



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 SHORELINE IMPROVEMENTS  
SCHEDULE C

PROJECT NO. 946523C

TABLE OF CONTENTS

Notice to Contractors .....	N-1
General Provisions .....	G-1
Special Provisions .....	S-1
Technical Specifications .....	TS-1
Proposal .....	P-1
Bidder's Project References .....	PR-1
Subcontractor List .....	SB-1
Contract .....	C-1
Performance Bond .....	B-1
Payment Bond .....	B-3
Certificate of Insurance .....	CI-1
Contractor's Affidavit .....	AF-1

CITY OF TEMPE, ARIZONA  
PUBLIC WORKS DEPARTMENT  
DIVISION OF ENGINEERING

NOTICE TO CONTRACTORS

**RIO SALADO TOWN LAKE SHORELINE IMPROVEMENTS SCHEDULE C**

**PROJECT NO. 946523C**

**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 10:00 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 will consist of installation of **20,120 CY OF SHORELINE CURB WALL, SEAT WALL, RETAINING WALLS, RAMPS, MARINAS, AND APPURTENANCES ON THE NORTH AND SOUTH SIDE OF THE SALT RIVER** 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.

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 five-hundred forty-six (546) calendar days thereafter. See construction sequencing schedule 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."**

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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 five-hundred forty-six (546) 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 C-G-3.

#### 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 well 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 Evaluator 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-C

SCHEDULE C - SHORELINE IMPROVEMENTS



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Tempe, Arizona  
November 1996

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Project No. 111253.09

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CONTENTS

	<u>Pages</u>
<u>SPECIFICATIONS</u>	
DIVISION 1 - GENERAL REQUIREMENTS	
01010	Summary of Work . . . . . 1- 2
01025	Measurement and Payment . . . . . 1- 5
01040	Coordination . . . . . 1- 9
01092	Abbreviations . . . . . 1- 4
01300	Submittals . . . . . 1- 8
	Supplement:
	Transmittal of Contractor's Submittal . . . . . 1- 1
01310	Progress Schedules . . . . . 1- 5
	Supplement:
	Exhibit A: RSTL Construction Coordination Schedule C . 1- 1
01500	Construction Facilities and Temporary Controls . . . . . 1- 11
01600	Material and Equipment . . . . . 1- 7
01640	Manufacturers' Services . . . . . 1- 2
01700	Contract Closeout . . . . . 1- 4
DIVISION 2 - SITE WORK	
02050	Demolition . . . . . 1- 2
02140	Diversion and Care of Water . . . . . 1- 5
02205	Excavation . . . . . 1- 3
02215	Subgrade Preparation . . . . . 1- 2
02220	Fill and Backfill . . . . . 1- 5
02236	Base Course . . . . . 1- 3
02272	Gabion Mattress Construction . . . . . 1- 4
DIVISION 3 - CONCRETE	
03100	Concrete Formwork . . . . . 1- 4
03210	Reinforcing Steel . . . . . 1- 4
03215	Doweling for Concrete and CSA . . . . . 1- 6
03251	Expansion, Construction, and Control Joints . . . . . 1- 3
03300	Cast-in-Place Concrete . . . . . 1- 19
03361	Shotcrete . . . . . 1- 7
03370	Concrete Curing . . . . . 1- 3
03400	Precast Concrete . . . . . 1- 6
03600	Grout . . . . . 1- 4
	Supplement:
	24-Hour Evaluation of Nonshrink Grout Test Form . . . . . 1- 4
DIVISION 4 - (NOT USED)	
DIVISION 5 - METALS	
05500	Metal Fabrications . . . . . 1- 6
DIVISION 6 - (NOT USED)	

DIVISION 7 - THERMAL AND MOISTURE PROTECTION  
07900 Joint Sealants . . . . . 1- 4

DIVISION 8 - (NOT USED)

DIVISION 9 - FINISHES  
09900 Painting . . . . . 1- 12

DIVISIONS 10 THROUGH 16 (NOT USED)

APPENDIX

DRAWINGS (BOUND SEPARATELY)

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. 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.
- H. 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 C):

- A. The completed Work covered by these Contract Documents will provide OWNER with the improvements to the Northshore and Southshore for the purpose of defining and enhancing the aesthetics of the Town Lake edge and controlling access to the Town Lake. The completed Work includes:
  - 1. Shoreline concrete slope protection and aesthetic enhancement.
  - 2. Concrete seat walls, curb walls, access ramps, stairs, boat tieups, boat beaches, and marinas.
  - 3. Continuous concrete safety ledge.
  - 4. Precast concrete wall caps, pilaster caps, and decorative spheres.

1.3 WORK NOT COVERED BY THESE CONTRACT DOCUMENTS

- A. Schedule A: Pipe and Well Systems.
- B. Schedule B: Dam Facilities.
- C. Schedule D: Cutoff Wall Construction.

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 in Bid List are Based on Profile Elevations: Existing ground profiles shown on Drawings were taken from a 1994 topographic map drawn with contour intervals of 1 foot with supplementary spot elevations to the nearest half foot.
- F. Payment quantities will be based on field measurements.
- G. Units of measure shown on the Bid Form shall be as follows unless specified otherwise.

<u>Item</u>	<u>Method of Measurement</u>
CY	Cubic Yard – Measured in-place volume
LS	Lump Sum – Unit is one; no measurement will be made

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 Specification sections 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 all work required for the diversion and care of water 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 RESIDENT ENGINEER's expressed written request, CONTRACTOR shall be compensated for such expense at CONTRACTOR's actual cost. CONTRACTOR shall provide all documentation requested by DESIGN 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, CSA Demolition: Includes all labor and equipment required for the removal and disposal of CSA material as shown on the Drawings and as directed by RESIDENT ENGINEER. Payment for the CSA demolition shall be paid on a cubic yard of CSA removed basis. Depth of CSA removal shall be as shown on the Drawings or that required to remove all unacceptable CSA material as directed by RESIDENT ENGINEER. Volume removed will be determined by length, width, and depth. Measurements will be made jointly by both CONTRACTOR and RESIDENT ENGINEER before and after CSA removal.

2. Item No. 3, Alluvium Overburden Removal: Includes all labor, materials, and equipment required for excavation, stockpile, backfill, and disposal of alluvium overburden. Payment for alluvium overburden removal shall be paid on a cubic yard of excavated alluvium by volume basis. Volume excavated shall be measured jointly by CONTRACTOR and RESIDENT ENGINEER.
3. Items Nos. 4, 5, and 6, Shoreline Curb Wall, Shoreline Seat Wall, and Shoreline Retaining Wall: Includes all labor, materials, equipment required for excavation, furnishing and placement of formwork, concrete, anchor dowels, reinforcing steel, concrete curing, precast concrete items, gabion removal and replacement, backfill, grouting, joint sealants, finishes, and all other miscellaneous items required for the complete structure shown. Payment for the shoreline curb wall, shoreline seat wall, and shoreline retaining wall shall be paid on a cubic yard of concrete placed by volume basis. Volume placed will be measured jointly by CONTRACTOR and RESIDENT ENGINEER.
4. Item Nos. 7, 8, 9, 10, 11, and 12, Boat Tie-up, Typical Marina, Marinas with Ramp, Boat Beach, Boat Launch Ramp, and Access Ramp Modifications: Includes all labor, equipment, and materials required for the excavation, formwork, concrete, anchor dowels, reinforcing steel, concrete curing, precast concrete items, guardrails, embedments, gabion removal and replacement, backfill, gravel surfacing, sandfill, grouting, joint sealants, finishes, and all other miscellaneous items required for the complete structure shown. Payment for the boat tie-up, typical marina, marina with ramp, boat beach, boat launch ramp, and access ramp modifications shall be paid on a cubic yard of concrete placed by volume basis. Volume placed will be measured jointly by CONTRACTOR and RESIDENT ENGINEER.

#### 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 public 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 make-up 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 performed by APS should be complete prior to award of this contract.
  - c. Work to be Performed by CONTRACTOR: Coordinate CONTRACTOR's Work with APS.
  - d. OWNER will be responsible for payment of direct charges of APS.
3. 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 representative(s) for the activities specified above.

D. Other Contractors:

1. Schedule A: Pipe and Well Systems (contractor unknown).
  - a. Storm drain systems.
  - b. Wells and associated piping.
  - c. Source water supply.
2. Schedule B: Dam Facilities (contractor unknown).
  - a. Upstream and downstream dam.
  - b. Upstream and downstream dam control buildings.
3. Schedule D: Cutoff Wall Construction (contractor unknown).
  - a. Northshore cutoff wall.
  - b. Southshore cutoff wall.
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 contractors, particularly at the following locations:
    - 1) Outfall of southbank interceptor is in immediate proximity to the downstream dam.
    - 2) Outfall of Dorsey Diversion and Recovery Well No. 6 are in immediate proximity to the upstream dam.
    - 3) Recovery wells, discharge piping, and recovery piping is in immediate proximity to both the northshore and southshore shoreline improvements.

- 4) Well No. 5 is in immediate proximity to upstream dam control building.
- 5) Existing storm drain outfall improvements or demolition along both the northshore and southshore are incorporated into the shoreline improvements.
- 6) At north and south dam abutment locations.

#### 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. 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) Test procedures.
    - 3) Operation and maintenance manuals.
    - 4) Record documents.
    - 5) Specifically required certificates, warranties.
  - 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. 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.

G. 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.

C. 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.

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

E. 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.

F. 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



**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 "C" work may be performed concurrently.

4. CSA Demolition/Removal is to proceed from west to east.

5. Shoreline construction is to proceed from east to west.

6. Schedule permits concurrent shoreline construction on each side of river.

Project Start	30DEC98		Early Bar
Project Finish	22JUN98		Progress Bar
Data Date	30DEC98		Critical Activity
Plot Date	06SEP98		

RSTL

Sheet 1 of 1

Parsons Brinckerhoff C. S.  
 Rio Salado Town Lake  
 Construction Coordination Schedule C

**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 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 D) 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 General 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 1.0, 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.
- B. Provide equipment and devices installed outdoors or in unheated enclosures capable of continuous operation within an ambient temperature range of 10 degrees F to 130 degrees F.

1.5 PREPARATION FOR SHIPMENT

- A. When practical, factory assemble products. Matchmark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with a strippable protective coating.
- B. 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.
- C. Spare Parts, Special Tools, Test Equipment, Expendables, and Maintenance Materials:
  - 1. Furnish as required by the Specifications prior to (i) starting functional testing as set forth in Section 01650, FACILITY STARTUP, or (ii) operation of the equipment by the OWNER, or (iii) 75 percent Project completion, whichever occurs first.
  - 2. Properly package to avoid damage, in original cartons insofar as possible. Replace parts damaged or otherwise inoperable.
  - 3. Firmly fix to, and prominently display on, each package.
    - a. Minimum 3-inch by 6-inch manila shipping tag with the following information printed clearly:
      - 1) Manufacturer's part description and number.
      - 2) Applicable equipment description.
      - 3) Quantity of parts in package.
      - 4) Equipment manufacturer.
      - 5) Applicable Specification section.
      - 6) Name of CONTRACTOR.
      - 7) Project name.
  - 4. Deliver materials to site.
  - 5. Notify RESIDENT ENGINEER.
- D. Protect equipment from exposure to the elements and keep thoroughly dry and dustfree at all times. Protect painted surfaces against impact, abrasion, discoloration, or other damage. Grease or oil all bearings and similar items.
- E. Request a minimum 7-day advance notice of shipment from manufacturers. Upon receipt of manufacturer's advance notice of shipment, promptly notify

RESIDENT ENGINEER of anticipated date and place of the arrival of recovery well pumps and motors.

- F. 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 electrical, instrumentation, and control products, and equipment with bearings in weathertight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulation against moisture, water, and dust damage. Connect and operate continuously all space heaters furnished in electrical equipment.
- D. Store fabricated products aboveground, on blocking or skids, and prevent soiling or staining. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter. Cover products that

are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

- E. Store finished products that are ready for installation in dry and well ventilated areas. Do not subject to extreme changes in temperature or humidity.
- F. 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 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 DESIGN ENGINEER and 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 review on the current accepted schedule is sufficient only 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 as specified herein, (iv) which are incomplete, or (v) which are uncertified, in which case CONTRACTOR shall provide the specified product.
- C. Submit seven copies of proposed substitute or "or-equal" item/method, to include all supporting data to allow 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, Article SHOP DRAWINGS AND SAMPLES, 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 DESIGN ENGINEER's evaluation and acceptance of CONTRACTOR's proposed substitute.
  - 2. Rejected:
    - a. One copy retained by DESIGN ENGINEER.
    - b. One copy retained by RESIDENT ENGINEER.

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

## 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.
- F. Equipment, Components, Systems, Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable OSHA, state, and local health and safety regulations.
- G. Safety Guards: Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal. Use 16-gauge or heavier; galvanized steel, aluminum coated steel, or galvanized or aluminum coated 1/2-inch mesh expanded steel. Provide galvanized steel accessories and supports, including bolts. For outdoors application, prevent entrance of rain and dripping water.
- H. Provide materials and equipment listed by UL wherever standards have been established by that agency.
- I. Equipment Finish:
  - 1. Provide manufacturer's standard finish and color, except where specific color is indicated.
  - 2. If manufacturer has no standard color, provide equipment with ANSI No. 61, light gray color.

- J. Special Tools and Accessories: Furnish to OWNER, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to, adequate oil and grease (as required for first lubrication of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts as required for maintenance.
- K. Lubricant: Provide initial lubricant recommended by equipment manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, startup, and operation until final acceptance by OWNER.

## 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. Design structural members for anticipated shock and vibratory loads.
4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
5. Modify standard products as necessary to meet performance Specifications.

### B. Lubrication System:

1. Require no more than weekly attention during continuous operation.
2. Convenient and accessible. Oil drains with bronze or stainless steel valves and fill plugs easily accessible from the normal operating area or platform. Locate drains to allow convenient collection of oil during oil changes without removing equipment from its installed position.
3. Provide constant-level oilers or oil level indicators for oil lubrication systems.
4. For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.

## 2.3 SOURCE QUALITY CONTROL

- A. Calibration Instruments: Bear the seal of a reputable laboratory certifying that instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- B. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

## 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.

### 3.2 INSTALLATION

- A. Equipment Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. No shimming between machined surfaces is allowed.
- C. Install Work in accordance with NECA Standard of Installation, unless otherwise specified.
- D. Repaint painted surfaces that are damaged prior to equipment acceptance.
- E. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions and as may be specified. Retain a copy of manufacturers' instruction at site, available for review at all times.
- F. For material and equipment specifically indicated or specified to be reused in the Work:
  - 1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
  - 2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such Work in the Contract Price.

### 3.3 FIELD FINISHING

- A. In accordance with Section 09900, PAINTING.

### 3.4 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

### 3.5 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by OWNER.

END OF SECTION

**SECTION 01640  
MANUFACTURERS' SERVICES**

**PART 1 GENERAL**

1.1 DEFINITIONS

- A. Person-Day: One person for 8 hours within regular CONTRACTOR working hours.

1.2 SUBMITTALS

- A. Quality Control Submittals: When specified in the individual Specifications, submit:
1. Qualifications of Manufacturer's Representative performing specified services.
  2. Manufacturer's Certificate of Proper Installation: On form appended to this section.

1.3 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

- A. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system. Additional qualifications may be specified elsewhere.
- B. Representative subject to acceptance by RESIDENT ENGINEER. No substitute representatives will be allowed unless prior written approval by RESIDENT ENGINEER has been given.

1.4 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

- A. Where manufacturers' services are specified, furnish manufacturer's qualified representative. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, additional time required to perform the specified services shall be considered incidental work.
- B. Schedule manufacturer's services to avoid conflicting with other onsite testing or other manufacturer's onsite services.
1. Determine that all conditions necessary to allow successful testing have been met before scheduling services.
- C. Only those days of service approved by ENGINEER will be credited to fulfill the specified minimum services.
- D. If specified, manufacturer's onsite services shall include as a minimum:
1. Assistance during product (system, subsystem, or component) installation to include observation, guidance, instruction of

CONTRACTOR's assembly, erection, installation or application procedures.

2. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish written approval of installation.
3. Revisiting the site as required to correct problems and until installation and operation are acceptable to RESIDENT ENGINEER.
4. Resolution of assembly or installation problems attributable to, or associated with, respective manufacturer's products and systems.
5. Completion of Manufacturer's Certificate of Proper Installation (form enclosed at end of this section) with applicable certificates for proper installation and initial, interim, and final test or service.
6. Additional requirements may be specified elsewhere.

**PART 2 PRODUCTS (Not Used)**

**PART 3 EXECUTION (Not Used)**

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 02050  
DEMOLITION**

**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Portions of structures and other areas scheduled for selective demolition, partial demolition, salvage, and remodeling work are as shown.

1.2 SUBMITTALS

- A. Quality Control Submittals:
  - 1. Schedule of demolition, as part of and consistent with the progress schedule specified in Section 01310, PROGRESS SCHEDULES.
  - 2. Methods of demolition and equipment proposed to demolish each structure and cement stabilized alluvium (CSA).
  - 3. Copies of any authorizations and permits required to perform Work.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

3.1 PREPARATION

- A. Utilities: Notify OWNER or appropriate utilities to turn off affected services before starting demolition.

3.2 DEMOLITION

- A. Drawings define minimum portion of chain link fence, gates, structures, and CSA to be removed. When approved by RESIDENT ENGINEER, rough cuts or breaks may be made exceeding limits of demolition shown.
- B. Cement Stabilized Alluvium (CSA) Demolition:
  - 1. RESIDENT ENGINEER will survey and set stakes for the North Shore and South Shore control lines.
  - 2. CONTRACTOR shall remove alluvium fill and loose CSA.
  - 3. RESIDENT ENGINEER and CONTRACTOR will review alignment and determine offset to true breakpoint of CSA slope.
  - 4. RESIDENT ENGINEER and CONTRACTOR will determine breakpoint of CSA excavation and approximate slope. Breakpoint and slope will be dependent upon the assessed condition of the CSA at that location.
  - 5. CONTRACTOR shall remove CSA as required to the depth of firm, dense CSA. Firm, dense CSA shall be defined as follows:
    - a. Uniform in appearance.
    - b. No loose particles.

- c. Minimum reading correlating to 1,000 psi compressive strength when tested by a Rebound Hammer in accordance with ASTM C805-85. Test at approximately 8 feet 0 inch on center each way.
  - d. Correlate Rebound Hammer test with one set of three concrete cylinders cored at 1,000-foot intervals along the shoreline in accordance with ASTM C42-90 and tested in accordance with ASTM C39-93.
6. Removal shall be a minimum of 4 inches into firm, dense CSA.
  7. Removal method shall not fracture, crack, or otherwise damage CSA that is to remain in place.
  8. Surface of firm, dense CSA shall be pressure washed to facilitate bonding with the new concrete. Pressure washing shall be at a minimum of 1,500 psi water pressure.
  9. Cuts at the boundaries on the CSA shall be sawed a minimum of 4 inches deep to create a uniform straight edge. Rough cut chipping may be used below sawcut depth.
  10. OWNER will resurvey and provide offset distances to locate lake face of shoreline walls, curbs, and other facilities for construction.
- C. Removal of existing gabion mattresses shall be as specified in Section 02272, GABION MATTRESS CONSTRUCTION.

### 3.3 DISPOSAL

- A. Dispose of cement stabilized alluvium, debris, and other nonsalvaged materials offsite in licensed landfills.

### 3.4 BACKFILLING

- A. Demolished Areas: Backfill to existing ground level or foundation level of new construction.
- B. Backfill Material and Compaction:
  1. Conform to Section 02220, FILL AND BACKFILL.
  2. Do not use demolition debris as backfill material.

### 3.5 SALVAGE

- A. Existing gates designated to be removed shall be delivered to the Flood Control District, County of Maricopa storage yard for reuse.
- B. Other equipment and materials, including piping within the limits of demolition, unless otherwise specified, will become the property of the CONTRACTOR.

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 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 plan shall also include CONTRACTOR's method for removing equipment and materials from the river channel. 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 the 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.

1.3 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 and state 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 damage, 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 placed and facilities repaired and suitably prepared to receive the next 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 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.
- 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 downstream of the construction site caused by failure of any part of the diversion or protective work. CONTRACTOR shall inspect, monitor, and repair 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, structural excavations, trenches, foundation excavation, and other areas as necessary to permit satisfactory construction at all times. Where an 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. CONTRACTOR will also be required to control seepage along the bottom of the excavation, which may require pipe drains leading to sumps from which the water shall be pumped. Such pipe drains shall be of uniform diameter for each run, shall be provided with grout connections and returns at 50-foot intervals, and shall be embedded in reasonably well-graded gravel.
  2. During the placing and compacting of the fill material, the water level at every point in the excavation shall be maintained below the bottom of the excavation until the compacted material in the foundation excavation has reached a depth of 10 feet, after which the water level shall be maintained at least 10 feet below the top of the compacted embankment. When the fill has been constructed to an elevation above the stabilized water level without pumping, the pipe drains and sumps, including surrounding gravel, shall be completely filled with grout composed of water, cement, and 5 percent bentonite. The grout mix shall be acceptable to RESIDENT ENGINEER. In no case shall a water cement ratio greater than 0.75 be used.

END OF SECTION

**SECTION 02205  
EXCAVATION**

**PART 1 GENERAL**

1.1 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.

1.2 QUALITY ASSURANCE

- A. Provide adequate survey control to avoid unauthorized overexcavation.

1.3 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.

1.4 SEQUENCING AND SCHEDULING

- A. Demolition: Complete applicable Work specified in Section 02050, DEMOLITION, prior to excavating.
- B. 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. Excavation is unclassified. Complete all excavation regardless of type, nature, or condition of materials encountered. Make own estimate of the kind and extent of various materials to be excavated in order to accomplish the Work.
- B. 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 forms, working space, granular base, topsoil, and similar items, wherever applicable. Trim to neat lines where concrete is to be deposited against earth.

- C. Do not overexcavate without written authorization of RESIDENT ENGINEER.
- D. Remove or protect obstructions as shown and as specified in Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS, Article PROTECTION OF WORK AND PROPERTY.
- E. For excavation of cement stabilization alluvium, see Section 02050, DEMOLITION.

### 3.2 EMBANKMENT AND CUT SLOPES

- A. Shape, trim, and finish cut slopes to conform with lines, grades, and cross-sections shown, with proper allowance for topsoil or slope protection, where shown.
- B. Remove stones and rock that exceed 3 inch in diameter and that are loose and may roll down slope. Remove exposed roots from cut slopes.
- C. Round tops of cut slopes in soil to not less than a 6-foot radius, provided such rounding does not extend offsite or outside easements and right-of-ways, or adversely impacts existing facilities, adjacent property, or completed Work.

### 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 debris or unsuitable material resulting from removal of underground facilities as specified in Section 02050, DEMOLITION, for demolition debris.

3.5 CEMENT STABILIZED ALLUVIUM (CSA)

A. Demolish and remove CSA as specified in Section 02050, DEMOLITION.

END OF SECTION

**SECTION 02215  
SUBGRADE PREPARATION**

**PART 1 GENERAL**

1.1 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.

1.2 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 and uniformly compact surface.
- 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 next course is placed.

3.2 COMPACTION

- A. Under Earthfill: Compact the upper 6 inches to minimum of 95 percent relative compaction as determined in accordance with ASTM D698.
- B. Under Granular Fill: Compact the upper 6 inches to minimum of 95 percent relative compaction as determined in accordance with ASTM D698.

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, scalping of sod, stripping of topsoil, 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. 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.
- G. Influence Area: Area within planes sloped downward and outward at 60-degree angle from horizontal measured from:
  - 1. 1 foot outside outermost edge at base of foundations or slabs.
  - 2. 1 foot outside outermost edge at surface of roadways or shoulder.
  - 3. 0.5 foot outside exterior at spring line of pipes or culverts.
- H. Borrow Material: Material from required excavations.

- 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. Structural Fill: Fill materials as required under structures, pavements, and other facilities.
- L. Embankment Material: Fill materials required to raise existing grade in areas other than under structures.
- M. 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.

1.3 QUALITY ASSURANCE

- A. Notify RESIDENT ENGINEER when:
  - 1. Structure is ready for backfilling, and whenever backfilling operations are resumed after a period of inactivity.
  - 2. Soft or loose subgrade materials are encountered wherever embankment or 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 Sections 02050, DEMOLITION; 02205, EXCAVATION; and 02215, SUBGRADE PREPARATION, prior to placing fill or backfill.
- B. Backfill against concrete structures only after concrete has attained compressive strength, specified in Section 03300, CAST-IN-PLACE CONCRETE. Obtain RESIDENT ENGINEER's acceptance of concrete work and attained strength prior to placing backfill.
- C. Do not place granular base, subbase, or surfacing 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 or produced processed material.

2. During production of imported or processed material, test as follows:
  - a. Granular Fill: One per 50 cubic yards, minimum of two.
- B. Samples: Collected in accordance with ASTM D75:
  1. During production of imported or processed material, provide Samples as follows:
    - a. Granular Fill: One per 50 cubic yards, minimum of two.
    - b. Earth Fill: One per 100 cubic yards, minimum of two.
  2. Clearly mark to show source of material and intended use.

## 2.2 GRANULAR FILL

- A. Processed select backfill or imported material meeting the following requirements: 1-1/2-inch minus crushed gravel or crushed rock.
- B. Free from dirt, clay balls, trash, debris, roots, and organic material.
- C. 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 EARTHFILL

- A. Selected fill excavated from required excavations, free from rocks larger than 3 inches, from roots and other organic matter, ashes, cinders, trash, debris, and other deleterious materials.
- B. Provide imported material of equivalent quality, if required to accomplish Work.

## 2.4 WATER FOR MOISTURE CONDITIONING

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

## 2.5 GRAVEL SURFACING ROCK

- A. As specified in Section 02236, BASE COURSE.

## 2.6 BOAT BEACH SAND FILL

- A. Well graded, 3/8-inch minus, clean, fill sand, ASTM C33-90.

## 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 BACKFILL UNDER AND AROUND STRUCTURES

- A. Under Facilities: Within influence area beneath structures, slabs, pavements, gravel surfacing, curbs, piping, conduits, duct banks, and other facilities, backfill with granular fill, unless otherwise shown. Place granular fill in lifts of 8-inch maximum thickness and compact each lift to minimum of 95 percent relative compaction.

### 3.3 FILL

- A. Outside Influence Areas Beneath Structures, Tanks, Pavements, Gravel Surfacing, Curbs, Slabs, Piping, and Other Facilities: Unless otherwise shown, place granular fill as follows:
  - 1. Allow for 6-inch thickness of topsoil where required.
  - 2. Maximum 8-inch thick lifts.
  - 3. Place and compact fill across full width of embankment.
  - 4. Compact to minimum 90 percent relative compaction.
  - 5. Dress completed embankment with allowance for topsoil, crest surfacing, and slope protection, where applicable.

### 3.4 BOAT BEACH SAND FILL

- A. Place and spread sand fill to uniformly sloping grade shown.

### 3.5 SITE TESTING

- A. Gradation:
  - 1. One sample from each 1,500 tons of finished product or more often as determined by RESIDENT ENGINEER, if variation in gradation is occurring, or if material appears to depart from Specifications.

2. If test results indicate material does not meet Specification requirements, terminate material placement until corrective measures are taken.
3. Remove material placed in Work that does not meet Specification requirements.

B. In-Place Density Tests: In accordance with ASTM D1556 or D2167. During placement of materials, test as follows:

1. Granular Fill: One per 25 cubic yards, minimum of one per lift.
2. Base Course Rock: As specified in Section 02236, BASE COURSE.

### 3.6 GRANULAR BASE, SUBBASE, AND SURFACING

A. Place and Compact as specified in Section 02236, BASE COURSE.

### 3.7 REPLACING OVEREXCAVATED MATERIAL

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

1. Beneath Footings: Granular fill, concrete fill, Concrete of strength equal to that of respective footing, as specified in Section 03300, CAST-IN-PLACE CONCRETE.
2. Beneath Fill or Backfill: Same material as specified for overlying fill or backfill.
3. Beneath Slabs-On-Grade: Granular fill.

### 3.8 ACCESS ROAD SURFACING

A. Place and compact as specified in Section 02236, BASE COURSE.

END OF SECTION

**SECTION 02236  
BASE COURSE**

**PART 1 GENERAL**

1.1 DEFINITIONS

- A. Completed Course: Compacted, unyielding, free from irregularities, with smooth, tight, even surface, true to grade, line, and cross-section.
- B. Completed Lift: Compacted with uniform surface reasonably true to cross-section.
- C. Standard Specifications: Uniform Standard Specifications for Public Works Construction, Maricopa Association of Governments.

1.2 SUBMITTALS

- A. Samples: Submit for specified materials 20 days prior to delivery to site.
- B. Quality Control Submittals:
  - 1. Certified Test Results on Source Materials: Submit copies from commercial testing laboratory 20 days prior to delivery of materials to project.

**PART 2 PRODUCTS**

2.1 BASE COURSE ROCK

- A. As specified for crushed aggregate, aggregate base, in Section 702 of the Standard Specifications.

2.2 GRAVEL SURFACING ROCK

- A. As specified in Section 702, of the Standard Specifications.
- B. Clean, tough, uniform quality, durable fragments of crushed rock, free from flat, elongated, soft or disintegrated pieces, or other objectionable matter occurring either free or as coating on stone.
- C. Physical Qualities: Same as for base course.

2.3 SOURCE QUALITY CONTROL

- A. CONTRACTOR: Perform tests necessary to locate acceptable source of materials meeting specified requirements.
- B. Final approval of aggregate material will be based on materials' test results on installed materials.

- C. Should separation of coarse from fine materials occur during processing or stockpiling, immediately change methods of handling materials to correct uniformity in grading.

### **PART 3 EXECUTION**

#### **3.1 SUBGRADE PREPARATION**

- A. As specified in Section 02215, SUBGRADE PREPARATION.
- B. Obtain RESIDENT ENGINEER's acceptance of subgrade before placement of base course rock.

#### **3.2 EQUIPMENT**

- A. Compaction Equipment: Adequate in design and number to provide compaction and obtain the specified density for each layer.

#### **3.3 HAULING AND SPREADING**

##### **A. Hauling Materials:**

1. Do not haul over surfacing in process of construction.
2. Loads: Of uniform capacity.
3. Measure capacity of truck to determine vehicle load and quantity.
4. Maintain consistent gradation of material delivered; loads of widely varying gradations will be cause for rejection.

##### **B. Spreading Materials:**

1. Distribute material to provide required density, depth, grade and dimensions with allowance for subsequent lifts.
2. Produce even distribution of material upon roadway without segregation.
3. Should segregation of coarse from fine materials occur during placing, immediately change methods of handling materials to correct uniformity in grading.

#### **3.4 CONSTRUCTION OF COURSES**

- A. General: Complete each lift in advance of laying succeeding lift to provide required results and adequate inspection.

##### **B. Base Course:**

1. Maximum Completed Lift Thickness: 6 inches.
2. Completed Course Total Thickness: As shown.
3. Spread lift on preceding course to required cross-section.
4. Lightly blade and roll surface until thoroughly compacted.

5. Add keystone to achieve compaction and as required when aggregate does not compact readily due to lack of fines or natural cementing properties, as follows:
  - a. Use leveling course or surfacing material as keystone.
  - b. Spread evenly on top of crushed base course, using spreader boxes or chip spreaders.
  - c. Roll surface until keystone is worked into interstices of crushed base course without excessive displacement.
  - d. Continue operation until course has become thoroughly keyed, compacted, and will not creep or move under roller.
6. Blade or broom surface to maintain true line, grade, and cross-section.

C. Gravel Surfacing:

1. Maximum Completed Lift Thickness: 6 inches.
2. Completed Course Total Thickness: As shown.
3. Spread on preceding course in accordance with cross-section shown.
4. Blade lightly and roll surface until material is thoroughly compacted.

3.5 ROLLING AND COMPACTION

- A. Rolling and Compaction: In accordance with Section 601.4, of the Standard Specifications.

3.6 SURFACE TOLERANCES

- A. Finished Surface of Base Course: Within plus or minus 0.04 foot of grade shown at any individual point.

3.7 FIELD QUALITY CONTROL

A. In-Place Density Tests:

1. Construct base course so areas shall be ready for testing.
2. Show proof that areas meet specified requirements before requesting that RESIDENT ENGINEER identify density test locations.
3. Perform a minimum of one test on completed course per location in accordance with AASHTO T 191-86, T 205-86, or T 238-86 at locations acceptable to RESIDENT ENGINEER.

3.8 CLEANING

- A. Remove excess material; clean stockpile areas of aggregate.

END OF SECTION

**SECTION 02272  
GABION MATTRESS CONSTRUCTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Work necessary for the removal and replacement of gabion mattress and buttress construction, complete.

**PART 2 PRODUCTS**

**2.1 GABIONS**

- A. New heavy-duty wire mesh galvanized gabions as manufactured by Maccaferri Gabions, Inc., New York, NY, or equivalent. Sizes shall be as shown on the Drawings.
- B. Reuse of removed gabions will not be allowed.

**2.2 BINDING WIRE**

- A. U.S. 13-1/2-gauge galvanized wire or as recommended by the manufacturer.

**2.3 GABION FILL MATERIAL**

- A. Clean, hard cobbles or crushed rock; 12-inch maximum particle size, 4-inch minimum particle size. Average stone size is 6 inches.

**2.4 EARTH BACKFILL**

- A. Material from the excavations free from roots, debris, organic material, or other deleterious materials as specified in Section 02200, FILL AND BACKFILL.

**2.5 UNCLASSIFIED EXCAVATION**

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

**2.6 GEOTEXTILE**

- A. Nonwoven, pervious sheet as shown to match existing product. Fibers of the fabric shall be constructed into a stable network that retain their relative position with respect to each other.

### **PART 3 EXECUTION**

#### **3.1 STRUCTURAL EXCAVATION**

- A. Perform all excavation, regardless of the type, nature, or condition of the material encountered. The method of excavation used is optional; however, no equipment shall be operated within 5 feet of existing structures or newly completed construction.
- B. Excavation that cannot be accomplished without endangering existing or new structures shall be done with hand tools.

#### **3.2 LIMITS OF EXCAVATION**

- A. Excavate to the depths and widths required to accomplish the construction. Cuts belowgrade shall be corrected by replacing with compacted earth backfill, compacted to a minimum of 90 percent relative compaction. CONTRACTOR shall bear all costs for correcting overexcavated areas.

#### **3.3 GABION REMOVAL**

- A. Protect existing gabions from damage from equipment and materials at all times during removal and installation.
- B. Remove existing gabion mattresses and buttresses where required to complete the elements of Work.
- C. Remove top of gabion mattress by cutting tie wire at side or end of basket or by securing remaining top to internal divider or diaphragm and cutting away top to be removed. Secure top to dividers or diaphragms with tie wire in accordance with manufacturer's requirements.
- D. Remove stone fill from mattresses and buttresses in a manner that will not damage the adjacent gabions or structures. Stone fill should be protected from contamination with other material so it can be reused in the replaced gabions.
- E. Remove the remaining gabion mattress and basket at an end or side or secure and remove at a divider or diaphragm in accordance with manufacturer's requirement.
- F. Cut and remove geotextile beneath gabions leaving 1.5 feet of material for overlap during gabion replacement.

#### **3.4 GABION ASSEMBLY**

- A. Place the first layer of gabion to the line and grades shown on the Drawings. Gabion edges shall be continuously wired together, using binding wire specified hereinbefore. Adjoining gabions shall be wired together along their vertical edges. Empty gabions shall be stretched and held in place while filling as recommended by the manufacturer. Empty gabions stacked on filled gabions shall be wired to the filled gabions at the front and back.

### 3.5 GABION CONSTRUCTION

- A. Place gabion fill in layers not thicker than 1 foot. Along all exposed gabion faces, place the outer layer of stone by hand in order to provide a neat, compact, square surface. In addition to the gabion fill, within 1 foot from the exposed face, the rock interstitial voids shall be filled with topsoil to permit establishing a vegetative cover. After each 1-foot lift is completed, one binding wire connecting tie shall be placed in each direction, across the fill surface, connecting opposite faces. The connecting wire shall be looped at least twice around two nonadjacent meshes of the gabion wall, then the free end wrapped back around the standing end of the wire to form a snug connection. At no time allow any gabion to be filled to a depth of more than 1 foot above the adjoining gabions. After the gabion is filled to the top and leveled off, fold the lid shut and wire it to the ends, sides, and diaphragms using binding wire.

### 3.6 GEOTEXTILE

- A. Surface Preparation: Remove or compact all materials on surface to receive geotextile. Roll surface with smooth roller to remove all undulations exceeding 1 inch. Obtain RESIDENT ENGINEER's approval of prepared surface.
- B. Laying Geotextile: Lay and maintain geotextile smooth and free of tension, folds, wrinkles, or creases.
- C. Sheet Orientation on Slopes: Orient geotextile with long dimension of each sheet parallel to direction of slope (up and down slope) extending across the top of the embankment below the aggregate base course.
- D. Joints: Overlap a minimum of 1.5 feet, unless otherwise shown.
- E. Securing Geotextile: Secure geotextile during installation as necessary with sand bags, or other means approved by RESIDENT ENGINEER.
- F. Placing Products Over Geotextile:
  - 1. Before placing material over geotextile, notify RESIDENT ENGINEER. Do not cover installed geotextile until after RESIDENT ENGINEER provides authorization to proceed.
  - 2. If tears, punctures, or other geotextile damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged geotextile. Repair damage as specified in Article REPAIRING GEOTEXTILE.
- G. Repairing Geotextile: Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged geotextile. Repair damaged geotextile by placing patch of undamaged geotextile over damaged area and at least 18 inches in all directions beyond damaged area. Remove interfering material as necessary to expose damaged geotextile for repair. Sew patches or secure them with pins and washers, as specified above in Article SECURING GEOTEXTILE, or by other means approved by RESIDENT ENGINEER.

3.7 SHORING, SHEETING, AND BRACING

- A. Furnish and install all shoring, sheeting, and bracing required to support adjacent earth banks and structures, and for the protection and safety of all personnel working in the excavations. All shoring, sheeting, and bracing shall conform to the requirements of the state or local agencies having jurisdiction over such matters.
- B. Remove shoring, sheeting, and bracing in a manner that will protect or prevent caving of banks or damage to property as the excavations are backfilled.

3.8 EARTH BACKFILL

- A. Remove all form materials and trash from the excavation prior to placing any backfill. Place earth backfill in all areas not designated on Drawings to be backfilled with other materials. Deposit material in horizontal layers and compact each lift to a minimum of 95 percent of relative compaction as determined by ASTM D698. Backfill to the specified grade.

3.9 TOLERANCE

- A. The following tolerances shall be maintained for the gabion wall construction:
  - 1. Horizontal alignment plus or minus 4 inches, not to exceed 2 inches in any 5-foot length.
  - 2. Slope face tilt not to deviate by more than 1 inch per foot when measured at the top and bottom gabion edges.

END OF SECTION

**SECTION 03100  
CONCRETE FORMWORK**

**PART 1 GENERAL**

1.1 SUBMITTALS

A. Shop Drawings:

1. Layout of panel joints, tie hole pattern, and recesses.
2. Form Ties – Tapered Through-Bolts: Proposed method of sealing form tie hole; coordinate with details shown.

B. Samples: One each as follows:

1. Form ties.

C. Quality Control Submittals:

1. Statements of qualification for formwork designer.
2. Manufacturer's Certificate of Proper Installation in accordance with Section 01640, MANUFACTURERS' SERVICES.

1.2 QUALITY ASSURANCE

- A. Qualifications: Formwork, falsework, and shoring designs prepared by an engineer licensed in the state of Project.

**PART 2 PRODUCTS (Not Used)**

**PART 3 EXECUTION**

3.1 SYSTEM DESIGN REQUIREMENTS

- A. Design formwork in accordance with ACI 347-89 and ACI 318-89 to provide the concrete finishes specified on the Drawings and in Section 03300, CAST-IN-PLACE CONCRETE.
- B. Make joints in forms watertight.
- C. Limit panel deflection to 1/360 of each component span to achieve tolerances specified.

3.2 FORM MATERIALS

A. Wall Forms and Underside of Slabs and Beams:

1. Materials: Plywood, hard plastic finished plywood, overlaid waterproof particle board, or steel in "new and undamaged" condition, of sufficient strength and surface smoothness to produce specified finish.

2. Curved Structures:
  - a. Forms conform to curvature of shoreline.
  - b. Straight segment form panels may be substituted for curved forms provided they do not exceed 4-feet in horizontal length and vertical joints align with precast concrete cap joints.
- B. Column Forms:
  1. Rectangular Columns and Pilasters: As specified for walls.
- C. All Other Forms: Materials as specified for wall forms.
- D. Form Sealer:
  1. Material: Surface sealer will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces when applied to most forms. A ready-to-use water based material formulated to reduce or eliminate surface imperfections, containing no mineral oil or organic solvents. Environmentally safe, meeting local, state, and federal regulations.
  2. Manufacturer and Product: Master Builders, Inc.; Rheofinish.
- E. Rustication Grooves and Beveled Edge Corner Strips: Nonabsorbent material, compatible with form surface, fully sealed on all sides prohibiting loss of paste or water between the two surfaces.
- F. Form Ties:
  1. Material: Steel.
  2. Spreader Inserts:
    - a. Conical or spherical type.
    - b. Design to maintain positive contact with forming material.
    - c. Furnish units that will leave no metal closer than 1 inch to concrete surface when forms, inserts, and tie ends are removed.
  3. Wire ties not permitted.
  4. Flat bar ties for panel forms, furnish plastic or rubber inserts with minimum 1-inch depth and sufficient dimensions to permit patching of tie hole.
  5. Water Stop Ties: For shoreline retaining walls, seat walls, and curb walls, furnish one of the following:
    - a. Integral steel water stop 0.103-inch thick and 0.625 inch in diameter tightly and continuously welded to tie.
    - b. Neoprene water stop 3/16-inch thick and 15/16 inch in diameter whose center hole is 1/2 diameter of tie, or a molded plastic water stop of comparable size.
    - c. Water Stop: Oriented perpendicular to tie and symmetrical about center of tie.
    - d. Design ties to prevent rotation or disturbance of center portion of tie during removal of ends and to prevent water leaking along tie.
  6. Through-Bolts: Tapered minimum 1-inch diameter at smallest end.

7. Elastic Vinyl Plug: Design and size of plug to allow insertion with tool to enable plug to elongate and return to original length, and diameter upon removal forming a watertight seal.
  - a. Manufacturer and Product: Dayton Superior Co., Miamisburg, OH; Dayton Sure Plug.

### 3.3 ERECTION

- A. General: Unless specified otherwise, follow the applicable recommendations of ACI 347-89.
- B. Beveled Edges (Chamfer):
  1. Form 3/4-inch bevels at concrete edges, unless otherwise shown.
  2. Where beveled edges on existing adjacent structures are other than 3/4 inch, obtain RESIDENT ENGINEER's approval of size prior to placement of beveled edge.
- C. Wall Forms:
  1. Do not reuse forms with damaged surfaces.
  2. Lay out form joints and ties in uniform pattern. All forms shall be in regular pattern with all joints and seams in line; all tie holes lined up; use single type of tie where exposed to view.
  3. Inspect form surfaces prior to installation to assure conformance with specified tolerances.
- D. Forms for Curbs, Sidewalks, and Driveways:
  1. Provide standard steel or wood forms to prevent movement.
  2. Set forms to true lines and grades, and securely stake in position.
- E. Form Tolerances: Provide forms in accordance with ACI 347-89 and ACI 318-89 and the following tolerances for finishes specified:
  1. Wall Tolerances:
    - a. Straight Vertical or Horizontal Wall Surface: Flat planes within tolerance specified.
    - b. Plumb within 1/4 inch in 10 feet or within 1/2 inch from top to bottom for walls over 40 feet high.
      - 1) Depressions in Wall Surface: Maximum 5/16 inch when 10-foot straightedge is placed on high points in all directions.
    - c. Thicknesses: Maximum 1/4-inch minus or 1/2-inch plus from dimensions shown.
  2. Slab Tolerances:
    - a. Exposed Slab Surfaces: Comprise of flat planes as required within tolerances specified.
    - b. Slab Finish Tolerances and Slope Tolerances: Crowns on slab surface not too high as to prevent 10-foot straightedge from resting on end blocks, nor low spots that allow a block of twice the tolerance in thickness to pass under the supported 10-foot straightedge.

- c. Slab steel gauge block 1/8-inch thick.
  - d. Finish Slab Elevation: Slope slabs to drain.
  - e. Thickness: Maximum 1/4-inch minus or 1/2-inch plus from thickness shown, except where thickness tolerance will not affect slope, drainage, or slab elevation.
3. Beams, Pilasters, and Columns Tolerances:
- a. Exposed Straight Horizontal and Vertical Surfaces: Flat planes within tolerances specified.
  - b. Beam:
    - 1) Physical Dimensions: Maximum 1/4-inch minus or 1/2-inch plus from dimension shown.
    - 2) Elevations: Within 1/2-inch plus or minus except where tops of beams become part of finished slab. In this case refer to slab tolerances.
  - c. Pilasters and Column:
    - 1) Physical Dimensions: Maximum 1/4-inch minus or 1/2-inch plus from dimension shown.
    - 2) Plumb within 1/4 inch in 10 feet in all directions with maximum 1/2-inch out-of-plumb at top with respect to bottom.

### 3.4 FORM SURFACE PREPARATION

- A. Thoroughly clean form surfaces in contact with concrete or previous concrete, dirt, and other surface contaminants prior to coating surface.
- B. Exposed Wood Forms in Contact with Concrete: Apply form sealer as recommended by the sealer material manufacturer.
- C. Steel Forms: Apply form sealer to steel forms as soon as they are cleaned to prevent discoloration of concrete from rust.

### 3.5 FORM REMOVAL

- A. Formwork not supporting weight of concrete, (i.e., sides of beams, walls, pilasters, columns, and similar parts of the Work) may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
- B. Leave forms and shoring for elevated structural slabs or beams in place, in accordance with ACI 318-89, Chapter 6, and until concrete has reached compressive strength equal to 80 percent of the specified 28-day compressive strength as determined by test cylinders.

END OF SECTION

**SECTION 03210  
REINFORCING STEEL**

**PART 1 GENERAL**

1.1 SUBMITTALS

A. Shop Drawings:

1. Prepare in accordance with CRSI 1990 Manual of Standard Practice and ACI SP-66 Detailing Manual:
  - a. Bending lists.
  - b. Placing drawings.
2. Welded splice and mechanical threaded splice.

B. Quality Control Submittals:

1. Lab test reports for reinforcing steel showing stress-strain curves and ultimate strengths.
2. Mechanical Threaded Connections:
  - a. Current International Conference of Building Officials (ICBO) Research Report or equivalent code agency report listing findings to include acceptance, special inspection requirements, and restrictions.
  - b. Manufacturer's instructions.
  - c. Verification that device threads have been checked and meet all requirements for thread quality, in accordance with manufacturer's published methods.
3. Welding Qualification: Prior to welding, submit welder qualifications and radiographic nondestructive testing procedures.
4. Test results of field testing.

1.2 QUALITY ASSURANCE

- A. Welder Qualifications: Certified in accordance with AWS D1.4-79.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Unload, store, and handle bars in accordance with CRSI publication "Placing Reinforcing Bars."

**PART 2 PRODUCTS**

2.1 MATERIALS

A. Deformed Billet-Steel Reinforcing Bars:

1. Includes stirrups, ties, and spirals.
2. ASTM A615-90, Grade 60, including Supplemental Requirements S1 where welding is not required.

3. ASTM A706/A706M-90, Grade 60, including Supplemental Requirements for reinforcing to be welded.

B. Splices and Mechanical Connections:

1. Mechanical Threaded Connections: Furnish metal coupling sleeve for splicing reinforcing in secondary members or in areas of low stress with internal threads engaging threaded ends of bars developing in tension or compression 125 percent of yield strength of bar.
  - a. Manufacturers and Products:
    - 1) Erico Products, Inc., Cleveland, OH; Lenton Reinforcing Steel Couplers.
    - 2) Richmond Screw Anchor Co., Inc., Fort Worth, TX; Richmond DB-SAE Dowel Bar Splicers.

C. Welded Wire Fabric:

1. ASTM A185-90a or A497-90b and ACI 318/318R-89, using ASTM A82-90a wire of 75 ksi minimum tensile strength.
2. Furnish flat sheets only, rolled sheets not permitted.

## 2.2 ACCESSORIES

A. Tie Wire:

1. Black, soft-annealed 16-gauge wire.
2. Nylon-, epoxy-, or plastic-coated wire.

B. Bar Supports and Spacers:

1. Precast concrete bar supports, cementitious fiber-reinforced bar supports, or all-plastic bar supports and side form spacers meeting the requirements of CRSI Manual of Standard Practice. Do not use other types of supports or spacers.
2. In Beams, Columns, Walls, and Slabs Exposed to View After Stripping: Small rectangular concrete blocks made up of same color and strength as concrete being placed around them or all-plastic bar supports and side form spacers.
3. Precast concrete supports of same strength as concrete for reinforcing in concrete placed on grade.

## 2.3 FABRICATION

- A. Follow CRSI Manual of Standard Practice.
- B. Bend all bars cold.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Notify RESIDENT ENGINEER when reinforcing is ready for inspection and allow sufficient time for inspection prior to placing concrete.

- B. Clean metal reinforcement of loose mill scale, oil, earth, and other contaminants.
- C. Coat wire projecting from precast concrete bar supports with dielectric material, epoxy, or plastic.

### 3.2 REINFORCING BAR INSTALLATION

- A. Bundle or space bars, instead of bending where construction access through reinforcing is necessary.
- B. Spacing and Positioning: Conform to ACI 318/318R-89.
- C. Location Tolerances: In accordance with CRSI publication, "Placing Reinforcing Bars".
- D. Splicing:
  - 1. Follow ACI 318/318R-89.
  - 2. Use lap splices unless otherwise shown or permitted in writing by DESIGN ENGINEER.
  - 3. Welded Splices: Accomplish by full penetration groove welds and develop at least 125 percent of yield strength of bar.
  - 4. Stagger splices in adjacent bars.
- E. Mechanical Splices and Connections:
  - 1. Use only in areas specifically approved in writing by the RESIDENT ENGINEER.
  - 2. Install as required by manufacturer with threads tightened and in accordance with ICBO Research Report.
  - 3. Maintain minimum edge distance and concrete cover.
- F. Tying Deformed Reinforcing Bars:
  - 1. Tie every other intersection on mats made up of Nos. 3, 4, 5, and 6 bars to hold them firmly at required spacing.
  - 2. Bend all noncoated tie wire to prevent tie wire from being closer than 1 inch from the surface of concrete.
- G. Welding Reinforcement:
  - 1. Only A706/A706M-90 bars may be welded.
  - 2. Do not perform welding until welder qualifications are approved.
- H. Straightening and Rebending: Field bending of reinforcing steel bars is not permitted.
- I. Unless permitted by DESIGN ENGINEER, do not cut reinforcing bars in the field.

### 3.3 WELDED WIRE FABRIC INSTALLATION

- A. Use only where shown.
- B. Extend fabric to within 2 inches of edges of slab, and lap splices at least 1-1/2 courses of fabric or minimum 8 inches.
- C. Tie laps and splices securely at ends and at least every 24 inches with tie wire.
- D. Place welded wire fabric on concrete blocks at correct distance as shown, above bottom of slab and rigidly support equal to that provided for reinforced bars. Do not use broken concrete, brick, or stone.
- E. Follow ACI 318/318R-89 and current Manual of Standard Practice, Welded Wire Fabric.
- F. Do not use fabric that has been rolled. Install flat sheets only.

### 3.4 TESTS AND INSPECTION

- A. Test all welds using radiographic, nondestructive testing procedures referenced in AWS D1.4-79.
- B. Inspect each splice and verify each component is in accordance with manufacturer's instructions and ICBO Research Report.

END OF SECTION

**SECTION 03215  
DOWELING FOR CONCRETE  
AND CSA**

**PART 1 GENERAL**

1.1 DEFINITIONS

- A. ICBO Reports: Published by ICBO for concrete anchor manufacturers.
- B. Special Inspection: As governed by the ICBO UBC-94.

1.2 SUBMITTALS

- A. Shop Drawings: Technical data for epoxy adhesive, vinyl ester adhesives, grouts, and bonding agents.
  - 1. Mixed Adhesive: Current test data indicating cured adhesive meets or exceeds design loads required.
- B. Samples: Two random Samples of each batch of products delivered to site, for independent testing.
- C. Quality Control Submittals:
  - 1. Manufacturer's specific instructions for preparation, placement, drilling of holes, installation of anchors and epoxy or vinyl ester, and handling of cartridges, nozzles, and equipment.
  - 2. Manufacturer's qualifications, to include client name, address, contact person, phone number, project location, and description of work.
  - 3. Manufacturer's Certificate of Proper Installation.
  - 4. Manufacturer's written letter of certification identifying installer's qualifications to install products.
  - 5. Doweling system manufacturer's ICBO Reports.
  - 6. Calibration data for pullout test load measurement system.
  - 7. Pullout test results.
  - 8. Copy of manufacturer's operation and repair manuals for each type of equipment delivered to site.

1.3 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Manufacturer: At least three similar projects with same products within the last 3 years.
  - 2. Installer: Trained and certified by manufacturer.

## 1.4 DELIVERY, STORAGE, AND HANDLING

### A. Epoxy Components:

1. Store epoxy components on pallets or shelving in a covered storage area.
2. Control temperature above 60 degrees F and dispose of product if shelf life has expired.
3. Dispose of product if stored at other than manufacturer's instructions.
4. Container Markings: Include manufacturer's name, product name, batch number, mix ratio by volume, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.

### B. Vinyl Ester Products:

1. Store components on pallets or shelving in a covered storage area with locking door.
2. Control temperature within 41 to 77 degrees F and dispose of product if shelf life has expired.
3. Dispose of product if stored at other than manufacturer's instructions.
4. Container Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.

## PART 2 PRODUCTS

### 2.1 EPOXY ADHESIVES

#### A. General:

1. Meet ASTM C881-90, Type 1, Grade 3, Class A, B, or C, depending on site conditions.
2. Two-component, 100 percent solids, nonsag, paste, insensitive to moisture, designed to be used in adverse environments and gray in color.
3. Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.
4. Mixing: Follow manufacturer's instructions.

#### B. Component "A" Base Resin: Modified biphenyl-A type epoxy.

1. Viscosity: Light paste, 350 cps maximum prior to mixing to ensure proper wetting of moist concrete surfaces.
2. Fillers: 100 percent solids, fumed silica and selected annular micro silica powders. Do not use micro spheres, fly ash, or Asbestos.
3. Color: White.

#### C. Component "B" Hardener or Curing Agent:

1. Viscosity: Light paste.
2. Fillers: 100 percent solids, fumed silica and selected annular micro silica powders. Do not use micro spheres, fly ash, or Asbestos.

3. Color: Black.

D. Mixed Epoxy Adhesive:

1. Nonsag light paste consistency with ability to remain in a 1-inch diameter overhead drilled hole without runout, holding the following properties:
  - a. Slant Shear Strength, ASTM C881-90/882-91, No Failure In Bond Line, Dry/Moist Conditions: 5,000 psi.
  - b. Compressive Strength, ASTM D695-90: 14,000 psi, minimum.
  - c. Tensile Strength, ASTM D695-90: 4,500 psi.
  - d. Heat Deflection Temperature, ASTM D648-82e: 135 degrees F, minimum.
2. Manufacturers and Products:
  - a. Adhesives Technology Corp., Kent, WA 98031; Anchor-It Fastening Systems, HS 200 Epoxy Resin; telephone 1-800/262-4748.
  - b. ITW Ramset/Red Head, Wood Dale, IL 60191; Epcon Ceramic 6 Epoxy Anchor System.
  - c. Covert Operations, Long Beach, CA 90853, NJ; CIA Epoxy Anchors with viscosity to suit application.

2.2 VINYL ESTER ADHESIVES

A. Materials:

1. Two-component, insensitive to moisture, designed to be installed in adverse environments.
2. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions.

B. Manufacturer and Product: HIT Doweling Anchor System (HIT C-100), by Hilti, Inc., Tulsa, OK 74146.

2.3 ANCHOR RODS

A. Reinforcing Bars: As specified in Section 03210, REINFORCING STEEL.

**PART 3 EXECUTION**

3.1 GENERAL

- A. Dispensing, Metering, or Mixing Epoxy Adhesive Components: Use portable, automatic metering and mixing device or machine capable of maintaining prescribed mix ratio within deviation of 5 percent or less, by volume. Do not use epoxy where fire or temperatures above 100 degrees F can occur.
- B. Install in accordance with manufacturer's specific instructions.

- C. Dispense components through specially designed static mixing nozzle that thoroughly mixes components and places mixed adhesive at base of predrilled hole.
- D. Mixing Nozzles:
  - 1. Disposable, manufactured in several sizes to accommodate size of reinforcing dowels.
  - 2. Nonremovable internal static mixer required to ensure proper blending of components.
- E. Where large meter and mixing pumps are impractical, provide adhesive packaged as follows:
  - 1. Disposable, self-contained cartridge system capable of dispensing both components in the proper mixing ratio, and fit into a manually or pneumatically operated caulking gun.
  - 2. Dispense components through a mixing nozzle that thoroughly mixes components and places adhesive at base of predrilled hole.
  - 3. Mixing Nozzles:
    - a. Disposable, manufactured in several sizes to accommodate sizes of reinforcing dowels.
    - b. Nonremovable internal static mixer required to ensure proper blending of components.

### 3.2 TESTING OF AUTOMATIC METERING AND MIXING DEVICES

- A. Tests for Proper Ratio:
  - 1. Retain small amount of dispensed adhesive for inspection after each time the pump is refilled.
  - 2. Check these Samples for color change.
  - 3. Should change in color occur, follow manufacturer's service instructions to obtain proper operation.
- B. Frequency of Tests: Make full ratio check after each 100 gallons of adhesive is dispensed or if color of mixed adhesive becomes noticeably darker or lighter.
- C. Ratio Check Procedure:
  - 1. Disconnect dispensing head behind ON/OFF valve.
  - 2. Place volume containers of the required proportions under the "B" and "A" component hose ends.
  - 3. Actuate the pump.
  - 4. Both cups should fill in an equal time, thereby verifying the proportion ratio by volume.

### 3.3 DOWEL SIZING AND INSTALLATION

- A. Follow adhesive manufacturer's instructions for installation.

B. Drilling Equipment:

1. Drilling Hammers for Dowel Holes: Electric or pneumatic rotary type with medium or light impact.
2. Hollow drills with flushing air systems are preferred.
3. Where edge distances are less than 2 inches, use lighter impact equipment to prevent microcracking and concrete spalling during drilling process.

C. Hole Diameter:

1. As small as possible to allow dowel to be embedded to required depth.
2. Use drill bit diameter meeting ICBO Report requirements.
3. Epoxy Adhesive: Dowel diameter plus 1/8 inch for ambient temperature at time of installation above 60 degrees F, or dowel diameter plus 1/4 inch for ambient temperature at time of installation below 60 degrees F.
4. For large reinforcing bars No. 8 or greater embedded 18 diameters or more, verify hole diameter with manufacturer.
5. Vinyl Ester Adhesive: As recommended by manufacturer.

D. Obstructions in Drill Path:

1. When existing reinforcing steel is encountered during drilling and when approved by the RESIDENT ENGINEER, enlarge the hole by 1/8 inch, core through the existing reinforcing steel at the larger diameter, and resume drilling at original hole diameter; or redrill hole 1 inch from original location, beginning in the same line at the surface, redirecting the drill to miss reinforcing steel.
2. Place dowels in both the misdrilled hole and the new one.
3. When using epoxy anchors, dowels may be prebent prior to installation to 15 degrees to align with other bars. Do not heat dowels to bend.
4. Bent Bar Dowels: Where edge distances are critical, and striking reinforcing steel is likely, drill hole at 10-degree angle or less and use prebend reinforcing bars.

3.4 CSA ANCHOR DOWEL PULLOUT TESTS

- A. Test 5 percent of anchors to verify adequate pullout resistance.
- B. RESIDENT ENGINEER will determine which anchors shall be tested.
- C. Test anchors after grout has achieved 4,000 psi compressive strength.
- D. Apply test load in tension equal to 80 percent of yield strength of bar. Maintain load for minimum of 10 minutes. If bar moves while maintaining test load, or if application of full test load is not possible, anchor will be rejected.

- E. Test Apparatus: Conform to ASTM D4435-84 for each of the following items:
  - 1. Loading system.
  - 2. Load transducer.
  - 3. Displacement transducer.
  - 4. Displacement transducer support.
- F. Load measurement systems shall be calibrated by independent testing laboratory and accurate to within plus or minus 5 percent of actual load.
- G. Method of load application shall not damage bar.
- H. Install replacement anchors for each failed anchor at location determined by RESIDENT ENGINEER.
- I. Retest one additional anchor bar for each failed bar in addition to number initially required.

### 3.5 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at site in accordance with Section 01640, MANUFACTURERS' SERVICES, for installation assistance, inspection, and certification of proper installation.

END OF SECTION

**SECTION 03251**  
**EXPANSION, CONSTRUCTION, AND CONTROL JOINTS**

**PART 1 GENERAL**

1.1 SUBMITTALS

A. Shop Drawings:

1. Construction Joints: Layout and location indicating type to be used.
2. Joint fillers for horizontal and sloped joints.
3. Preformed control joints.

B. Quality Control Submittals:

1. Joint Filler and Primer: Manufacturer's written instructions for product shipment, storage, handling, application, and repair.
2. Preformed Control Joint: Manufacturer's written instructions for product shipment, storage, handling, application, and repair.

**PART 2 PRODUCTS**

2.1 BOND BREAKER

- A. Tape for Expansion Joints: Adhesive-backed glazed butyl or polyethylene tape, same width as the joint, that will adhere to the premolded joint material or concrete surface.
- B. Use either bond breaker tape or a bond prevention material as specified in Section 03300, CAST-IN-PLACE CONCRETE, except where a tape is specifically called for.

2.2 EXPANSIVE WATER STOP

A. Manufacturers:

1. BBZ, USA, Southing, CT; Duroseal Gasket Water Stop, Type W, 1 inch by 3/4 inch.
2. Greenstreak, St. Louis, MO; Hydrotite CJ-1030.

2.3 PREMOLDED JOINT FILLER

A. Bituminous Type: ASTM D994-71e or D1751-83.

B. Sponge Rubber: Neoprene, closed-cell, expanded; ASTM D1056-85, Type 2C5, with a compression deflection, 25 percent deflection (limits), 119 to 168 kPa (17 to 24 psi) minimum.

1. Manufacturer and Product: Rubatex Corp.; R451N.

## 2.4 STEEL EXPANSION JOINT DOWELS

- A. Dowels: ASTM A36-90 round smooth steel bars.
- B. Bar Coating: Two-coat System No. 29A, FUSION BONDED, STEEL DOWEL COATING, as specified in Section 09900, PAINTING, with a factory-applied lubricating coating.

## 2.5 ACCESSORIES

- A. Joint Sealants: As specified in Section 07900, JOINT SEALANTS.
- B. Nonshrink Grout:
  - 1. As specified in Section 03600, GROUT.
  - 2. Compatible with joint sealant.
- C. Roofing Felt: ASTM D226-89, Type II, 30-pound asphalt-saturated or equal weight of ASTM D227-89 coal-tar saturated felt.
- D. Reinforcing Steel: As specified in Section 03210, REINFORCING STEEL.
- E. Nails: As required for securing bituminous type premolded joint filler.
- F. Masking Tape: As required to temporarily adhere to concrete at each side of joint to receive filler.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Construct straight joints; make vertical or horizontal, except where walls intersect sloping slabs.
- B. Locate expansion and control joints as shown.
- C. Construction joints shall be located belowgrade or at changes in concrete configuration to minimize visual impact.
- D. Commence concrete placement after the joint preparation is complete.
- E. Time Between Concrete Pours: As specified in Section 03300, CAST-IN-PLACE CONCRETE.

### 3.2 SURFACE PREPARATION

- A. Construction Joints: Prior to placement of abutting concrete, clean contact surface:
  - 1. Remove laitance and spillage from reinforcing steel and dowels.
  - 2. Roughen surface to a minimum of 1/4-inch amplitude:
    - a. Sandblast after the concrete has fully cured.

- b. Water blast after the concrete has partially cured.
- c. Green cut fresh concrete with high pressure water and hand tools.

B. Control Joint:

1. Coat concrete surfaces with bond breaker. Do not apply bond breaker where water stop or sealant are to be attached.
2. Furnish correct type and size of reinforcing and dowels.

3.3 INSTALLATION OF WATER STOPS

- A. Install in location shown or between reinforcing steel and wet face of wall.
- B. Use water stop manufacturer's standard adhesive to bond to joint surface.
- C. Splice in accordance with water stop manufacturer's recommendations.

3.4 EXPANSION JOINT INSTALLATION

A. Bituminous Type Premolded Joint Filler:

1. Drive nails approximately 1 foot 6 inches on center through the filler, prior to installing, to provide anchorage embedment into the concrete during concrete placement.
2. Secure premolded joint filler in forms before concrete is placed.

B. Steel Expansion Joint Dowels:

1. Install coated and lubricated bars parallel to wall or slab surface and in true horizontal position perpendicular to the joint in both plan and section view, so as to permit joint to expand or contract without bending the dowels.
2. Secure dowels tightly in forms with rigid ties.
3. Install reinforcing steel in the concrete as shown.

END OF SECTION

**SECTION 03300  
CAST-IN-PLACE CONCRETE**

**PART 1 GENERAL**

1.1 DEFINITIONS

- A. Architectural Concrete: Concrete surfaces that are exposed and can be seen.
- B. *Defective Areas*: Surface defects that include honeycomb, rock pockets, indentations, cracks 0.005-inch wide and larger, and cracks that leak in water-retaining structures, spalls, chips, air bubbles, pinholes, bug holes, embedded debris, lift lines, sand lines, bleed lines, leakage from form joints, fins and other projections, form popouts, texture irregularities, and stains and other color variations that cannot be removed by cleaning.
- C. New Concrete: Less than 60 days old.
- D. MAG: Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction.

1.2 SUBMITTALS

- A. Administrative Submittals: Preinstallation conference minutes.
- B. Shop Drawings:
  - 1. Product Data: Admixtures, bonding agent, bond breaker, and patching materials.
  - 2. Design Data: Concrete mix designs signed by qualified mix designer.
  - 3. Placement Drawings: Concrete, identifying location of each type of construction joint.
  - 4. Gradation for coarse and fine aggregates, and combined together. List gradings, percent passing through each sieve size.
  - 5. Detailed plan for cold weather curing and protection of concrete placed and cured in weather below 40 degrees F.
- C. Samples:
  - 1. One Sample of each type of architectural concrete wall finish, 24 inches by 24 inches square by 2 inches thick.
  - 2. Demonstrate the use of bonding admixtures proposed for use.
- D. Quality Control Submittals:
  - 1. Manufacturer's application instructions for bonding agent, and bond breaker.
  - 2. Proposed application schedule and instructions for patching materials.

3. Manufacturers' Certificate of Compliance:
  - a. Cement used in architectural concrete.
  - b. Portland cement.
  - c. Admixtures.
  - d. Fly ash.
  - e. Aggregates.
  - f. Bonding agent.
  - g. Bond breaker.
  - h. Patching materials.
4. Admixtures: Manufacturers' Certificate of Proper Installation.
5. Statements of Qualification:
  - a. CONTRACTOR's resident superintendent for concrete installation.
  - b. Mix designer.
  - c. Batch plant.
6. Test Reports:
  - a. Admixtures, test reports showing chemical ingredients and percentage of chloride in each admixture and fly ash.
  - b. Source test analysis report for fly ash.
  - c. Statement identifying aggregates reactivity and aggregate effects on concrete finish and appearance. Showing total chloride in each component of aggregates utilizing grinding to 50-mesh screen and determination of total chloride. Use Florida DOT method.
  - d. For each trial mix design and signed by qualified mix designer.
  - e. Cylinder test results from laboratory mixes.
  - f. Concrete shrinkage test results.
7. Concrete Delivery Tickets:
  - a. For each batch of concrete before unloading at site.
  - b. Record of drum revolution counter, type, brand, test certification, and amount of fly ash if used in accordance with ASTM C94-90, Section 16.

### 1.3 QUALITY ASSURANCE

#### A. Qualifications:

1. CONTRACTOR's Resident Superintendent for Concrete Installation:
  - a. Supervised successful construction of at least three large volume concrete projects in similar environmental conditions.
2. Mix Designer: Licensed professional engineer registered in the state of Project.
3. Batch Plant: Currently certified by the National Ready Mixed Concrete Association.

#### B. Mockup Panels:

1. Construct one panel for each type of finish. Mock-up panels for sloping concrete shall be cast in a sloping position to simulate actual conditions.

2. Minimum dimensions for each panel 10 feet by 10 feet.
  - a. Demonstrate sandblasting techniques, in presence of RESIDENT ENGINEER, to show how uniform appearance will be achieved regardless of age of concrete.
3. The panels shall be used as a means determining the degree of sandblasting acceptable to OWNER.
4. Before concrete work starts, construct panels with specified materials, forming systems, reinforcing details, and leakage prevention techniques.
5. Show architectural details, joints, chamfers, form ties, recesses, and rebar spacers to produce finished surface required.
6. Test form sealer on one mockup panel to assure no adverse effects affect form materials.
7. Cast panels from minimum of 3-cubic-yard truck mixer load.
8. Surface finish uniform in appearance.
9. Panels shall establish standards of quality by which concrete work will be judged.
10. Replace panels if not representative of Work as specified.
11. Panels shall be used as a means to demonstrate and refine patching and repair methods and means. Construct additional 8-foot by 8-foot panel to develop and test patching techniques and mixes.
12. Mockup panels shall remain in place during construction for reference, and shall be removed completely upon completion of the Work with approval of RESIDENT ENGINEER. Restore casting surfaces as required.

C. Preinstallation Meetings:

1. Required Meeting Attendees:
  - a. CONTRACTOR.
  - b. Ready-mix producer.
  - c. Admixture representative.
  - d. Testing personnel.
  - e. RESIDENT ENGINEER.
2. Schedule and conduct prior to incorporation of respective products into Project. Notify RESIDENT ENGINEER of location and time.
3. Agenda shall include:
  - a. Admixture types, dosage, performance, and redosing at site.
  - b. Mix designs, test of mixes, and Submittals.
  - c. Placement methods, techniques, equipment, consolidation, and form pressures.
  - d. Slump and placement time to maintain slump.
  - e. Finish, curing, and water retention.
  - f. Other specified requirements requiring coordination.
4. Conference minutes as specified in Section 01040, COORDINATION.

## 1.4 ENVIRONMENTAL REQUIREMENTS

### A. Cold Weather Placement:

1. Do not place concrete when ambient temperature is below 40 degrees F or approaching 40 degrees F and falling, without special protection as specified or approved by RESIDENT ENGINEER.
2. Do not place concrete against frozen earth or ice, or against forms and reinforcement with frost or ice present.
3. Provide heated enclosures when air temperatures are below 40 degrees F.

## PART 2 PRODUCTS

### 2.1 MATERIALS

#### A. Cement: Furnish from one source.

1. Portland Cement Type II:
  - a. Meet ASTM C150-89.
  - b. Alkalies: Maximum 0.60 percent.

#### B. Aggregates: Furnish from one source.

1. Natural Aggregates:
  - a. Free from deleterious coatings and substances in accordance with ASTM C33-90, except as modified herein.
  - b. Free of materials and aggregate types causing popouts, discoloration, staining, or other defects on surface of concrete.
2. Nonpotentially Reactive: In accordance with ASTM C33-90, Appendix XI, paragraph X1.1.
3. Aggregate Soundness: Test for fine and coarse aggregates in accordance with ASTM C33-90 and ASTM C88-90 using sodium sulfate solution.
4. Fine Aggregates:
  - a. Clean, sharp, natural sand.
  - b. ASTM C33-90.
  - c. Materials Passing 200 Sieve: 4 percent maximum.
  - d. Limit deleterious substances in accordance with ASTM C33-90, Table 1 with material finer than 200 sieve limited to 3 percent, coal and lignite limited to 0.5 percent.
5. Coarse Aggregate:
  - a. Natural gravels, combination of gravels and crushed gravels, crushed stone, or combination of these materials containing no more than 15 percent flat or elongated particles (long dimension more than five times the short dimension).
  - b. Materials Passing 200 Sieve: 0.5 percent maximum.
  - c. Limit deleterious substances in accordance with ASTM C33-90, Table 3 for exposed architectural concrete.

C. Admixtures: Furnish from one manufacturer.

1. Characteristics: Compatible with each other and free of chlorides or other corrosive chemicals.
2. Air-Entraining Admixture:
  - a. ASTM C260-86, nontoxic after 30 days and contain no chlorides.
  - b. Concrete with air-entrainment admixture added shall maintain air percentage as batched, within plus or minus 2 percent for time required for placement into structure.
3. Water-Reducing Admixtures: ASTM C494-90, Type A or Type D.
  - a. Manufacturers and Products:
    - 1) Master Builders, Inc., Cleveland, OH; Pozzolith or Pozzolith Polyheed.
    - 2) W. R. Grace & Co., Cambridge, MA; WRDA-64.
    - 3) Euclid Chemical Co., Cleveland, OH; Eucon WR-90.
4. Superplasticizers:
  - a. ASTM C494-90.
  - b. Hold slump of 5 inches or greater for time required for placement into structure with water-cement ratio.
  - c. Furnish type as recommended by manufacturer for allowed temperature ranges.
  - d. Type F or G.
  - e. Manufacturers and Products:
    - 1) Master Builders, Inc., Cleveland, OH; Rheobuild or Pozzolith Polyheed at dosage greater than 10 ounces per 100 pounds of cement.
    - 2) W. R. Grace & Co., Cambridge, MA; WRDA-19.
    - 3) Euclid Chemical Co., Cleveland, OH; Eucon Super F or 537G.
    - 4) No "or-equal" or substitute products will be considered.
5. Pozzolan (Fly Ash): Class F fly ash in accordance with ASTM C618-91, Table 1 and 2, except as modified herein:
  - a. Loss on Ignition: Maximum 3 percent.
  - b. Water Requirement: Maximum 100 percent of control.
  - c.  $\frac{\text{CaO}(\%)-5}{\text{Fe}_2\text{O}_3(\%)}$  : Maximum 1.5
  - d. ASTM C618-91, Table 1A apply when aggregates or portion of coarse or fine aggregates used are reactive as specified under paragraph Aggregates.
  - e. ASTM C618-91, Table 2A, Reactivity with Cement Alkalies, apply when aggregates or portions of aggregates are reactive as specified under paragraph Aggregates.
  - f. ASTM C618-91, Table 2A, Uniformity Requirements, apply when loss on ignition of fly ash furnished exceeds 3 percent.
6. For fly ash not meeting the requirements of the chemical ratio listed above, furnish the following:
  - a. Test fly ash in accordance with ASTM C1012-89.
  - b. Furnish test data confirming fly ash in combination with cement used meets strength requirements and is compatible with air-entraining agents and other additives.

D. Water: Clean and potable containing less than 50 ppm of chlorides.

## 2.2 ANCILLARY MATERIALS

- A. Bonding Agent: Furnish as recommended by manufacturer for surface finish, pot life, set time, vertical or horizontal application, and forming restrictions.
  - 1. Manufacturers:
    - a. Master Builders Technologies, Cleveland, OH.
    - b. Sika Chemical Corp., Lyndhurst, NJ.
    - c. Euclid Chemical Co., Cleveland, OH.
- B. Bond Breaker: Nonstaining type, providing a positive bond prevention.
  - 1. Manufacturers and Products:
    - a. Williams Distributors, Inc., Seattle, WA; Williams Tilt-Up Compound.
    - b. SCA Construction Supply Div., Superior Concrete Accessories, Franklin Park, IL; Silcoseal 77.
    - c. Burke Co., San Mateo, CA; Burke Clean Lift Bond Breaker or Burke Tilt Free Bond Breaker.
- C. Patching Material:
  - 1. Contain no chlorides or other chemicals causing steel corrosion.

## 2.3 CONCRETE MIX DESIGN

- A. Design: Select and proportion ingredients using trial batches; sample, cure and test concrete mix through an approved independent testing laboratory in accordance ACI 309-89 per ACI 211.1-91.
  - 1. Concrete Compressive Strength,  $F'_c$ :
    - a. 4,000 psi at 28 days, unless otherwise shown. (MAG Class AA, except as modified in this Specification).
    - b. Design lab-cured trial mix cylinders.
    - c. Use additional cement or cement plus fly ash above minimum specified if required to meet average compressive strength,  $F'_{cr}$ .
    - d. Use  $F'_{cr}$  as basis for selection of concrete proportions as set forth in Chapter 5 of ACI 318-89 and commentary ACI 318R-89.
    - e.  $F'_{cr}$ : Equal to  $F'_c$  plus 1,200 when data is not available to establish standard deviation.
  - 2. Concrete Fill:
    - a. Design for 2,500 psi at 28 days using 1-inch aggregate (MAG Class B), 4-inch maximum slump and 0.50 maximum water-cement ratio.
    - b. Use water-reducing admixture.
- B. Proportions:
  - 1. Design mix to meet aesthetic and structural concrete requirements.
  - 2. In accordance with ACI 211.1-89, unless specified otherwise.

3. Water-cement ratio (or water-cement plus fly ash ratio) shall control amount of total water added to concrete. Limit water-cement ratio to value specified for combined aggregate grading selected as follows:

<u>Coarse Aggregate Size</u>	<u>W/C Ratio</u>
1-1/2 inch	0.45
1 inch	0.42
3/4 inch	0.40

4. Minimum Cement Content (or Combined Cement Plus Fly Ash):
- 517 pounds per cubic yard for concrete with 1-1/2-inch maximum size aggregate.
  - 540 pounds per cubic yard for 1-inch maximum size aggregate.
  - 564 pounds per cubic yard for 3/4-inch maximum size aggregate.
  - Increase cement content as required to meet strength requirements and water-cement ratio.
- C. Concrete Shrinkage: Design mix so shrinkage test is in accordance with ASTM C157-89, results at 28 days do not exceed 0.048 percent.
- D. Admixtures:
- Air Content: 4 percent plus or minus 1-1/2 percent when tested in accordance with ASTM C231-91.
  - Water Reducers: Use in all concrete.
  - Superplasticizers: Use as required for placement and consolidation of concrete.
  - Fly Ash: Use in all concrete. Maximum 25 percent, minimum 15 percent of total weight of fly ash plus cement. Combine fly ash with cement at batch plant.
- E. Slump Range at Site:
- Minimum: 4 inches with superplasticizers.
  - Maximum: 8 inches with superplasticizers.
  - Minimum: 2 inches without superplasticizers.
  - Maximum: 5 inches without superplasticizers.
  - Take design mix test cylinders from concrete with slump equal to that used on Project.
- F. Combined Aggregate Gradings:
- Structures: 1-1/2-inch maximum grading, as shown in table.

2. Grading Limits:

Sieve Sizes	Percentage Passing		
	1-1/2" Max.	1" Max.	3/4" Max.
2"	- 100	-	-
1-1/2"	95 - 100	- 100	-
1"	65 - 85	90 - 100	- 100
3/4"	55 - 75	70 - 90	92 - 100
1/2"	-	-	68 - 86
3/8"	40 - 55	45 - 65	57 - 74
No. 4	30 - 45	31 - 47	38 - 57
No. 8	23 - 38	23 - 40	28 - 46
No. 16	16 - 30	17 - 35	20 - 36
No. 30	10 - 20	10 - 23	14 - 25
No. 50	4 - 10	2 - 10	5 - 14
No. 100	0 - 3	0 - 3	0 - 5
No. 200	0 - 2	0 - 2	0 - 2

2.4 CONCRETE MIXING

- A. General: In accordance with ACI 304R-89.
- B. Concrete Mix Temperatures: As shown below for various stages of mixing and placing:

CONCRETE TEMPERATURES				
Ambient Air Temp.	Concrete Member Size, Minimum Dimension			
	<12"	12"-36"	36"-72"	>72"
Minimum concrete temperature as mixed for indicated air temperature:				
Above 30 deg. F	60 deg. F	55 deg. F	50 deg. F	45 deg. F
0-30 deg. F	65 deg. F	60 deg. F	55 deg. F	50 deg. F
Below 0 deg. F	70 deg. F	65 deg. F	60 deg. F	55 deg. F
Maximum allowable gradual temperature drop in first 24 hours after curing period and after end of protection:				
--	50 deg. F	40 deg. F	30 deg. F	20 deg. F

C. Truck Mixers:

1. Equip with electrically actuated counters to readily verify number of revolutions of drum or blades.
2. Counter:
  - a. Resettable, recording type, mounted in driver's cab.
  - b. Actuated at time of starting mixers at mixing speeds.
3. Truck mixer operation shall furnish a concrete batch as discharged that is homogeneous with respect to consistency, mix, and grading.
4. If slump tests taken at approximately 1/4 and 3/4 points of load during discharge give slumps differing by more than 2 inches when specified, slump is more than 4 inches, discontinue use of truck mixer unless causing condition is corrected and satisfactory performance is verified by additional slump tests.
5. Before attempting to reuse unit, check mechanical details of mixer, such as water measuring, and discharge apparatus, condition of blades, speed of rotation, general mechanical condition of unit, admixture dispensing equipment, and clearance of drum.
6. Do not use nonagitating or combination truck and trailer equipment for transporting ready-mixed concrete.
7. Concrete Volume in Truck:
  - a. Limit to 63 percent of total volume capacity in accordance with ASTM C94-90 when truck mixed.
  - b. Limit to 80 percent of total volume capacity when central mixed.
8. Mix each batch of concrete in truck mixer for minimum 70 revolutions of drum or blades at rate of rotation designated by equipment manufacturer.
9. Perform additional mixing, if required, at speed designated by equipment manufacturer as agitating speed.
10. Place materials, including mixing water, in mixer drum before actuating the revolution counter for determining number of mixing revolutions.

D. Aggregates: Thoroughly and uniformly wash before use.

E. Admixtures:

1. Air-Entraining Admixture: Add at plant through manufacturer-approved dispensing equipment.
2. Water Reducers: Add prior to addition of superplasticizer.
3. Superplasticizers and Air-Entraining Admixtures:
  - a. Add at concrete plant only through equipment furnished or approved by admixture manufacturer.
  - b. Accomplish variations in slump, working time, and air content for flowable mixes by increasing or reducing superplasticizer dose or air-entraining admixture dose at ready-mix plant only.
  - c. Equipment shall provide for easy and quick visual verification of admixture amount used for each dose.
  - d. Add discharge amount to each load of concrete into separate dispensing container, verify amount is correct, then add to concrete.

- e. Additional dosage of superplasticizer may be added in the field using manufacturer-approved dispensing when unexpected delays cause too great of a slump loss.

## 2.5 SOURCE QUALITY CONTROL

- A. Cement: Test for total chloride content.
- B. Fly Ash: Test in accordance with ASTM C311-90.
- C. Batch Plant Inspection: RESIDENT ENGINEER shall have access to and have the right to inspect batch plants, cement mills, and supply facilities of Suppliers, manufacturers, and Subcontractors, providing products included in these Specifications.
  - 1. Weighing Scales: Tested and certified within tolerances set forth in the National Bureau of Standards Handbook No. 44.
  - 2. Batch Plant Equipment: Either semiautomatic or fully automatic in accordance with ASTM C94-90.

## PART 3 EXECUTION

### 3.1 PLACING CONCRETE

- A. Preparation: Meet requirements and recommendations of ACI 304R-89 and ACI 301-89, except as modified herein.
- B. Inspection: Notify RESIDENT ENGINEER at least 1 full working day in advance before starting to place concrete.
- C. Discharge Time:
  - 1. As determined by set time, do not exceed 1-1/2 hours after adding cement to water unless special approved time delay admixtures are used. Coordinate information with admixture manufacturer and RESIDENT ENGINEER prior to placing concrete.
  - 2. Adjust slump or air content at site by adding admixtures for particular load when approved by RESIDENT ENGINEER, then adjust plant dose rest of placement. Additional dosage at site shall be through an approved dispenser supplied by admixture manufacturer.
  - 3. Maintain required slump throughout time of concrete placement and consolidation. Discontinue use of superplasticizer if it fails to maintain slump in required range for the length of time required. Redesign mix adjusting set control admixtures to maintain setting time in the range required.
- D. Placement into Formwork:
  - 1. Before depositing concrete, remove debris from space to be occupied by concrete.
  - 2. Prior to placement of concrete, dampen fill under slabs on ground, dampen sand where vapor retarder is specified, and dampen wood forms.

3. Reinforcement: Secure in position before placing concrete.
4. Place concrete soon as possible after leaving mixer, without segregation or loss of ingredients, without splashing forms or steel above, and in layers not over 1.5 feet deep, except for slabs. Place and consolidate successive layers prior to initial set of first layer to prevent cold joints.
5. Use placement devices, for example, chutes, pouring spouts, and pumps.
6. Vertical Free Fall Drop to Final Placement: 5 feet in forms, 8-inch or less wide and 8 feet in forms wider than 8 inches, except as specified.
  - a. Superplasticized Mixes: Up to 15 feet if slump is over 6 inches.
  - b. For placements where drops are greater than specified, use placement device such that free fall below placement device conforms to required value.
  - c. Free fall limit to prevent segregation caused by aggregates hitting reinforcing steel.
7. Do not use aluminum conveying devices.
8. Provide sufficient illumination for interior of forms so concrete at places of deposit are visible permitting confirmation of consolidation quality.
9. If reinforcement is in direct sunlight or is more than 20 degrees F higher in temperature than concrete temperature before placement, wet reinforcement with water fog spray before placing concrete to cool reinforcement.
10. Round off top exposed edges of walls with a 1/4-inch radius steel edging tool.

E. Conveyor Belts and Chutes:

1. Design and arrange ends of chutes, hopper gates, and other points of concrete discharge throughout conveying, hoisting, and placing system for concrete to pass without becoming segregated.
2. Do not use chutes longer than 50 feet.
3. Minimum Slopes of Chutes: Angled to allow concrete to readily flow without segregation.
4. Conveyor Belts:
  - a. Approved by RESIDENT ENGINEER.
  - b. Wipe clean with device which does not allow mortar to adhere to belt.
  - c. Cover conveyor belts and chutes.

F. Retempering: Not permitted for concrete where cement has partially hydrated.

G. Pumping of Concrete:

1. Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during pumping, for adequate redundancy to assure completion of concrete placement without cold joints in case of a primary placing equipment breakdown.
2. Minimum Pump Hose (Conduit) Diameter: 4 inches.

3. Replace pumping equipment and hoses (conduits) that are not functioning properly.

H. Maximum Size of Concrete Placements:

1. Limit size of each placement to allow for strength gain and volume change due to shrinkage.
2. Where expansion joints or control joints are not shown or where expansion joints or control joints are spaced at more than 60 feet, or where wall expansion or control joints are spaced more than 30 feet from wall corners or intersections, provide intermediate construction joints at maximum spacing of 40 feet.

I. Minimum Time Between Adjacent Placements:

1. Construction Joints: 14 days.
2. Control Joints: 6 days.
3. Expansion Joints: 1 day.
4. At least 2 hours shall elapse after depositing concrete in long columns and walls thicker than 8 inches before depositing concrete in beams, girders, or slabs supported thereon.
5. For columns and walls, 10 feet in height or less, wait at least 45 minutes prior to depositing concrete in beams, girders, brackets, column capitals, or slabs supported thereon.

J. Removal of Water: Remove water from space to be occupied by concrete.

K. Consolidation and Visual Observation:

1. Consolidate concrete with internal vibrators with minimum frequency of 8,000 cycles per minute and amplitude required to consolidate concrete in section being placed.
2. Provide at least one standby vibrator in operable condition at placement site prior to placing concrete.
3. Consolidation Equipment and Methods: ACI 309R-87.
4. Provide sufficient windows in forms or limit form height to allow for concrete placement through windows and for visual observation of concrete.
5. Vibration consolidation shall not exceed a distance of 5 feet from point of placement.
6. Vibrate concrete in vicinity of joints to obtain impervious concrete there.
7. Influence lines of the vibrator shall overlap 50 percent.
8. Vibrator shall be removed at a slow removal rate (approximately 3 inches per second).
9. Vibration of each lift shall penetrate previous lift 6 inches.

L. Hot Weather:

1. Prepare ingredients, mix, place, cure, and protect in accordance with ACI 305R-89.
2. Placement frequency shall be such that lift lines will not be visible in architectural concrete finishes.

3. Maintain concrete temperature below 80 degrees F at time of placement. Ingredients may be cooled before mixing.
4. Make provisions for windbreaks, shading, fog spraying, sprinkling, ice, or wet cover, or other means to provide concrete with temperature specified.
5. Prevent differential temperature between reinforcing steel and concrete.
6. Evaporation Retardant: As specified in Section 03370, CONCRETE CURING.

M. Cold Weather:

1. Maintain surface temperature of concrete above 40 degrees F and cure concrete as specified in Section 03370, CONCRETE CURING, for minimum of 7 days.
2. Provide maximum and minimum thermometers placed on concrete surfaces spaced throughout Work to allow monitoring of concrete surface temperatures representative of Work.
3. In accordance with ACI 306R-88 and ACI 318-89.
4. External Heating Units:
  - a. Vent heating units to atmosphere, and do not locally heat or dry concrete. Where water cure is specified, maintain wet condition.
  - b. Do not exhaust flue gases directly into an enclosed area to prevent concentrated carbon dioxide from causing concrete carbonation.
5. Maintain curing conditions as specified in Section 03370, CONCRETE CURING.

3.2 CONCRETE BONDING

A. To New Concrete Wall Horizontal Construction Joints:

1. Thoroughly clean and saturate joint with water.
2. Limit concrete lift placed immediately above construction joint to 12 inches thick.
3. Thoroughly vibrate.

B. To Old Concrete and CSA:

1. Mechanically roughen existing concrete surfaces to a clean, rough surface using a "Blastrac" by Wheelabrator-Frye, Inc.; or "Porta-Shotblast" by Nelco Manufacturing Corp, or as approved by the RESIDENT ENGINEER to remove existing concrete surface, and provide a minimum roughness profile of 1/4-inch.
2. Saturate surface with water for 24 hours.

3.3 CONSTRUCTION JOINTS

A. As specified in Section 03251, EXPANSION, CONSTRUCTION, AND CONTROL JOINTS.

### 3.4 PATCHING

#### A. General:

1. Repair of surface defects and tie holes shall be performed on the mock-up panels to allow color and texture match of the repair to the finished surface specified.
2. Leak lines shall be removed by pneumatic-type needle guns.
3. Prior to starting patching work, obtain quantities of color-matched patching material and manufacturer's detailed instructions for use to provide a structural patch with finish to match adjacent surface.
4. Develop patching techniques with grout manufacturer on mockup panel.
5. Dress surface of patches that will remain exposed to view to match color and texture of adjacent surfaces. Patching of concrete shall provide a structurally sound surface finish, uniform in appearance or upgrade finish by other means until acceptable to RESIDENT ENGINEER.
6. Very lightly sandblast repairs where, in the opinion of RESIDENT ENGINEER, total uniformity in the surface is required.

#### B. Tie Holes:

1. Fill with Category I or II grout as specified in Section 03600, GROUT, except where sealant is shown. Use only enough water to dry pack.
2. Match color of adjacent concrete.
3. Compact grout using steel hammer and steel tool to drive grout to high density. Cure grout with water.

#### C. Alternate Form Ties – Through-Bolts:

1. Seal through-bolt hole by sandblasting or mechanically cleaning and roughening entire interior surface of hole, epoxy coating roughened surface and driving elastic vinyl plug and then dry packing entire hole on each side of plug with Category II grout, as specified in Section 03600, GROUT. Use only enough water to dry pack grout. Dry pack while epoxy is still tacky or remove epoxy by mechanical means and reapply new epoxy.
2. Fill through-bolt openings with Category II grout, as specified in Section 03600, GROUT.
3. Compact grout using steel hammer and steel tool to drive grout to high density. Cure grout with water.

#### D. Defective Areas:

1. Remove *defective* concrete to a depth of sound concrete.
2. Small shallow holes caused by air entrapment at surface of forms shall not be considered *defective* unless amount is so great as to be considered not the standard of the industry.
3. If chipping is required, make edges perpendicular to surface with a minimum of 1/2 inch in depth. Do not feather edges. Obtain RESIDENT ENGINEER's approval of chipping work.

4. Patch *defective* area to match appearance of adjacent concrete surfaces after cracks are filled.

E. Blockouts at Pipes or Other Penetrations:

1. Meet details shown or submit proposed blockouts for review.
2. Use nonshrink, nonmetallic grout, Category I or II.

3.5 CONCRETE WALL FINISHES

A. Ordinary Wall Finish:

1. Use where below grade or not exposed to view.
2. Patch tie holes.
3. Knock off projections.
4. Patch *defective* areas.

B. Smooth Wall Finish:

1. Use on all walls unless otherwise shown.
2. Patch tie holes.
3. Grind off projections, fins, and rough spots.
4. Patch *defective* areas and repair rough spots resulting from form release agent failure or other reasons to provide smooth uniform appearance.

C. Sandblast Finish:

1. Prepare wall as required for smooth wall finish.
2. Sandblast where noted on Drawings in accordance with ACI Manual of Concrete Practice, 1993, 303R-25:
  - a. Light Sandblast: Intent of this procedure is to remove surface skin to a depth no more than 1/16 inch, and expose only fine aggregate and air holes near the surface, thus producing a uniform texture.
  - b. Medium Sandblast: Intent of this procedure is to remove the surface skin to a depth of no more than 1/4 inch, sufficient to generally expose coarse aggregate with only a slight reveal, producing a uniform texture.
3. Perform sandblasting on concrete surfaces in the same area of view all at the same time and obtain uniformity of appearance.
4. Perform sandblasting on concrete surfaces that are approximately of the same age. Age of sample panel, concrete placement, and removal of forms at time of sandblasting shall be same as anticipated for actual field concrete.
5. The same person shall accomplish sandblasting on one structure and on concrete in the same area.
6. Perform sandblasting to match approved mockup panel.
7. Abrasive: Use clean silica sand free of foreign materials and supplied in sealed sacks.
8. Blast surface with 100 psi air pressure at rate of 2 to 3 square feet per minute with nozzle held approximately 2 feet from surface and perpendicular thereto.

### 3.6 CONCRETE SLAB FINISHES

#### A. General:

1. Do not use "jitterbugs" or other special tools designed for the purpose of forcing coarse aggregate away from the surface and allowing a layer of mortar, which will be weak and cause surface cracks or delamination, to accumulate.
2. Do not dust surfaces with dry materials.
3. Use evaporation retardant.
4. Round off edges of slabs with a steel edging tool, except where a cove finish is shown. Steel edging tool radius shall be 1/4 inch.

#### B. Steel Troweled Finish:

1. Finish by screeding and floating with straightedges to bring surfaces to required finish elevation. Use evaporation retardant.
2. While concrete is still green, but sufficiently hardened to bear a person's weight without deep imprint, wood float to true, even plane with no coarse aggregate visible.
3. Use sufficient pressure on wood floats to bring moisture to surface.
4. After surface moisture has disappeared, hand trowel concrete to produce smooth, impervious surface, free from trowel marks.
5. Burnish surface with an additional troweling. Final troweling shall produce a ringing sound from trowel.
6. Do not use dry cement or additional water during troweling, nor will excessive troweling be permitted.
7. Power Finishing:
  - a. An approved power machine may be used in lieu of hand finishing in accordance with directions of machine manufacturer.
  - b. Do not use power machine when concrete has not attained the necessary set to allow finishing without introducing high and low spots in slab.
  - c. Do first steel troweling for slab finish by hand.

C. Underside Elevated Slab Finish: When forming is removed, grind off projections on underside of slab and patch *defective* areas, including small shallow air pockets where schedule of concrete finishes requires:

D. Light Broomed Finish: Finish as specified for steel troweled floor finish, except omit final troweling and finish surface by drawing a fine-hair broom lightly across the surface.

1. Brooming: In same direction and parallel to expansion joints, or, in the case of inclined slabs or surfaces, perpendicular to slope.

E. Heavy Broomed Finish: Same as light broomed finish, except use a coarse stiff bristle broom.

### 3.7 BEAM, PILASTER, AND COLUMN FINISHES

A. General: Patch and repair *defective* areas.

- B. Beam:
1. Repair rock pockets.
  2. Fill air voids.
  3. Match smooth wall finish.

- C. Pilasters and Columns:
1. Fill air pockets.
  2. Match sandblast wall finish.

### 3.8 BACKFILL AGAINST WALLS

- A. Do not backfill against walls until concrete has obtained 28-day compressive strength.
- B. Place backfill simultaneously on both sides of wall, where required, to prevent differential pressures.

### 3.9 FIELD QUALITY CONTROL

- A. General:
1. Provide adequate facilities for safe storage and proper curing of concrete test cylinders onsite for first 24 hours, and for additional time as may be required before transporting to test lab.
  2. Provide concrete for testing of slump, air content, and for making cylinders from the point of discharge into forms. When concrete is pumped, Samples used shall be taken from discharge end of pump hose.
  3. Evaluation will be in accordance with the MAG Specifications Section 725.10 and 725.11 and these specifications.
  4. Specimens will be made, cured, and tested in accordance with ASTM C31-90a and ASTM C39-86.
  5. Frequency of testing may be changed at discretion of RESIDENT ENGINEER.
  6. Pumped Concrete: Take concrete samples for slump (ASTM C143-90a) and test cylinders (ASTM C31-90a and C39-86) and shrinkage specimens (ASTM C157-89) at placement (discharge) end of line.
- B. Admixture Segregation Test: Test each truck prior to use on job.
1. Segregation Test Objective: Concrete with 5- to 9-inch slump must stay together when slumped. Segregation is assumed to cause mortar to flow out of mix even though aggregate may stay piled enough to meet slump test.
  2. Test Procedure: Make slump test and check for excessive slump and observe to see if mortar or moisture flows from slumped concrete.
  3. Reject concrete if mortar or moisture separates and flows out of mix.

C. Tolerances:

1. Walls: Measure and inspect walls for compliance with tolerances specified in Section 03100, CONCRETE FORMWORK.
2. Slab Finish Tolerances and Slope Tolerances:
  - a. Slab flatness measurements will be made the day after floor is finished and before shoring is removed, to eliminate effects of shrinkage, curing, and deflection.
  - b. Support 10-foot long straightedge at each end with steel gauge blocks of thicknesses equal to specified tolerance.
  - c. Compliance with designated limits in four of five consecutive measurements is satisfactory unless *defective* conditions are observed.

3.10 MANUFACTURER'S SERVICES

A. Provide the following representative at site in accordance with Section 01640, MANUFACTURERS' SERVICES, for installation assistance, inspection and certification of proper installation for concrete ingredients, mix design, mixing, and placement.

1. Batch Plant Representative:
  - a. Observe how concrete mixes are performing.
  - b. Be present during first placement of each type of concrete mix.
  - c. Assist with concrete mix design, performance, placement, weather problems, and problems as may occur with concrete mix throughout the Project.
  - d. Establish control limits on concrete mix designs.
2. Admixture Manufacturer's Representative:
  - a. Demonstrate special features, product performance, product mixing, testing, and placement or installation for each type of admixture.
  - b. Observe how concrete mixes are performing.
  - c. Be present during the first placement of each type of concrete mix.
  - d. Assist with concrete mix design, performance, placement, weather problems, and problems as may occur with concrete mix throughout the Project, including instructions for redosing.
  - e. Provide equipment for control of concrete redosing for air entrainment or superplasticizer at the site to maintain proper slump and air content if so needed.
3. Bonding Agent Manufacturer's Representative: Demonstrate product performance, product mixing, and placement.

3.11 PROTECTION OF INSTALLED WORK

A. After curing as specified in Section 03370, CONCRETE CURING, and after applying final floor finish, cover slabs with plywood or particle board or plastic sheeting or other material to keep slab clean and protect it from material and damage due to other construction work.

B. Patch and repair *defective* areas and areas damaged by construction.

END OF SECTION

**SECTION 03361  
SHOTCRETE**

**PART 1 GENERAL**

1.1 DEFINITIONS

- A. Shotcrete: Mixture of cement, water, and aggregates pumped through a hose and projected at high velocity by jet upon intended surface.
- B. Rebound: Wet shotcrete which bounces off a surface against which it is projected. Rebound materials will not be used nor incorporated into the Work.
- C. MAG: Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction.

1.2 SUBMITTALS

- A. Product data for admixtures and fiber reinforcement.
- B. Quality Control Submittals:
  - 1. Manufacturer's Written Instructions: Project-specific instructions for mix, mixing, application of shotcrete, and curing.
  - 2. Certificates:
    - a. Manufacturer's Certificate of Proper Installation for mixing, application, equipment and procedures.
    - b. Scales for weighing sand and cement.
    - c. Mix certification and test results as specified in Section 03300, CAST-IN-PLACE CONCRETE.
  - 3. Statements of Qualification:
    - a. Nozzleman.
    - b. Gunman.

1.3 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Nozzleman:
    - a. Minimum 2 years' experience on shotcreting work similar to Project.
    - b. Capable of applying thin or thick coats of shotcrete, even and uniformed thickness demonstrated by preconstruction test panels.
  - 2. Gunman: Minimum 6 months' experience with handling gun for work similar to Project.
  - 3. Do not include experience gained on swimming pool and ditch construction.

B. Shotcrete Panel Mockups:

1. Assemble test panels at least 10 feet by 10 feet for each concrete mix texture or finish being considered. Test panels shall be on the same 1.5 to 1 slope as the shoreline surface.
2. Test panels shall be constructed by the same nozzleman that will perform the Project shotcrete installation.
3. Test panels shall be same thickness as structure, but not less than 8 inches.
4. Take minimum three cubes or cores from panels for strength testing of shotcrete. Repair core or cube holes in accordance with Section 03300, CAST-IN-PLACE CONCRETE.
5. Cut or broken surfaces shall be dense and free from laminations and sand pockets.
6. Retain and maintain test panels during construction to establish standards by which completed shotcrete Work will be judged. After completion of the Project and with the approval of the RESIDENT ENGINEER, test panels shall be removed.
7. Independent Testing Laboratory Services shall:
  - a. Test proposed materials, including water.
  - b. Test proposed mix proportions.
  - c. Test specimens.
  - d. Secure production samples of materials at plants or stockpiles during construction and test.
  - e. Test strength of shotcrete as Work progresses.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect aggregates with tarpaulins or polyethylene sheets at all times.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Wind:

1. Do not apply shotcrete under strong wind conditions, as evidenced by removal of a large amount of cement and moisture from mortar spray between nozzle and application surface.
2. Place shields around nozzleman to minimize loss of cement carried away by wind.

B. Cold Weather Application:

1. Surfaces shall not be frozen, outdoor temperature during day shall be expected to rise to at least 40 degrees F, and night temperature following shotcrete application shall not be expected to drop below 33 degrees F.
2. Take precaution to protect shotcrete areas by keeping surface temperature of shotcrete above 33 degrees F until curing is complete.
3. Remove and replace shotcrete that has frozen.
4. Use thermometers to verify surface temperature during curing period.

- C. Rain: Remove and replace new shotcrete damaged by rain.

- D. Low Humidity Conditions (Below 50 Percent): May have an adverse effect on shotcrete. Cracks may develop rapidly and are often seen in a matter of hours after shotcrete application. Proceed as follows:
1. Upon occurrence of such conditions, immediately cease shotcrete operations until humidity has increased.
  2. Start continuous water curing as soon as shotcrete has hardened sufficiently to prevent washout of cement.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Cement: ASTM C150-89, Type II. Total alkali content when determined as mixed sulfates of sodium, potassium, and sodium oxide shall not exceed 0.6 of 1 percent.
- B. Aggregate: Aggregate shall comply with Section 03300, CAST-IN-PLACE CONCRETE, except gradation shall be as follows:

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
3/4-inch	100
1/2-inch	80 - 95
3/8-inch	70 - 90
No. 4	50 - 70
No. 8	35 - 55
No. 16	20 - 40
No. 30	10 - 30
No. 50	5 - 17
No. 100	2 - 10

### 2.2 WATER

- A. Clean and potable containing less than 5 ppm of chlorides, free from oil, acid, alkali, organic matter, and other deleterious substances.

### 2.3 ADMIXTURES

- A. Water-Reducers: ASTM C494-90, Type A or Type D.
1. Manufacturers and Products:
    - a. Master Builders, Inc., Cleveland, OH; Pozzolith or Pozzolith Polyheed.
    - b. W. R. Grace & Co., Cambridge, MA; WRDA-64.
    - c. Euclid Chemical Co., Cleveland, OH; Eucon WR-90.

- B. Air-Entraining: ASTM C260-86 and ASTM C457-90, nontoxic after 30 days and contain no chlorides or other chemicals causing corrosion.
  - 1. Manufacturers and Products:
    - a. Master Builders, Inc., Cleveland, OH; MB-VR or Micro-Air.
    - b. W. R. Grace & Co., Cambridge, MA; Darex AEA or Daravair.
    - c. Euclid Chemical Co., Cleveland, OH; Air Mix or Perma-Air.

## 2.4 PROPORTIONING AND MIXING

- A. General:
  - 1. Strength minimum of 4,000 psi (f'c) at 28 days, unless otherwise shown.
  - 2. Shotcrete mix design shall comply with Section 03300, CAST-IN-PLACE CONCRETE. Maximum slump shall be 3 inches. Minimum cement content shall be 564 pounds per cubic yard. Fly ash shall be used. Air content shall be 4 percent after placement.
- B. Dry Mix Process: Dry mix process shall not be used.

## 2.5 FIBROUS SHOTCRETE REINFORCEMENT

- A. Manufacturer: Fibermesh Co., Chattanooga, TN.
- B. Shotcrete, unless specified otherwise herein shall be fibrous reinforced. Reinforcement shall consist of 100 percent virgin polypropylene fibrillated fibers used as secondary reinforcement for shotcrete.
- C. Required volume of fibers per cubic yard of shotcrete shall be 3.0 pounds.
- D. Fibers shall be in accordance with ASTM C1116-91, Type III and ASTM C1018 E1-89.
- E. Physical Characteristics:
  - 1. Specific Gravity: 0.91.
  - 2. Tensile Strength: 80 to 110 ksi.
  - 3. Fiber Length: Graded per manufacturer.
- F. Fibers shall be added to shotcrete in accordance with manufacturer's instructions.

## PART 3 EXECUTION

### 3.1 PREPARATION OF EXISTING CEMENT STABILIZED ALLUVIUM (CSA)

- A. Remove unsound material from surface of existing cement stabilized alluvium as shown.
- B. Chip or scarify surface area removing offsets that would cause abrupt change in thickness without suitable reinforcement.

- C. Taper edges to eliminate square shoulders at perimeter of cavity.
- D. Remove loose material from areas receiving shotcrete.
- E. Wet surface until damp and remove free moisture.
- F. Pressure wash, sandblast using a heavy sandblast, or mechanically chip existing surfaces to remove paint, oil, grease, and other contaminants.
- G. Roughen surface to minimum amplitude of 1/2 inch.

### 3.2 FORMWORK

- A. Formwork shall be as specified in Section 03100, CONCRETE FORMWORK.

### 3.3 INSTALLATION OF REINFORCEMENT

- A. Install reinforcing steel in accordance with Section 03210, REINFORCING STEEL.
- B. Add fibrous concrete reinforcement to concrete materials at the time concrete is batched in amounts in accordance with approved submittals for each type of concrete required.
- C. Mix concrete in strict accordance with fiber reinforcement manufacturer's instructions and recommendations for uniform and complete distribution.

### 3.4 JOINTS

- A. Control and construction joints shall be as shown and as specified in Section 03251, EXPANSION, CONSTRUCTION, AND CONTROL JOINTS.

### 3.5 APPLICATION EQUIPMENT

- A. Control discharge of mixed materials into hose and deliver continuous smooth stream of uniformly mixed material free from slugs at velocity to discharge from nozzle.
- B. Wet Mix Process:
  - 1. Automated Delivery Equipment:
    - a. Equipment parts available for regular inspection and replacement as required.
    - b. Air compressor capacity, minimum 400 cfm of air available at nozzle, excluding air supplied simultaneously for other purposes.

### 3.6 SHOTCRETE PLACEMENT

- A. General:
  - 1. Apply shotcrete in accordance with ACI 506.2-90.

2. Apply shotcrete utilizing wet mix process.
3. Increase cement content if shotcrete fails to meet 28-day strength of at least 4,000 psi.
4. If flow of shotcrete becomes intermittent, direct away from Work until flow becomes constant.
5. Apply shotcrete at total thickness of 8 inches minimum.

B. Rebound Removal:

1. Use 3/4-inch blowpipe to remove rebound, sand, and miscellaneous debris ahead of shotcrete work.
2. Protect adjacent concrete, other surfaces, and equipment from being damaged by overshooting shotcrete. Remove overshoot shotcrete and deposited rebound materials as Work proceeds.
3. Do not work rebound into shotcrete.

C. Nozzle Position:

1. Keep nozzle at uniform constant distance from surface, always ensuring a right-angle spray of material to surface.
2. Modify procedure of shooting shotcrete to better direct material around reinforcing bars.
3. Apply shotcrete material wet enough to ensure no buildup of shotcrete to prevent voids.

D. Shotcreting More than One Layer:

1. Allow each layer of shotcrete to set before applying next layer without sagging.
2. Steel broom shotcrete layers after initial set to increase bond of next shotcrete coat.
3. Do not broom shotcrete surfaces before shotcrete has initially set.
4. Dry sandblast with silica sand, surfaces that have not been broomed.
5. Before applying next layer of shotcrete, sound surface with hammer for hollow areas.
6. Remove and replace hollow areas before applying next layer of shotcrete.
7. Remove rebound pockets before next layer is applied. Corner areas are particularly susceptible to this condition.
8. Slope construction or work joints to a thin, clean, regular feathered edge.

E. Finish:

1. Slab tolerances shall be as specified in Section 03100, CONCRETE FORMWORK.
2. Finish shotcrete as shown and as specified in Section 03300, CAST-IN-PLACE CONCRETE.
3. On completing surface, bring shotcrete to an even plane and to well-formed corners by working up to ground wires or other thickness or alignment guides, using lower placing velocity than normal.

4. Screed exposed surfaces or underlayers by working upward against gravity with thin-edged screed using a slicing motion to trim off high spots and expose low spots.
5. Avoid pulling and breaking surface with subsequent checking.

### 3.7 WATER CURING

- A. Wet cure shotcrete as specified in Section 03370, CONCRETE CURING, for a period of 10 days.
- B. Curing shall not cause erosion of shotcrete.
- C. Do not membrane cure shotcrete.
- D. Intermediate Layers of Shotcrete:
  1. Keep damp by hand curing or other means.
  2. Water curing is not required if next layer of shotcrete is applied within 12 hours of previous layer.
  3. Avoid indiscriminate use of continuous water curing, causing excessive deposits of free alkali on surface preventing bonding between layers.

### 3.8 FIELD QUALITY CONTROL

- A. Wet Mix Process: Take shotcrete cylinders from mixer or ready-mix truck and test as specified in Section 03300, CAST-IN-PLACE CONCRETE.
- B. Shotcrete evaluation will be based on results obtained from cylinders and drilled cores in accordance with ASTM C1140 and the MAG Specifications Section 725.10 and 725.11. Not less than four core cylinder specimens shall be taken and tested at 28 days for each 100 cubic yards of concrete.
- C. Use of data obtained from impact hammers, ultrasonic equipment, or nondestructive testing devices is not permitted. However, these devices may be used for determining uniformity of shotcrete.
- D. Remove and replace shotcrete found not meeting tests, or cut cores and further test shotcrete, or repair and replace as approved by RESIDENT ENGINEER.

### 3.9 MANUFACTURER'S FIELD SERVICE

- A. Provide the services of a qualified technical representative of manufacturer of polypropylene fibers to instruct the concrete supplier in proper batching and mixing of materials to be provided.

END OF SECTION

**SECTION 03370  
CONCRETE CURING**

**PART 1 GENERAL**

**1.1 SUBMITTALS**

**A. Shop Drawings:**

1. Curing methods proposed.
2. Manufacturers' data for the following products:
  - a. Evaporation retardant.
  - b. Curing compound.

**B. Quality Control Submittals:**

1. Curing Compound: Manufacturer's Certificate of Compliance showing moisture retention requirements.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

**A. Curing Compound:**

1. Solvent-based, high chlorinated rubber solids content curing compound meeting requirements of ASTM C309-89.
  - a. Moisture Loss: 0.030 gm/square cm/72 hours maximum.
  - b. Capable of meeting moisture retention with one coat.
2. Manufacturers and Products:
  - a. Master Builders Co., Cleveland, OH; Masterkure CR.
  - b. Euclid Chemical Co., Cleveland, OH; Euco Super Floor Coat.
  - c. No "or-equal" or substitute products will be considered.

**B. Evaporation Retardant:**

1. Optional: Fluorescent color tint that disappears completely upon drying.
2. Manufacturers and Products:
  - a. Master Builders Co., Cleveland, OH; CONFILM.
  - b. Euclid Chemical Co., Cleveland, OH; Eucobar.
  - c. No "or-equal" or substitute products will be considered.

**C. Water: Clean and potable, containing less than 50 ppm of chlorides.**

## **PART 3 EXECUTION**

### **3.1 CURING OF CONCRETE**

A. Use one of the following methods as approved by RESIDENT ENGINEER:

1. Walls:

- a. General: Where walls are to receive coatings, painting, cementitious material, or other similar finishes, or where solvent-based coatings are not permitted, use only water curing procedures.
- b. Method 1: Leave concrete forms in place and keep entire surfaces of forms and concrete wet for 10 days.
- c. Method 2: Apply curing compound, where allowed, immediately after removal of forms.
- d. Method 3: Continuously sprinkle with water 100 percent of exposed surfaces for 10 days starting immediately after removal of forms.

2. Slabs and Curbs:

- a. Method 1: Protect surface by water ponding for 10 days.
- b. Method 2: Cover with burlap or cotton mats and keep continuously wet for 10 days.
- c. Method 3: Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously wet for 10 days.
- d. Method 4: Continuously sprinkle exposed surface for 10 days.
- e. Other agreed upon method that will keep moisture present and uniform at all times on surface of slabs. Do not use curing compounds.
- f. Protect slabs during cold weather with plastic sheets or other material inside required heated enclosure if foot traffic is permitted on slabs.

B. Use only water curing methods where solvents in the curing compounds are prohibited by state or federal air quality laws.

C. Use only water curing where additional finishes such as clear sealer, hardeners, painting, and other special coatings are required.

### **3.2 EVAPORATION RETARDANT APPLICATION**

A. Spray onto surface of fresh flatwork concrete immediately after screeding to react with surface moisture.

B. Reapply as needed to ensure a continuous moist surface until final finishing is completed.

### **3.3 MANUFACTURER'S SERVICES**

A. Provide manufacturer's representative at site in accordance with Section 01640, MANUFACTURERS' SERVICES, for installation assistance, inspection, and certification of proper installation for products specified.

- B. Provide curing compound manufacturer's representative to demonstrate proper application of curing compound to show coverage in one coat.

END OF SECTION

**SECTION 03400  
PRECAST CONCRETE**

**PART 1 GENERAL**

**1.1 SUBMITTALS**

**A. Shop Drawings:**

1. Sealer for Exterior Surfaces: Product data with mixing/application instructions.
2. Setting mortar mix design proposed.

**B. Quality Control Submittals:**

1. Complete list of architectural panelwork accomplished in past 2 years, including:
  - a. Type of structure.
  - b. Name of owner.
  - c. Address of completed work.
2. Certificate of Compliance: Certify admixtures and concrete do not contain calcium chloride.
3. Test Reports:
  - a. For precast manufacturer's concrete test cylinders.
  - b. Inspection of installed curb and seat panels.

**1.2 QUALITY ASSURANCE**

**A. Qualifications of Precasting Manufacturers:**

1. Precast Concrete and Precast Prestressed Concrete: Product of manufacturer with 3 years' experience producing precast concrete products of quality specified.

**B. Sample:**

1. One 12-inch by 12-inch sample for OWNER's confirmation of acceptable finish.
2. Additional samples (2 maximum) for adjusting finish acceptability.

**C. MockUp for Precast Pilaster Cap, Sphere, Curb and Wall Seat Caps:**

1. Construct:
  - a. One full-size sample of each type of precast component.
  - b. One 24 foot typical wall segment, utilizing approved sample components installed as shown and specified. Location of wall segment shall be approved by RESIDENT ENGINEER.
  - c. Sample components and typical wall segment shall be in accordance with details shown using materials, finish, forming systems, reinforcing details, cast-in inserts, drill-in dowels, mix proportions, and as specified and approved.

2. Finish:
  - a. Sample component finish constitutes standard of quality required in completed Work.
3. If sample component does not represent quality required, construct additional sample components or wall segments until approved by RESIDENT ENGINEER. Remove all sample components and typical wall segment that are not approved.
4. Protect and maintain approved sample components and typical wall segments at location selected by RESIDENT ENGINEER, or until RESIDENT ENGINEER approves installation in their respective locations in the Project.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Formwork:
  1. One-piece, full length and without seams except for spheres which may have a horizontal seam at mid-height.
  2. As specified in Section 03100, FORMWORK.
- B. Reinforcing Steel: As specified in Section 03210, REINFORCING STEEL.
- C. Cement: As specified in Section 03300, CAST-IN-PLACE CONCRETE.
- D. Aggregates: As specified in Section 03300, CAST-IN-PLACE CONCRETE, for 3/4-inch maximum size.
- E. Admixtures: As specified in Section 03300, CAST-IN-PLACE CONCRETE.
- F. Embedded Items:
  1. ASTM A36-90 steel.
  2. As specified in section 05500, METAL FABRICATIONS.
- G. Grout: Nonshrink, nonmetallic Type II grout as specified in Section 03600, GROUT.
- H. Setting Mortar
  1. Cement: ASTM C150-89, Type II, portland cement.
  2. Lime: ASTM C207-91, Type S hydrated.
  3. Aggregate: ASTM C144-89, sand.
  4. Water: Fresh, clean, potable.
  5. Mix Proportions: In accordance with ASTM C270-89, Type M.
  6. Machine mix in approved mixers.
  7. Keep mixer drums clean and free of debris and dried mortar.
  8. Mix by placing 1/2 water and 1/2 aggregate in operating mixer.
  9. Add cement.
  10. Add remaining aggregate and water and mix for at least 2 minutes.

11. Add lime and continue mixing as long as needed to secure a uniform mass, but not less than 3 minutes after addition of lime.

I. Sealer for Exposed Surfaces:

1. Silane Sealer: One-component penetrating sealer, hydrophilic (isopropyl alcohol as a carrier) with 40 percent active ingredients.
2. Manufacturers:
  - a. Master Builders Co.
  - b. Euclid Chemical Co.

2.2 CONCRETE MIX

- A. As specified in Section 03300, CAST-IN-PLACE CONCRETE.
- B. Design Strength: 4,000 psi at 28 days.
- C. Water/Cement Ratio: 0.40 maximum.
- D. Fly ash is not required.

2.3 DESIGN REQUIREMENTS

- A. Precast Components:
  1. Stresses: Limit tensile stress in the components, from all handling and installation loads, to that less than that which would cause cracking.
  2. Design pickup locations and reinforce to withstand handling and erection loads. Pickup locations shall not be visible after installation of components.

2.4 FABRICATION

- A. General:
  1. Reinforcing Steel:
    - a. Place in position before concrete is cast.
    - b. Keep clean and free from form oil or other substances harmful to bond.
  2. Forms: Produce smooth surfaces.
  3. Concrete: Deposit, vibrate, finish, and cure in accordance with recommended practices of ACI 304R-89. Steam curing is permitted.
  4. Coordinate dimensions, determine type, quantity, size, and location of, and furnish necessary embedded items in precast concrete. Coordinate location of embedded items and anchor holes in cast-in-place concrete necessary to connect precast items.
- B. Precast Components:
  1. Furnish or cut special shapes for corners and other areas shown or required. Miter joints as shown.
  2. Special units shall match color and texture of standard components.

3. Where components are placed so end of a component is exposed, such as at a corner or intersection, the exposed end of that component shall have surface to match color and texture of sides of other components.
4. Furnish sound, dry, clean components free of cracks, prior to placing in structure.

C. Surface Finish for Precast Curb and Wall Seat Panels:

1. Light sandblast.
2. Meet standard of quality represented by approved sample components.
3. Furnish components from same manufacturer.

D. Sealer:

1. Apply to exposed surfaces of precast components, at site, after sandblasting, in accordance with manufacturer's instructions.
2. Protect surface until installed in the Work.
3. Repair damage as approved by manufacturer.

2.5 SOURCE QUALITY CONTROL

- A. Prepare minimum three standard concrete test cylinders for each 50 cubic yards of concrete placed in the precast work or every weeks precast component production in accordance with ASTM C31-90a.
- B. Test and record concrete strengths.

**PART 3 EXECUTION**

3.1 PREPARATION FOR SETTING PRECAST COMPONENTS

- A. Clean surfaces of loose material and lightly sandblast prior to initial mortar placement.
- B. Prevent surface damage to top of wall or pilaster concrete that will be exposed to view outside of contact area.

3.2 ERECTION

- A. Verify that anchorage inserts are in correct locations.
- B. Handle and erect precast concrete with care as recommended by manufacturer.
- C. Erect precast units plumb, straight, level, square, and in proper alignment.
- D. Secure units in place and shim and brace to maintain position, stability, and alignment until permanently connected.
- E. Field Cutting: Not allowed without prior approval of RESIDENT ENGINEER.

### 3.3 MORTAR JOINTS

#### A. General:

1. Straight, clean, with uniform thickness.
2. Horizontal and vertical mortar joints shall have full mortar coverage.
3. Fill vertical head joints solid.
4. Place mortar before initial setting of cement takes place. Do not retemper mortar that has started to set.

#### B. Exposed Joints:

1. Tool joints exposed to view after final construction, unless otherwise noted or shown.
2. Cut joints flush and, as mortar takes its initial set, tool to provide a concave joint.
3. Perform tooling when mortar is partially set but still sufficiently plastic to bond.
4. Perform tooling with a tool which compacts mortar, pressing excess mortar out rather than dragging it out.
5. Rake out joints which are not tight at time of tooling, point, and then tool.
6. Rake and tool joints at split-face surfaces, interior, and exterior.

#### C. Concealed Joints: Strike flush with no further treatment required.

#### D. Moisture Protection: Protect mortar from loss of moisture during curing period of 3 days. Protect for 7 days when ambient air temperature is 90 degrees F or greater and when relative humidity is less than 50 percent.

#### E. Grout Anchor Dowels: Type II Grout as specified in Section 03600, GROUT. Install as specified in Section 03215, DOWELING IN CONCRETE.

### 3.4 PATCHING

#### A. Mix and place patching mixture to match color and texture of surrounding concrete and to minimize shrinkage. Patch as specified in Section 03300, CAST-IN-PLACE CONCRETE.

#### B. Demonstrate patching method and obtain acceptance and approval.

### 3.5 FINISHING

#### A. Light sandblast exposed surfaces as recommended by the Precast/Prestressed Concrete Institute (PCI) "Architectural Precast Concrete Manual," and as shown on the approved sample precast component.

3.6 FIELD QUALITY CONTROL

A. Inspection:

1. With RESIDENT ENGINEER, inspect precast pilaster cap, sphere, curb and wall seat components for chips, cracks, discoloration, and other damage.
2. Compare every component to approved sample component.
3. Record location and condition of damaged or nonmatching components.

B. Resolution:

1. Repair damage to satisfaction of RESIDENT ENGINEER and OWNER.
2. Remove components with damage or repairs not acceptable to RESIDENT ENGINEER.
3. Install new acceptable components in place of those removed.
4. Perform reinspection and obtain acceptance by RESIDENT ENGINEER.

- C. OWNER will test mortar. Provide adequate facilities for safe storage and proper curing of mortar samples onsite for first 24 hours, and for additional time as may be required before transporting to test lab.

3.7 PROTECTION

- A. Protect precast components from chipping, spalling, cracking, staining or other damage after delivery to the site, and after installation until acceptance by the OWNER.

END OF SECTION

**SECTION 03600  
GROUT**

**PART 1 GENERAL**

**1.1 SUBMITTALS**

- A. Shop Drawings: Product data of grouts.
- B. Quality Control Submittals:
  - 1. Manufacturer's Certificate of Compliance:
    - a. Grout free from chlorides and other corrosion-causing chemicals.
    - b. Nonshrink grout properties of Categories II, verifying expansion at 3 or 14 days will not exceed the 28-day expansion and nonshrink properties are not based on gas or gypsum expansion.
  - 2. Manufacturer's Certificate of Proper Installation.
  - 3. Statements of Qualification: Nonshrink grout manufacturer's representative.
  - 4. Test Reports:
    - a. Test report for 24-hour evaluation of nonshrink grout. Independent testing laboratory to certify that testing was conducted within the past 18 months.
    - b. Test results and service report from the demonstration and training session, and from field tests.
    - c. Field test reports and laboratory test results for field-drawn samples.

**1.2 QUALIFICATIONS**

- A. Nonshrink Grout Manufacturer's Representative: Authorized and trained representative of grout manufacturer. Minimum of 1-year experience that has resulted in successful installation of grouts similar to those for this Project.

**1.3 GUARANTEE**

- A. Manufacturer's guarantee shall not contain disclaimer on the product data sheet, grout bag, or container limiting responsibility to only the purchase price of products and materials furnished.
- B. Manufacturer guarantees participation with CONTRACTOR in replacing or repairing grout found *defective* due to faulty materials, as determined by industry standard test methods.

**PART 2 PRODUCTS**

**2.1 NONSHRINK GROUT SCHEDULE**

- A. Furnish nonshrink grout for applications in grout category in the following schedule:

Application	Temperature Range	Max. Placing Time	
	40 to 100 deg F	20 min	Greater than 20 min
Filling tie holes	I	I	I
Through-bolt openings	II	II	II
Patching concrete walls	II	II	II

**2.2 NONSHRINK GROUT**

- A. Category I:

1. Nonmetallic and nongas-liberating flowable fluid.
2. Prepackaged natural aggregate grout requiring only the addition of water.
3. Test in accordance with ASTM C1107-91:
  - a. Flowable consistency 140 percent, five drops in 30 seconds, in accordance with ASTM C230-90.
  - b. Flowable for 15 minutes.
4. Grout shall not bleed at maximum allowed water.
5. Minimum strength of grout, 3,000 psi at 3 days, 5,000 psi at 7 days, and 7,000 psi at 28 days.
6. Manufacturers and Products:
  - a. Master Builders Co., Cleveland, OH; SET GROUT.
  - b. Euclid Chemical Co., Cleveland, OH; NS Grout.
  - c. Dayton Superior Corp., Miamisburge, OH; Sure-Grip High Performance Grout.

- B. Category II:

1. Nonmetallic, nongas-liberating flowable fluid.
2. Prepackaged natural aggregate grout requiring only the addition of water.
3. Aggregate shall show no segregation or settlement at fluid consistency at specified times or temperatures.
4. Test in accordance with CRD-C621-83 and ASTM C1107-91, Grade B:
  - a. Fluid consistency 20 to 30 seconds in accordance with CRD-C611-81.
  - b. Temperatures of 40, 80, and 100 degrees F.
5. 1 hour after mixing, pass fluid grout through flow cone with continuous flow.
6. Minimum strength of grout, 2,500 psi at 1 day, 4,500 psi at 3 days, and 7,000 psi at 28 days.

7. Maintain fluid consistency when mixed in 1- to 9-yard loads in ready-mix truck.
8. Manufacturers and Products:
  - a. Master Builders Co., Cleveland, OH; Master Flow 928.
  - b. Five Star Products Inc., Fairfield, CT; Five Star 100.
  - c. Euclid Chemical Co., Cleveland, OH; Hi Flow Grout.

### **PART 3 EXECUTION**

#### **3.1 NONSHRINK GROUT**

- A. General: Mix, place, and cure nonshrink grout in accordance with grout manufacturer's representative training instructions.
- B. Form Tie or Through-Bolt Holes: Provide nonshrink grout, Category I and II, fill space with dry pack dense grout hammered in with steel tool and hammer. Through-bolt holes, coordinate dry pack dense grout application with vinyl plug in Section 03100, CONCRETE FORMWORK and bonding agent in Section 03300, CAST-IN-PLACE CONCRETE.

#### **3.2 FIELD QUALITY CONTROL**

- A. Evaluation and Acceptance of Nonshrink Grout:
  1. Provide a flow cone and cube molds with restraining plates onsite. Continue tests during Project as demonstrated by grout manufacturer's representative.
  2. Perform flow cone and bleed tests, and make three 2-inch by 2-inch cubes for each 25 cubic feet of each type of nonshrink grout used. Restraining caps for cube molds in accordance with CRD-C-621-83.
  3. For large grout applications make three more cubes, one more flow cone test, including bleed test for each additional 25 cubic feet of nonshrink grout placed.
  4. Consistency: As specified in Article 2.2 NONSHRINK GROUT. Reject grout with consistencies outside range requirements.
  5. Segregation: As specified in Article 2.2 NONSHRINK GROUT. Reject grout when aggregate separates.
  6. Nonshrink grout cubes shall test equal to or greater than minimum strength.
  7. Strength Test Failures: Reject nonshrink grout work failing strength tests, remove and replace grout.
  8. Perform bleeding test to demonstrate grout will not bleed.
  9. Store cubes at 70 degrees F.
  10. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with CRD-C621-83.

#### **3.3 MANUFACTURER'S SERVICES**

- A. General:
  1. Coordinate demonstrations, training sessions, and applicable site visits with grout manufacturer's representative.

2. Provide and conduct onsite, demonstration and training sessions for bleed tests, mixing, flow cone measurement, cube testing, application, and curing for each category and type of nonshrink grout.
3. Coordinate necessary equipment and materials are available for demonstration.

B. Training:

1. Grout manufacturer's representative shall train CONTRACTOR to preform grout work.
2. Establish location at site and schedule time for grout manufacturer's demonstration and training session of proposed nonshrink grouts. Mix nonshrink grouts to required consistency, test, place, and cure on actual Project, e.g., baseplates and tie holes to provide actual on-the-job training.
3. Use minimum of five bags for grout Category II. Mix grout to fluid consistency and conduct flow cone and two bleed tests, make a minimum of six cubes for testing of two cubes at 1, 3, and 28 days. Use remaining grout for final Work. Training includes methods for curing grout.
4. Mix sufficient grout Category I for minimum of 15 tie holes.
5. Transport test cubes to an independent test laboratory and obtain test reports.

3.4 SUPPLEMENTS

A. The supplement listed below, following "END OF SECTION," is part of this Specification.

1. 24-Hour Evaluation of Nonshrink Grout Test Form and Grout Testing Procedures.

END OF SECTION

\_\_\_\_\_  
(Test Lab Name)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Phone No.)

### 24-HOUR EVALUATION OF NONSHRINK GROUT TEST FORM

OBJECTIVE: Define standard set of test procedures for an independent testing laboratory to perform and complete within a 24-hour period.

SCOPE: Utilize test procedures providing 24-hour results to duplicate field grouting demands. Intent of evaluation is establish grout manufacturer's qualifications.

PRIOR TO TEST: Obtain five bags of each type of grout.

1. From intended grout supplier for Project.
2. Five bags of grout shall be of same lot number.

ANSWER THE FOLLOWING QUESTIONS FOR GROUT BEING TESTED FROM LITERATURE, DATA, AND PRINTING ON BAG:

- A. Product data and warranty information contained in company literature and data? Yes \_\_\_\_\_ No \_\_\_\_\_
- B. Literature and bag information meet specified requirements? Yes \_\_\_\_\_ No \_\_\_\_\_
- C. Manufacturer guarantees grout as specified in Article GUARANTEE? Yes \_\_\_\_\_ No \_\_\_\_\_
- D. Guarantee extends beyond grout replacement value and allows participation with CONTRACTOR in replacing and repairing *defective* areas? Yes \_\_\_\_\_ No \_\_\_\_\_
- E. Water demands and limits printed on bag? Yes \_\_\_\_\_ No \_\_\_\_\_
- F. Mixing information printed on the bag? Yes \_\_\_\_\_ No \_\_\_\_\_
- G. Temperature restrictions printed on bag? Yes \_\_\_\_\_ No \_\_\_\_\_

\*Rejection of a grout will occur if one or more answers are noted NO.

### GROUT TESTING PROCEDURES

A. Bagged Material:

1. List lot numbers. \_\_\_\_\_
2. List expiration date. \_\_\_\_\_
3. Weigh bags and record weight. \_\_\_\_\_

RESIDENT ENGINEER will disqualify grout if bag weights have misstated measure plus or minus 2 pounds by more than one out of five bags. (Accuracy of weights is required to regulate amount of water used in mixing since this will affect properties.)

B. Mixing and Consistency Determination:

1. Mix full bag of grout in 10-gallon pail.
2. Use electric drill with a paddle device to mix grout (jiffy or jiffler type paddle).
3. Use maximum water allowed per water requirements listed in bag instructions.
4. Mix grout to maximum time listed on bag instructions.
5. In accordance with CRD-C611-81 (flow cone) determine time of mixed grout through the flow cone. \_\_\_\_\_ seconds
6. Add water to attain 20- to 30-second flow in accordance with CRD-C611-81.
7. Record time of grout through cone at new water demand. \_\_\_\_\_ seconds
8. Record total water needed to attain 20- to 30-second flow. \_\_\_\_\_ pounds
9. Record percent of water. \_\_\_\_\_ percent

C. When fluid grout is specified and additional water is required beyond grout manufacturer's listed maximum water, CRD-C621-83 will be run at new water per grout ratio to determine whether grout passes using actual water requirements to be fluid. Use new water per grout ratio on remaining tests.

D. Bleed Test:

1. Fill two gallon cans half full of freshly mixed grout at ambient temperatures for each category and at required consistency for each.
2. Place one can of grout in tub of ice water and leave one can at ambient temperature.

3. Cover top of both cans with glass or plastic plate preventing evaporation.
4. Maintain 38 to 42 degrees F temperature with grout placed in ice and maintain ambient temperature for second container for 1 hour.
5. Visually check for bleeding of water at 15-minute intervals for 2 hours.
6. Perform final observation at 24 hours.

If grout bleeds a small amount at temperatures specified, grout will be rejected.

E. Extended Flow Time and Segregation Test (for Category II):

1. Divide the remaining grout into two 3-gallon cans. Place the cans into the 40 degree F and 100 degree F containers and leave for 20, 40, and 60 minutes. Every 20 minutes remove and check for segregation or settlement of aggregate. Use a gloved hand to reach to the bottom of the can, if more than 1/4 inch of aggregate has settled to the bottom or aggregate has segregated into clumps reject the grout.
2. Right after the settlement test mix the grout with the drill mixer for 10 seconds. Take a CRD-C611-81 flow cone test of grout and record flow time. Maintain this process for 1 hour at ambient temperatures of 40 and 100 degrees F.
  - a. 20 min \_\_\_\_\_, sec. @ 40 degrees F.
  - b. 40 min \_\_\_\_\_, sec. @ 40 degrees F.
  - c. 60 min \_\_\_\_\_, sec. @ 40 degrees F.
  - d. 20 min \_\_\_\_\_, sec. @ 100 degrees F.
  - e. 40 min \_\_\_\_\_, sec. @ 100 degrees F.
  - f. 60 min \_\_\_\_\_, sec. @ 100 degrees F.

All Category II grout that will not go through the flow cone with continuous flow after 60 minutes will be disqualified.

Qualified \_\_\_\_\_ Disqualified \_\_\_\_\_

F. 24-Hour Strength Test:

1. Using grout left in mixing cans in accordance with CRD-C621-83 for mixing and consistency determination test and for extended time flow test, make minimum of nine cube samples.
2. Store cubes at 70 degrees F for 24 hours.
3. Record average compressive strength of nine cubes at 24 hours.

Grout will be disqualified if 24-hour compressive strengths are under 2,500 psi for grouts claiming fluid placement capabilities.

Grouts that have not been disqualified after these tests are qualified for use on the Project for the application indicated in Nonshrink Grout Schedule.

\_\_\_\_\_  
Signature of Independent Testing Laboratory

\_\_\_\_\_  
Date Test Conducted

**SECTION 05500  
METAL FABRICATIONS**

**PART 1 GENERAL**

**1.1 SUBMITTALS**

**A. Shop Drawings:**

1. Metal fabrications, including welding and fastener information.
2. Specific instructions for all phases of installation including hole size, preparation, placement, procedures, and instructions for safe handling of anchoring systems.

**B. Samples:**

1. Epoxy Anchors: Two self-contained epoxy adhesive cartridges for each batch of epoxy delivered to site, for independent testing.
2. Vinyl Ester Anchors: Two self-contained adhesive cartridges for each batch of adhesive delivered to site, for independent testing.

**C. Quality Control Submittals:**

1. Vinyl Ester and Epoxy Anchors:
  - a. Manufacturer's Certificate of Compliance.
  - b. Manufacturer's past project experience data.
  - c. Test reports for each batch of vinyl ester or epoxy delivered to site.
  - d. Manufacturer's Certificate of Qualification for installers.
  - e. Current test data indicating that cured adhesive anchors meet or exceed design loads.
2. Welders: Evidence of certification.

**1.2 QUALITY ASSURANCE**

**A. Qualifications:**

1. Welders: Certified in accordance with AWS D1.1-92, Chapter 5.
2. Vinyl Ester and Epoxy Anchor Manufacturers: Experience on at least three similar projects within the last 3 years.
3. Vinyl Ester and Epoxy Anchor Installers: Trained and certified by manufacturer.

**B. Regulatory Requirements:**

1. Anchoring Systems:
  - a. Current evaluation and acceptance reports by ICBO.

**C. Welding Procedures: Follow the requirements of AWS D1.1-92 and AWS D1.2-90.**

1.3 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Shipment:

1. Insofar as practical, factory assemble items specified herein.
2. Package and clearly tag parts and assemblies that are of necessity shipped unassembled, in a manner that will protect materials from damage, and facilitate identification and field assembly.

B. Storage of Epoxy Adhesive:

1. Store epoxy cartridges on pallets or shelving in a covered storage area.
2. Control temperature above 60 degrees F and dispose of cartridges if shelf life has expired.

C. Storage of Vinyl Ester Products:

1. Store components on pallets or shelving in a covered storage area with locking door.
2. Control temperature within 41 to 77 degrees F and dispose of product if shelf life has expired.

**PART 2 PRODUCTS**

2.1 MATERIALS

A. Unless otherwise indicated, meet the following requirements:

<u>Item</u>	<u>ASTM Specification</u>
Steel Shapes and Plates	A36-91
Steel Pipe	A501-89 or A53-90b, Type E or S, Grade B
Structural Steel Tubing	A500-90a, Grade B
Stainless Steel:	
Bars and Shapes	A276-92, AISI Type 316
Steel Plate, Sheet, and Strip	A167-92b, AISI Type 316
Bolts and Threaded Rods	A193-92, AISI Type 316, B8MN, B8M2, or B8M3
Nuts	A194-92a, AISI Type 316, B8MN, B8M2, or B8M3
Steel Bolts and Nuts:	
Carbon Steel	A307-92a or A36-90
High-Strength	A325-92a, Type 3

<u>Item</u>	<u>ASTM Specification</u>
Galvanized Steel Bolts and Nuts	A307-92a or A36-91, with A153-82 Zinc Coating, and ANSI B1.1-89
Eyebolts	A489-90
Threaded Rods	A36-91
Flat Washers (Unhardened)	F844-90; use A153-82 for Zinc Coating
Flat Washers (Hardened)	F436-92
Aluminum, Structural Shapes, and Plates	B209-92a and B308-92a, Alloy 6061-T6
Aluminum Bolts and Nuts	F468-90b, Alloy 2024-T4
Cast Iron	A48-92, Class 35

- B. Anchor Bolts: As shown and as specified.
- C. Antiseizing Lubricant: Lubricant shall contain substantial amounts of molybdenum disulfide, graphite, mica, talc, or copper. Use Loc Tite Co., Permatex.

## 2.2 ANCHORING SYSTEMS FOR CURED CONCRETE

### A. Epoxy Anchors:

1. Anchor Rod: Stainless steel threaded rod free of grease, oil, or other deleterious material with a 45-degree chisel point.
2. Epoxy Adhesive:
  - a. ASTM C881-90, Type 1, Grade 3, Class A, B, or C.
  - b. Two-component, 100 percent solids, nonsag, paste, insensitive to moisture, designed to be used in adverse freeze/thaw environments and gray in color.
  - c. Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.
3. Mixed Epoxy Adhesive: Nonsag paste consistency, with ability to remain in a 1-inch diameter overhead drilled hole without runout, having the following properties:
  - a. Slant Shear Strength, ASTM C881-90, No Failure In Bond Line, Dry/Moist Conditions: 5,000 psi.
  - b. Compressive Strength, ASTM D695-91: 14,000 psi, minimum.
  - c. Tensile Strength, ASTM D695-91: 4,500 psi.
  - d. Heat Deflection Temperature, ASTM D648 E2-82: 135 degrees F, minimum.
4. Epoxy Adhesive Packaging:
  - a. Disposable, self-contained cartridge system capable of dispensing both epoxy components in the proper mixing ratio, and fit into a manually or pneumatically operated caulking gun.
  - b. Cartridge Markings: Include manufacturer's name, batch number, mix ratio by volume, product expiration date, ANSI

hazard classification, and appropriate ANSI handling precautions.

5. Manufacturers and Products:
  - a. Adhesives Technology Corp., Kent WA 98031; Anchor-It Fastening Systems, HS 200 Epoxy Resin.
  - b. ITW Ramset/Red Head, Wood Dale, IL 60191; Epcon Ceramic 6 Epoxy Anchor System.
  - c. Covert Operations, Long Beach, CA 90853; CIA Epoxy Anchors with viscosity to suit application.
  - d. Rawl Plug Co., New Rochele, NY 10802; Rawl/Sika Foil Fast Epoxy Injection Gel System.

B. Adhesive Anchors:

1. Two-component vinyl ester adhesive, insensitive to moisture, designed to be installed in adverse freeze/thaw environments.
2. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions.
3. Container Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
4. Anchor Rods: Stainless steel threaded rods, sized by adhesive manufacturer for design loads required and adhesive system used.
5. Manufacturer and Product: Hilti, Inc., Tulsa, OK 74121; HIT Doweling Anchor System (HIT C-100).

C. Threaded Inserts: Ferrule loop inserts as shown. Richmond Screw Anchor Co., City of Industry, CA 91745.

2.3 FABRICATION

A. General:

1. Finish exposed surfaces smooth, sharp, and to well-defined lines.
2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in neat, substantial manner.
3. Conceal fastenings where practical; where exposed, flush countersink.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Round sharp edges to small uniform radius. Grind burrs, jagged edges, and surface defects smooth.
6. Material Thinner than 1/8 Inch: Either galvanize before fabrication in accordance with ASTM A525-91b, Coating Designation G210, or after fabrication in accordance with ASTM A123-89a, except the weight of zinc coating shall average minimum 1.2 ounces per square foot of actual surface area with no individual specimen having a weight of less than 1 ounce per square foot.

B. Materials: Use steel shapes unless otherwise noted.

C. Fabrication:

1. Fit and assemble in largest practical sections for delivery to site.

2. Fabricate as shown on Drawings and in accordance with ASTM A385-80.
3. Weld connections and grind exposed welds smooth.
4. Use fasteners as shown or scheduled.
5. Grind cut edges smooth and straight.

D. Finish:

1. ASTM A123-89a hot-dip galvanize after fabrication, unless otherwise noted.
2. For items embedded in concrete, coat with System No. 2 as specified in Section 09900, PAINTING.
3. Galvanize components of bolted assemblies separately before assembly. Galvanizing of tapped holes is not required.
4. Prepare galvanized surfaces to be painted in the field approximately 48 to 72 hours before painting as specified in Section 09900, PAINTING, System No. 10, Galvanized Metal Conditioning.
5. Completely seal edges of tightly contacting surfaces, where galvanizing is required, by welding before galvanizing.

E. Fitting: Where removal of fabrications is required or shown, cut, fit, and align items for smooth operation. Make corners square and opposite sides parallel.

F. Accessories: Furnish as required for a complete installation. Fasten by welding or with stainless steel bolts or screws.

## 2.4 WELDING

A. Steel:

1. Meet requirements of AWS D1.1-92 for techniques of welding employed, appearance, quality of welds made, and the methods of correcting *defective* work.
2. Meet visual acceptance standards of AWS D1.1-92, paragraph 8.15.1.
3. Complete welding before applying finish.

## PART 3 EXECUTION

### 3.1 INSTALLATION OF METAL FABRICATIONS

A. General:

1. Install metal fabrications plumb or level, accurately fitted, free from distortion or defects.
2. Install rigid, substantial, and neat in appearance.
3. Erect steel in accordance with applicable portions of AISC Code of Standard Practice, except as modified.
4. Install manufactured products in accordance with manufacturer's recommendations.
5. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

6. Field weld components indicated.
7. Perform field welding in accordance with AWS D1.1-92.
8. Obtain RESIDENT ENGINEER approval prior to site cutting or making adjustments not scheduled.
9. After erection, apply prime or galvanize coating to welds, abrasions, and surfaces not in contact with concrete.

### 3.2 ANCHOR BOLTS

- A. Accurately locate and hold anchor bolts in place with templates at the time concrete is placed.

### 3.3 ANCHORING SYSTEMS FOR CONCRETE

- A. Begin installation only after concrete or masonry receiving anchors have attained design strength.
- B. Do not install an anchor closer than six times its diameter to either an edge of concrete or masonry, or to another anchor, unless specifically shown otherwise.
- C. Install in accordance with manufacturer's specific quality control submittal instructions. Hole diameters are critical to installation, use only drills recommended by anchor manufacturer. Follow manufacturer's safe handling instructions.
- D. Epoxy or Adhesive Anchors: Do not install when temperature of concrete is below 40 degrees F or above 100 degrees F, unless stated otherwise in manufacturer's written instructions.
- E. Do not use epoxy anchors where ambient temperature will exceed 120 degrees F.
- F. Follow specific manufacturer safe handling practices when handling and installing concrete anchors.

### 3.4 MANUFACTURERS' SERVICES

- A. Epoxy and Vinyl Ester Anchors: Conduct site training of installation personnel for safe and proper installation, handling, and storage of epoxy or vinyl ester adhesive system. Notify RESIDENT ENGINEER of time and place for sessions.

END OF SECTION

**SECTION 07900  
JOINT SEALANTS**

**PART 1 GENERAL**

1.1 SUBMITTALS

- A. Shop Drawings: Surface preparation and installation instructions. Indicate where each product is proposed to be used.
- B. Samples: Material proposed for use showing color range available.
- C. Quality Control Submittals:
  - 1. Applicator Qualification: Documentation showing minimum of 5 years' experience installing sealants in projects of similar scope.
  - 2. Certificates of Compliance: Proposed materials meet Specification requirements.
- D. Contract Closeout Submittals: Special guarantee.

1.2 ENVIRONMENTAL REQUIREMENTS

- A. Ambient Temperature: Between 40 and 80 degrees F (4 and 27 degrees C) when sealant is applied. Consult manufacturer when sealant cannot be applied within these temperature ranges.

1.3 SPECIAL GUARANTEE

- A. Product: Furnish manufacturer's extended guarantee or warranty, with OWNER named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction or, at the option of the OWNER, removal and replacement of Work specified in this section found *defective* during a period of 5 years after the date of Substantial Completion. Duties and obligations for correction or removal and replacement of *defective* Work shall be as specified in the General Provisions.
- B. Conditions: No adhesive or cohesive failure of sealant.
- C. Sealed Joints: Watertight and weathertight with normal usage.

**PART 2 PRODUCTS**

2.1 SEALANT MATERIALS

- A. Sealant Characteristics:
  - 1. Uniform, homogeneous.
  - 2. Free from lumps, skins, and coarse particles when mixed.
  - 3. Nonstaining, nonbleeding.

4. Hardness of 15 minimum and 50 maximum, measured by ASTM C661 method.
- B. Sealant Color: Unless specifically noted, match the color of the concrete material adjoining the area of application.
- C. One-Part Polyurethane, Immersible:
1. Polyurethane base, single-component, moisture curing; ASTM C920-87, Type S, Grade NS or P, Class 25.
  2. Capable of being continuously immersed in water.
  3. Manufacturers and Products for Nonsag:
    - a. Sika Chemical Corp.; Sikaflex-1a.
    - b. Mameco International; Vulkem 116.
  4. Manufacturers and Products for Self-Leveling:
    - a. Sonneborn; Sonolastic SL-1.
    - b. Mameco International; Vulkem 45.

## 2.2 BACKUP MATERIAL

- A. Nongassing, extruded, closed-cell round polyethylene foam rod, compatible with sealant used, and as recommended by sealant manufacturer.
- B. Size: As shown or as recommended by sealant material manufacturer. Provide for joints greater than 3/16-inch wide.
- C. Manufacturers and Products:
1. Haveg Industries; Minicel.
  2. Dow Corning; Ethafoam SB.
  3. Sonneborn; Sonofoam.
  4. Hercules, Inc.; HBR.

## 2.3 ANCILLARY MATERIALS

- A. Bond Breaker: Pressure sensitive tape as recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Noncorrosive and nonstaining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Primer: Nonstaining type recommended by sealant manufacturer to suit application.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Use of more than one material for the same joint is not allowed unless approved by the sealant manufacturer.
- B. Install joint sealants in accordance with ASTM C1193-91.

- C. Horizontal and Sloping Joints of 1 Percent Maximum Slope: Use self-leveling (Grade P) joint sealant.
- D. Steeper Sloped Joints, Vertical Joints, and Overhead Joints: Use nonsag (Grade NS) joint sealant.
- E. Use joint sealant as required for the applicable application.

### 3.2 PREPARATION

- A. Verify that joint dimensions, and physical and environmental conditions, are acceptable to receive sealant.
- B. Surfaces to be sealed shall be clean, dry, sound, and free of dust, loose mortar, oil, and other foreign materials.
  - 1. Mask adjacent surfaces where necessary to maintain neat edge.
  - 2. Starting of work will be construed as acceptance of subsurfaces.
  - 3. Apply primer to dry surfaces as recommended by sealant manufacturer.
- C. Verify that joint shaping materials and release tapes are compatible with sealant.
- D. Examine joint dimensions and size materials to achieve required width/depth ratios.
- E. Carefully follow manufacturer's instructions for mixing multi-component products.

### 3.3 INSTALLATION

- A. Use joint filler to achieve required joint depths, to allow sealants to perform intended function.
  - 1. Install backup material as recommended by sealant manufacturer.
  - 2. Where possible, provide full length sections without splices; minimize number of splices.
  - 3. Tape sealant may be used as joint filler if approved by sealant manufacturer.
- B. Use bond breaker where recommended by sealant manufacturer.
- C. Joint Sealant Materials: Follow manufacturer's recommendation and instructions, filling joint completely from back to top, without voids.
- D. Joints: Tool slightly concave after sealant is installed.
  - 1. When tooling white or light color sealant, use a water wet tool.
  - 2. Finish joints free of air pockets, foreign embedded matter, ridges, and sags.

3.4 CLEANING

- A. Clean surfaces next to the sealed joints of smears or other soiling resultant of sealing application.
- B. Replace damaged surfaces resulting from joint sealing or cleaning activities.

END OF SECTION

**SECTION 09900  
PAINTING**

**PART 1 GENERAL**

1.1 DEFINITIONS

A. Terms used in this section:

1. Coverage: Total minimum dry film thickness in mils, or square feet per gallon.
2. FRP: Fiberglass Reinforced Plastic.
3. HCl: Hydrochloric Acid.
4. MDFT: Minimum Dry Film Thickness.
5. MDFTPC: Minimum Dry Film Thickness Per Coat.
6. Mil: Thousandth of an inch.
7. MIL-P: Military Specification - Paint.
8. PSDS: Paint System Data Sheet.
9. SFPG: Square Feet Per Gallon.
10. SFPGPC: Square Feet Per Gallon Per Coat.
11. SP: Surface Preparation.

1.2 SUBMITTALS

A. Shop Drawings:

1. Data Sheets:
  - a. For each paint system, furnish a Paint System Data Sheet (PSDS), the manufacturer's Technical Data Sheets, and paint colors available (where applicable) for each product used in the paint system. The PSDS form is appended to the end of this section.
  - b. Submit required information on a system-by-system basis.
  - c. Furnish copies of paint system submittals to the coating applicator.
  - d. Indiscriminate submittal of manufacturer's literature only is not acceptable.

B. Samples:

1. Reference Panel.
2. Unless otherwise specified, before painting work is started, prepare minimum 8- by 10-inch samples with type of paint and application specified on similar substrate to which paint is to be applied.
3. Furnish additional samples as required until colors, finishes, and textures are approved.
4. Approved samples to be the quality standard for final finishes.

C. Contract Closeout Submittals: Special guarantee.

### 1.3 QUALITY ASSURANCE

#### A. Qualifications:

1. Applicator's Experience: Minimum 5 years' experience in application of specified products.

#### B. Regulatory Requirements:

1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds.
2. Perform surface preparation and painting in accordance with recommendations of the following:
  - a. Paint manufacturer's instructions.
  - b. SSPC-PA Guide No. 3, Guide to Safety in Paint Applications.
  - c. Federal, state, and local agencies having jurisdiction.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- #### A.
- Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.

### 1.5 ENVIRONMENTAL REQUIREMENTS

- #### A.
- Do not apply paint in temperatures outside of manufacturer's recommended maximum or minimum allowable, or in dust, smoke-laden atmosphere, damp or humid weather.
- #### B.
- Do not perform abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air.

### 1.6 SPECIAL GUARANTEE

- #### A.
- Furnish manufacturer's extended guarantee or warranty, with OWNER named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at the option of the OWNER, removal and replacement of Work specified in this Specification section found *defective* during a period of 2 years after the date of Substantial Completion. Duties and obligations for correction or removal and replacement of *defective* Work as specified in the General Provisions.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- #### A.
- Coatings Manufacturers Code A (Able to supply most heavy-duty industrial coatings and architectural paints):
1. Ameron Protective Coatings, Brea, CA.
  2. Carboline Coatings Co., St. Louis, MO.
  3. Devoe & Raynolds Co., Louisville, KY.

4. DuPont Chemical Co., Wilmington, DE.
5. Hempel/Reliance Paints, Houston, TX.
6. Keeler and Long, Inc., Watertown, CT.
7. Master Builders, Inc., Cleveland, OH.
8. Plas-Chem Coatings, St. Louis, MO.
9. Porter-International, Louisville, KY.
10. Sigma Coatings, Inc., Harvey, LA.
11. Tnemec Coatings, Kansas City, MO.
12. Valspar Corp., Azusa, CA.
13. Wisconsin Protective Coatings, Green Bay, WI.

B. Fusion Bonded Coating Applicators Code E:

1. Industrial Operations, Inc., Phoenix, AZ.
2. Waterworks Manufacturing, Marysville, CA.
3. Water Specialties, Porterville, CA.

2.2 MATERIALS

A. General:

1. Material Quality: Manufacturer's highest quality products and suitable for intended service.
2. Materials Including Primer and Finish Coats: Produced by same manufacturer.
3. Thinners, Cleaners, Driers, and Other Additives: As recommended by manufacturer of the particular coating.

B. Products are listed below according to their approximate order of appearance in the systems. The letter designating the manufacturer code refers to Article MANUFACTURERS.

Product	Definition	Manufacturer Code
Coal-Tar Epoxy	Amine or phenolic epoxy type; 70 percent volume solids minimum, suitable for immersion service	A
Organic Zinc Rich Primer	Converted epoxy, epoxy/phenolic or urethane type, minimum 10 pounds metallic zinc content per gallon	A
Wash Primer	Vinyl butyral acid	A
Polyurethane Enamel	Two-component, aliphatic or acrylic based polyurethane; high gloss finish	A

Product	Definition	Manufacturer Code
Epoxy Primer	Polyamide, anticorrosive, converted epoxy primer containing rust-inhibitive pigments	A
Bituminous Paint	Single-component, coal-tar pitch based	A
Fusion Bonded Coating	100 percent solids, thermosetting, fusion bonded, dry powder epoxy or polyurethane resin, suitable for the intended service	E
Fusion Bonded, TFE Lube or Grease Lube	Tetrafluoroethylene, liquid coating; No. 62-4621-4830-5 as manufactured by 3M Co., St. Paul, MN; or open gear grease as supplied by McMaster-Carr Co., Elmhurst, IL; RL 736 manufactured by Amrep, Marietta, GA	E

2.3 MIXING

A. Multiple-Component Coatings:

1. Prepare using the contents of the container for each component as packaged by paint manufacturer.
2. No partial batches will be permitted.
3. Do not use multiple-component coatings that have been mixed beyond their pot life.
4. Furnish small quantity kits for touchup painting and for painting other small areas.
5. Mix only components specified and furnished by paint manufacturer.
6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

2.4 COLORS

- A. Formulate paints with colorants free of lead, lead compounds, or other materials that might be affected by presence of hydrogen sulfide or other gas likely to be present at the site.
- B. Colors shall be as selected by RESIDENT ENGINEER, unless noted otherwise.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Surface Preparation Verifications: Inspect and provide substrate surfaces prepared in accordance with these Specifications and the printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.

### 3.2 PREPARATION

- A. Shop Blast Cleaning: Handrails and guardrails may be shop prepared and primed. Centrifugal wheel blast cleaning is an acceptable alternate to shop blast cleaning.
- B. Field Abrasive Blasting: Perform blasting for items and equipment where specified and as required to restore damaged surfaces previously shop or field blasted and primed.
- C. Protection of Items not to be Painted:
  - 1. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted.
  - 2. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.

### 3.3 PREPARATION OF SURFACES

- A. Metal Surfaces:
  - 1. Where indicated, meet requirements of the following SSPC Specifications:
    - a. Solvent Cleaning: SP 1-82.
    - b. Hand Tool Cleaning: SP 2-89.
    - c. Power Tool Cleaning: SP 3-89.
    - d. White Metal Blast Cleaning: SP 5-91.
    - e. Commercial Blast Cleaning: SP 6-91.
    - f. Brush-Off Blast Cleaning: SP 7-91.
    - g. Pickling: SP 8-91.
    - h. Near-White Blast Cleaning: SP 10-91.
    - i. Power Tool Cleaning to Bare Metal: SP 11-91.
  - 2. The words "solvent cleaning", "hand tool cleaning", "wire brushing", and "blast cleaning", or similar words of equal intent in these Specifications or in paint manufacturer's specifications refer to the applicable SSPC Specifications.
  - 3. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Coating manufacturers' recommendations for wet blast additives and first coat application shall apply.
  - 4. Hand tool clean areas that cannot be cleaned by power tool cleaning.

5. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.
6. Welds and Adjacent Areas:
  - a. Prepare such that there is:
    - 1) No undercutting or reverse ridges on weld bead.
    - 2) No weld spatter on or adjacent to weld or any other area to be painted.
    - 3) No sharp peaks or ridges along weld bead.
  - b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
7. Preblast Cleaning Requirements:
  - a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
  - b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
  - c. Clean small isolated areas as above or solvent clean with suitable solvents and clean cloths.
8. Blast Cleaning Requirements:
  - a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer's recommendations.
  - b. Select type and size of abrasive to produce a surface profile that meets coating manufacturer's recommendations for particular primer to be used.
  - c. Use only dry blast cleaning methods.
  - d. Do not reuse abrasive, except for designed recyclable systems.
  - e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space entry (if required), and disposition of spent aggregate and debris.
9. Post-Blast Cleaning and Other Cleaning Requirements:
  - a. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wipe with a tack cloth.
  - b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.

### 3.4 SURFACE CLEANING METHODS

#### A. Brushoff Blast Cleaning:

1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC-SP 7-91, Brushoff Blast Cleaning.
2. Abrasive: Either wet or dry blasting sand, grit, or nut shell.
3. Select various surface preparation parameters such as size and hardness of abrasive, nozzle size, air pressure, and nozzle distance from surface such that surface is cleaned without pitting, chipping, or other damage.

4. Repair or replace surfaces damaged by blast cleaning.

B. Solvent Cleaning:

1. Consists of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by using solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods which involve a solvent or cleaning action.
2. Meets requirements of SSPC-SP 1-82.

3.5 APPLICATION

A. General:

1. Apply coatings in accordance with these Specifications and the paint manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.
2. Sand lightly between coats to achieve required finish.
3. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
4. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
5. Keep paint materials sealed when not in use.

B. Film Thickness:

1. Number of Coats: Minimum required without regard to coating thickness. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturers' products, and atmospheric conditions.
2. Maximum film build per coat shall not exceed coating manufacturer's recommendations.
3. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.

C. Damaged Coatings, Pinholes, and Holidays:

1. Feather edges and repair in accordance with recommendations of paint manufacturer.
2. Apply finish coats, including touchup and damage-repair coats in a manner which will present a uniform texture and color-matched appearance.

D. Unsatisfactory Application:

1. If item has an improper finish color, or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.

2. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather the edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.
3. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.
4. Repair defects in accordance with written recommendations of coating manufacturer.

3.6 CLEANUP

- A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at the end of each day.
- B. Upon completion of the Work, remove staging, scaffolding, and containers from the site or destroy in a legal manner.
- C. Completely remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

3.7 COATING SYSTEMS

- A. System No. 2 Concrete Embedded Metal:

Surface Prep.	Paint Material	Min. Coats, Cover
Abrasive Blast, or Centrifugal Wheel Blast (SP SP 5)	Polyamide, Anticorrosive Epoxy Primer	1 coat, 2.5 MDFT
	Coal-Tar Epoxy	2 coats, 16 MDFT

- B. System No. 5A Exposed Metal – Mildly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
System No. 10	Polyurethane Enamel	2 coats, 3 MDFT

- C. System No. 10 Galvanized Metal Conditioning:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1) Followed by Hand Tool (SP 2), Power Tool (SP 3)	Wash Primer or Coating Manufacturer's Recommendation	1 coat, 0.4 MDFT

D. System No. 11 Galvanized Metal Repair:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1-82) Followed by Hand Tool (SP 2-89), Power Tool (SP 3-89), or Brushoff Blast (SP 7-91)	Organic Zinc Rich Primer	1 coat, 3 MDFT

E. System No. 27 Aluminum and Dissimilar Metal Insulation:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1-82)	Wash Primer	1 coat, 0.4 MDFT
	Bituminous Paint	1 coat, 10 MDFT

F. System No. 29A Fusion Bonded, Steel Dowel Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
Abrasive Blast, or Centrifugal Wheel Blast (SP 10-91) or Acid Pickling (SP 8-91)	Fusion Bonded 100 Percent Solids Epoxy or Polyurethane	1 or 2 coats, 7 MDFT
TFE Lube, Shop Applied; Grease Lube Alternative, Field Applied Just Prior to Installation	TFE Lube or Grease Lube	1 coat, as required

3.8 APPLICATION SCHEDULE

- A. In accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from RESIDENT ENGINEER before starting work in question.
- B. System No. 2 Concrete Embedded Metal: Use on the following items or areas:
  - 1. Concrete embedded surfaces of metallic items, such as wall pipes, pipe sleeves and structural steel.

- C. System No. 5A Exposed Metal—Mildly Corrosive: Use on the following items or areas:
  - 1. Handrails and guardrails. Paint color to match Ameritone 1U52B, Mikado.
- D. System No. 10 Galvanized Metal Conditioning: Use on the following items or areas:
  - 1. Galvanized surfaces requiring painting.
- E. System No. 11 Galvanized Metal Repair: Use on the following items or areas:
  - 1. Galvanized surfaces that are abraded, chipped, or otherwise damaged.
- F. System No. 27 Aluminum and Dissimilar Metal Insulation: Use on concrete embedded aluminum surface.
- G. System No. 29A Fusion Bonded Coating: Use on expansion joint dowels as noted in Section 03251, EXPANSION, CONSTRUCTION, AND CONTROL JOINTS.
- H. Surfaces Not Requiring Painting: Unless otherwise stated or shown, the following areas or items will not require painting or coating:
  - 1. Concrete and masonry surfaces.
  - 2. Reinforcing steel.
  - 3. Nonferrous and corrosion-resistant ferrous alloys such as copper, bronze, monel, aluminum, chromium plate, atmospherically exposed weathering steel, and stainless steel, except where:
    - a. Required for electrical insulation between dissimilar metals.
    - b. Aluminum and stainless steel are embedded in concrete or masonry, or aluminum is in contact with concrete or masonry.
    - c. Color coding of equipment and piping is required.
  - 4. Nonmetallic materials such as glass, PVC, wood, porcelain, and plastic (FRP) except as required for architectural painting or color coding.
  - 5. Prefinished electrical and architectural items such as motor control centers, switchboards, switchgear, panelboards, transformers, disconnect switches (if prefinished in OSHA yellow), acoustical tile, cabinets, elevators, building louvers, and wall panels; color coding of equipment is required.
  - 6. Nonsubmerged electrical conduits attached to unpainted concrete surfaces.
  - 7. Cathodic protection anodes.
  - 8. Items specified to be galvanized after fabrication, unless specified elsewhere or subject to immersion.

9. Insulated piping and insulated piping with jacket will not require exterior coating, except as required for architectural painting or color coding.

(See PSDS form attached)

END OF SECTION

**PAINT SYSTEM DATA SHEET**

Complete and attach manufacturer's Technical Data Sheet to this PSDS for each coating system.

Paint System Number (from Spec.):		
Paint System Title (from Spec.):		
Coating Supplier:		
Representative:		
Surface Preparation:		
Paint Material (Generic)	Product Name/Number (Proprietary)	Min. Coats, Coverage

## 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  
(PERMITTEE)

*Assistant City Engineer*

Howard C. Hargis, P.E., Assistant City Engineer

4/21/95  
(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

Diane K. Noda  
Diane K. Noda  
Acting Chief, Regulatory Branch  
(for the District Engineer)

4 May 1995  
(DATE)

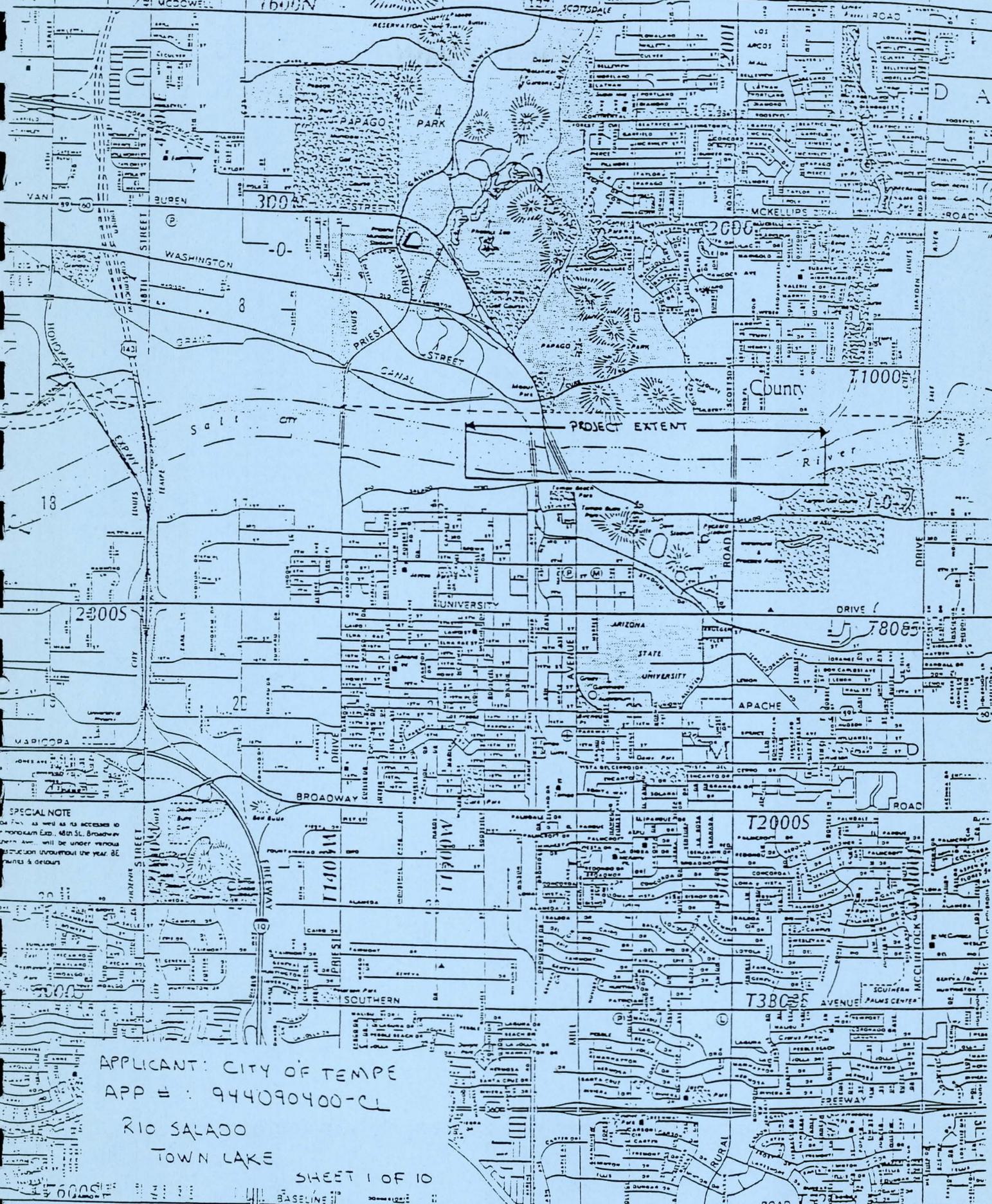
When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

\_\_\_\_\_  
(TRANSFEREE)

\_\_\_\_\_  
(DATE)

SPECIAL CONDITIONS  
PERMIT NO. 94-40904-00-CJL

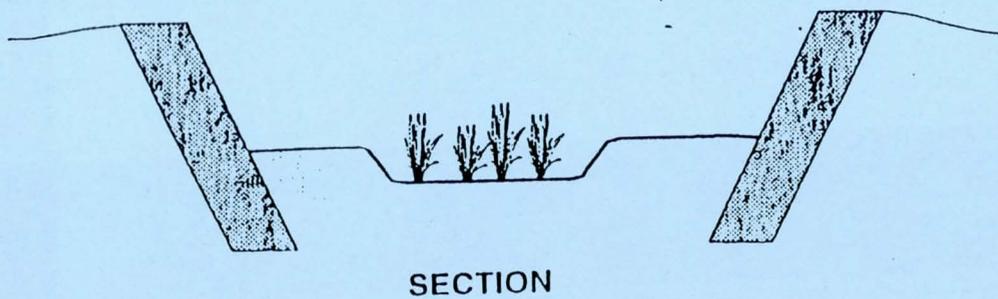
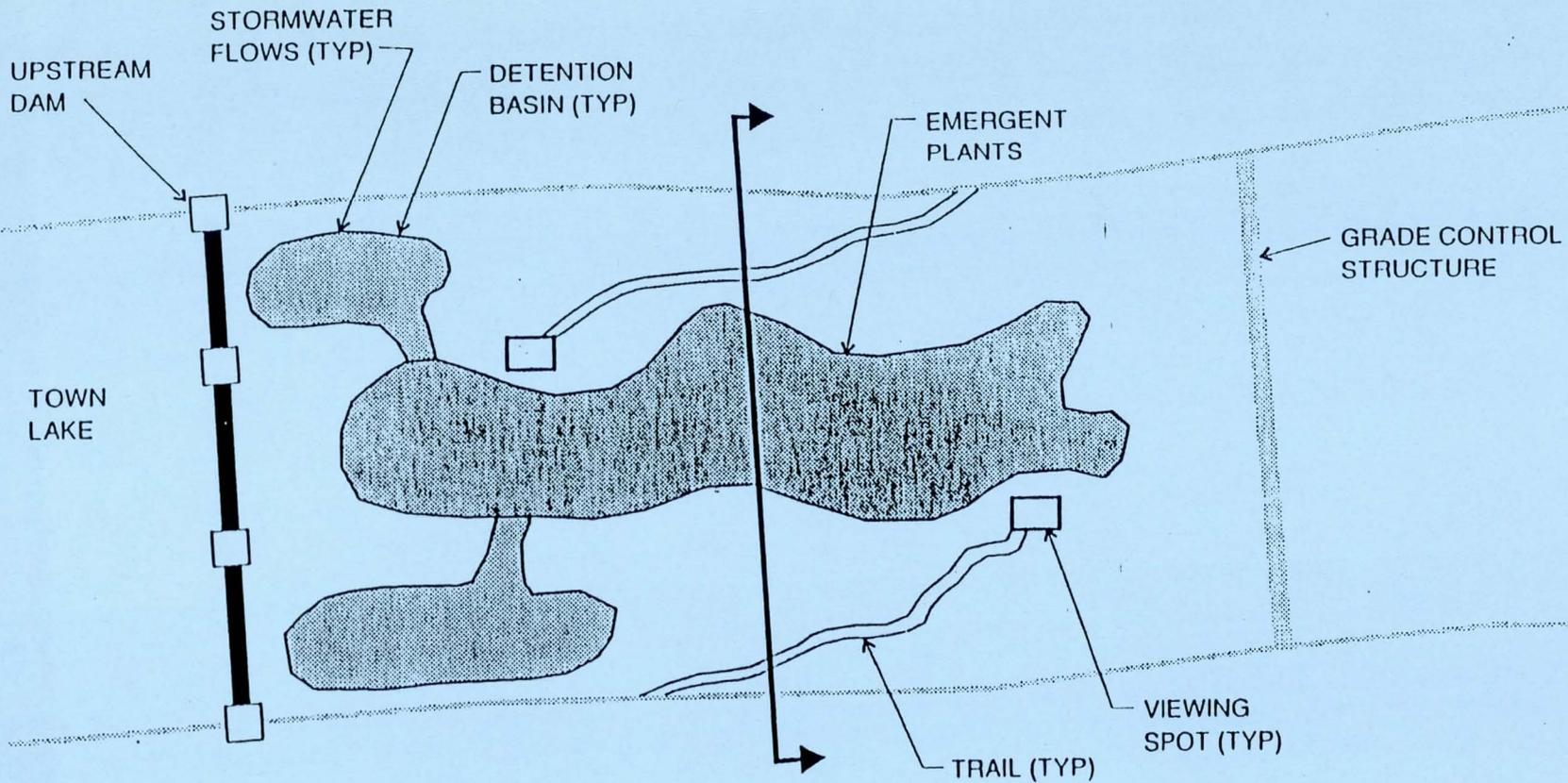
1. The permittee shall abide by the terms and conditions of the attached letter of water quality certification issued by the Arizona Department of Environmental Quality on March 13, 1995.



SPECIAL NOTE  
 The City of Tempe, Arizona, as well as its access to  
 information, shall be under various  
 restrictions throughout the year. See  
 notes & details.

APPLICANT: CITY OF TEMPE  
 APP # : 944090400-C1  
 RIO SALADO  
 TOWN LAKE

SHEET 1 OF 10



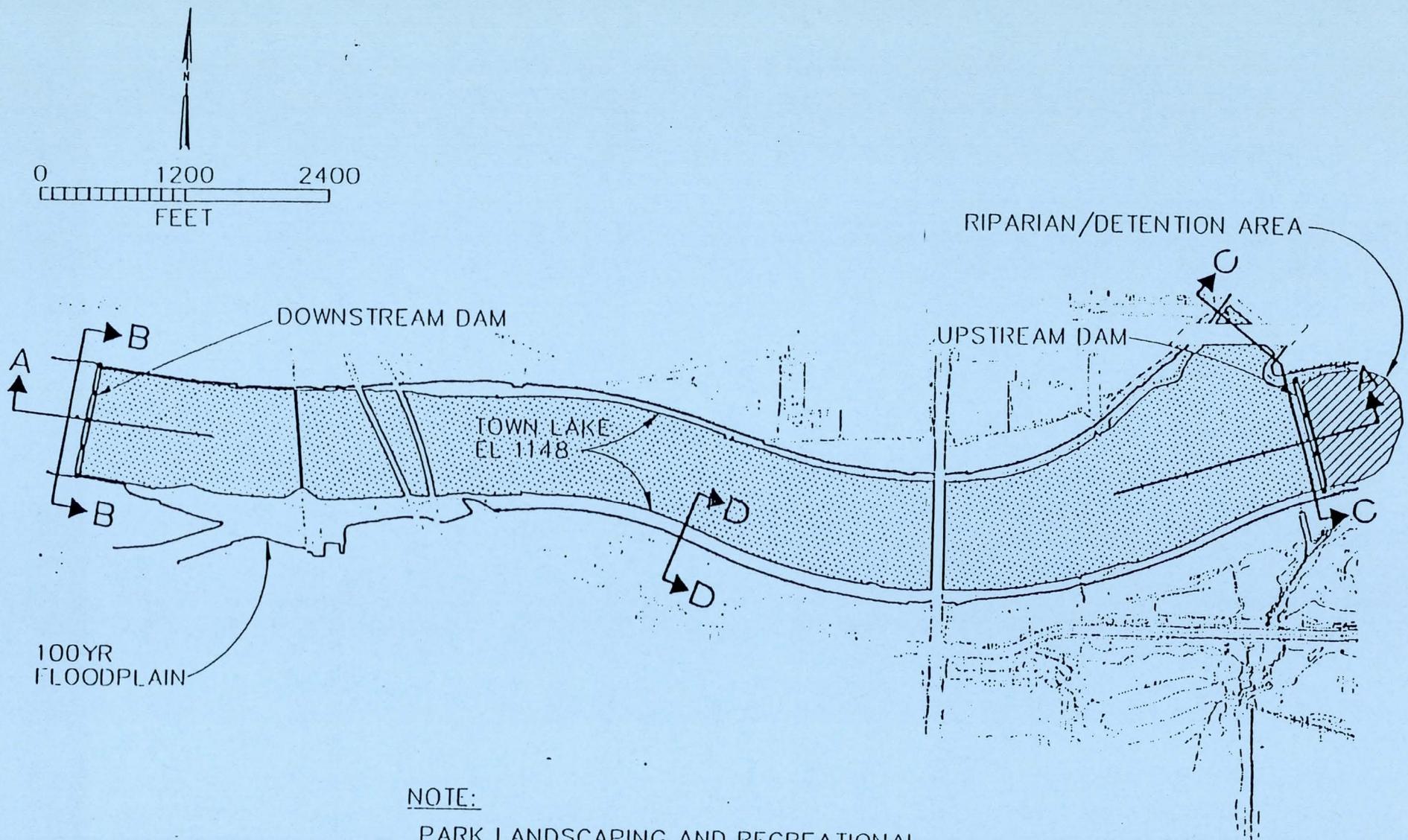
APPL: CITY OF TEMPE  
 APPL #: 944090900-CL  
 SHEET 3 OF 10

**RIPARIAN/DETENTION AREA**

Rio Salado COE 404  
 Permit Application



McCLINTOCK DRIVE



NOTE:

PARK LANDSCAPING AND RECREATIONAL AREAS WILL BE CREATED AROUND THE PERIMETER OF THE LAKE.

APPL: CITY OF TEMPE  
APPL #: 944090400-CL

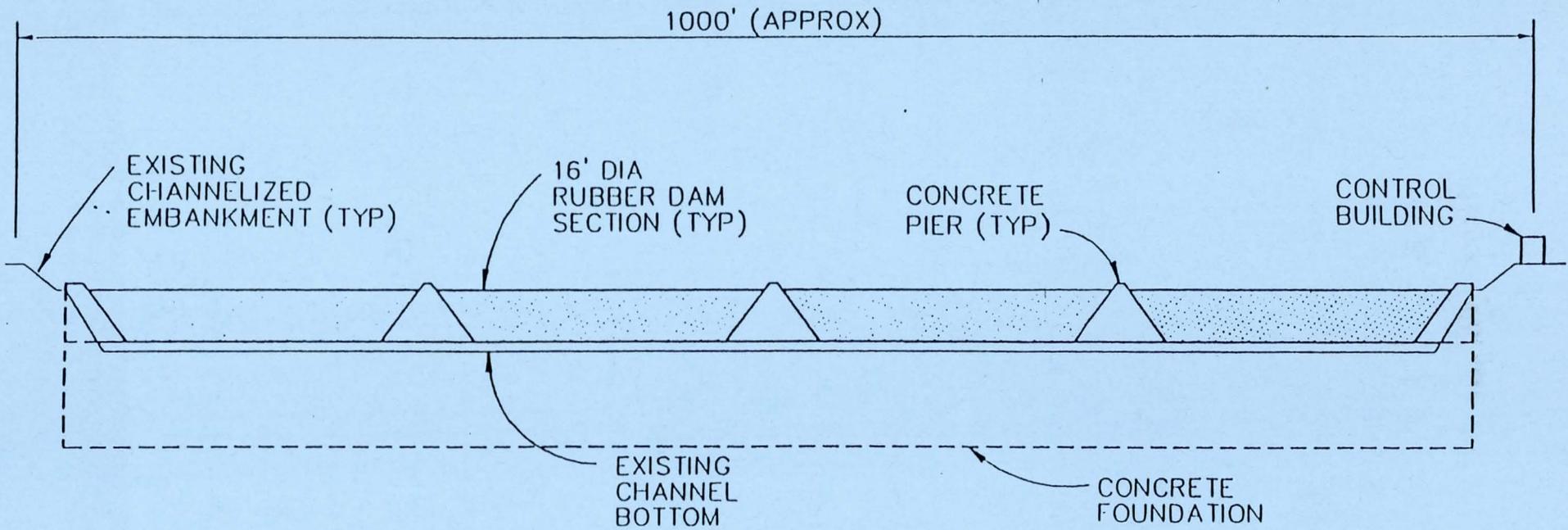
SHEET 5 OF 10

TOWN LAKE PLAN

RIO SALADO COE 404  
PERMIT APPLICATION



05-18-94



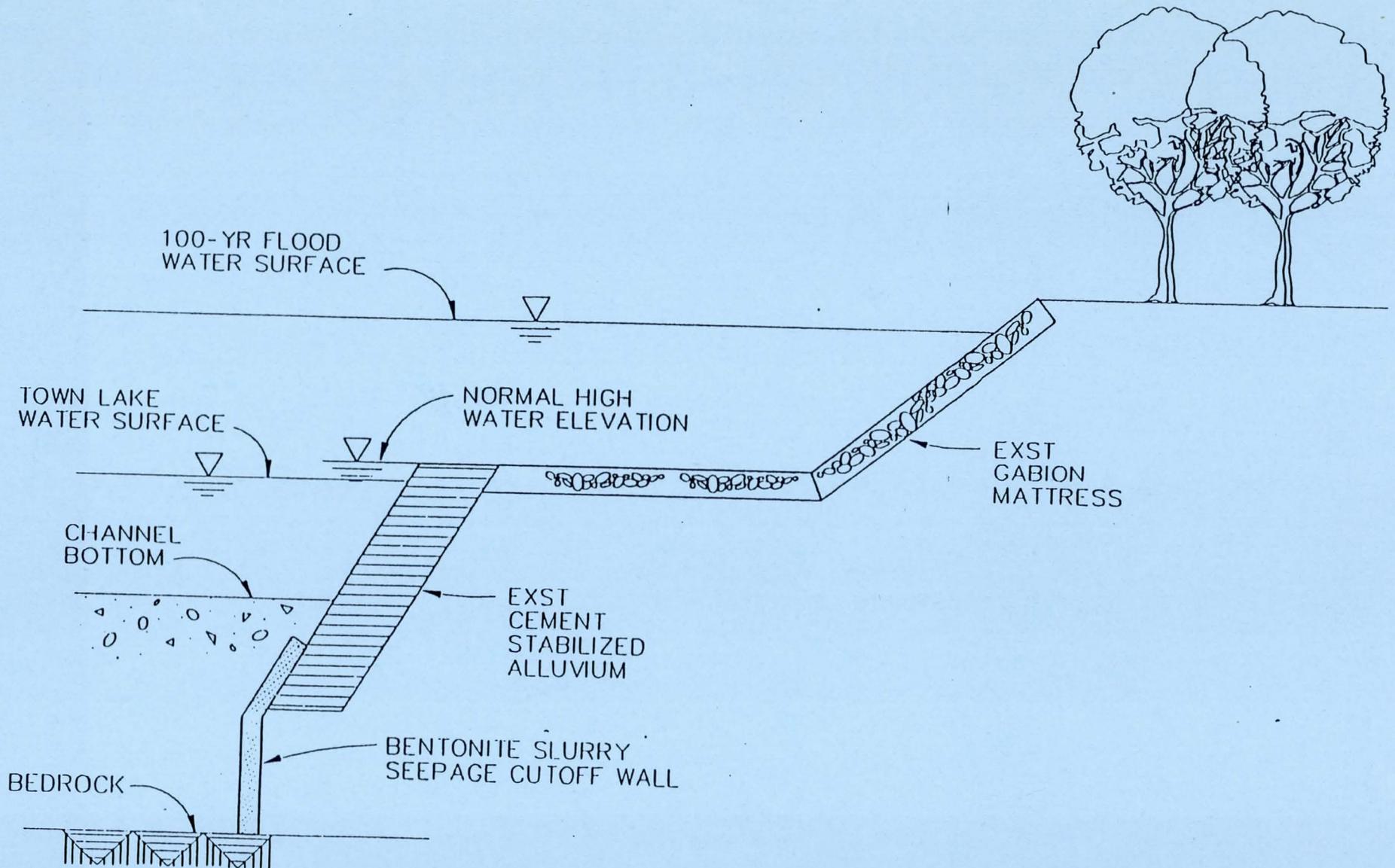
APPL: CITY OF TEMPE  
APPL #: 944090400-CL

SHEET 1 OF 10

SECTION B-B

RIO SALADO COE 404  
PERMIT APPLICATION





APPL: CITY OF TEMPE  
APPL #: 944090400-CL  
SHEET 9 OF 10

SECTION D-D  
RIO SALADO COE 404  
PERMIT APPLICATION



## 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 subcontractor 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.

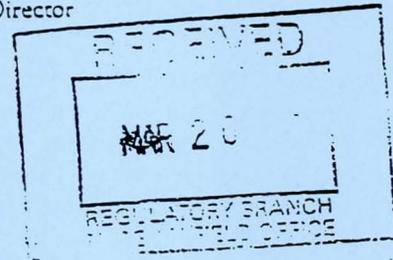
Necessary forms for the N.O.I., and the draft S.W.P.P.P. are contained in this booklet. Additional forms will be available through the City's Construction Project Manager and Inspector.



## 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.

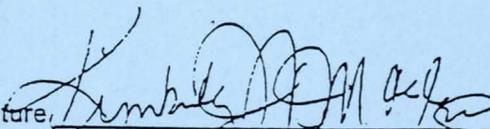
- e. Sampling for Total Petroleum Hydrocarbons (TPH) will be conducted monthly at the same locations as the nutrient and metals samples.
- f. Sampling for metals will commence at monthly intervals after the lake has been filled. Metals and nutrients may be sampled at the same time and location. A pattern 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 originally 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 coliform 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, \_\_\_\_\_



Kimberly W. MacEachern, Director  
Water Division

Date \_\_\_\_\_

Enclosure.

KWM:JRM:jrm

cc: James Romero, EPA Region 9  
Corps of Engineers Regulatory Branch - Phoenix  
Larry Rielly, AGFD  
Sam Spiller, USFWS

# INORGANIC CHEMISTRY TEST SETS

TO USE, CHECK:	SDW	PRIMARY STANDARDS	SECONDARY STANDARDS	SURFACE	SURFACE	PP METALS	DISS. METALS	TOTAL RECOV. METALS	MAJOR CATIONS/ ANIONS
	ALL INORGANIC			WATER-ALL INORGANICS	WATER NUTRIENTS				
	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			
PHOSPHOROUS						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.

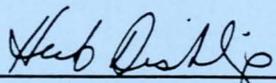
Legal description of the land on which recovered water will be used:

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  
Land Agent  
SI Land Services

Enclosure



ENCROACHMENT PERMIT  
AND INDEMNIFICATION AGREEMENT

This Encroachment Permit and Indemnification Agreement (the "Agreement") is entered into this 29<sup>th</sup> 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. Davis

Its

Assistant City Engineer

ARIZONA PUBLIC SERVICE COMPANY  
an Arizona corporation

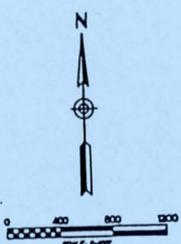
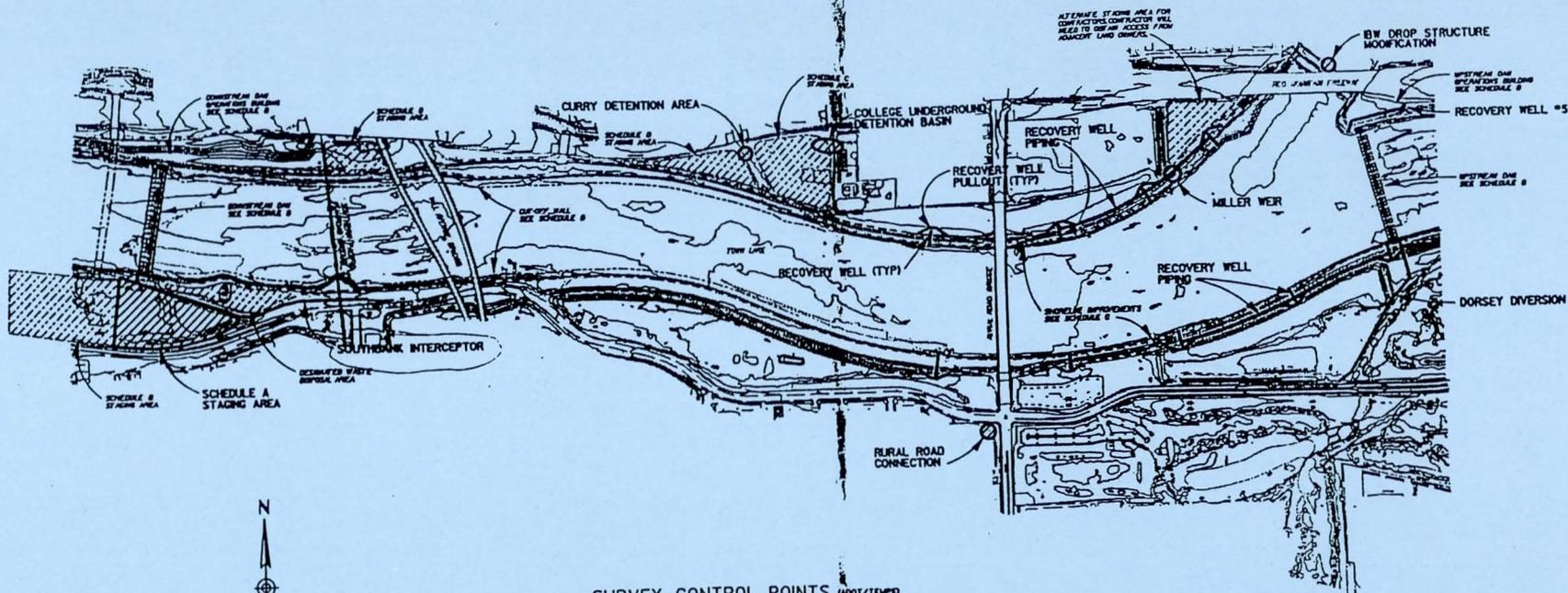
By

Michael A. Phett

Its

Acting Group Leader





**SURVEY CONTROL POINTS** (ADOT/TEMPO)

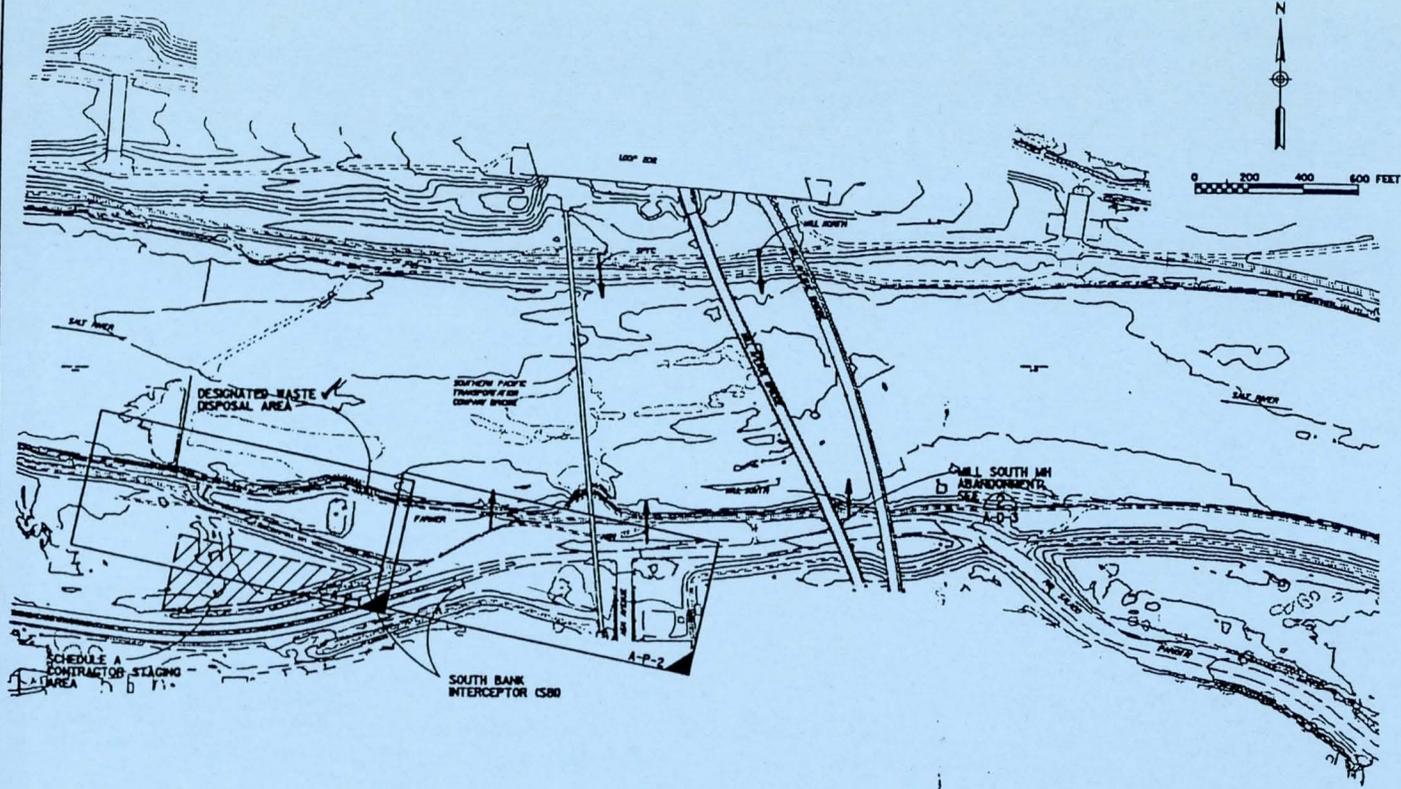
NO	N	E	ELEV	DESCRIPTION
174	283837.0774	297359.7527	867.70	B.C. IN HANDWELL AT CENTERLINE SCOTTSDALE RD 200' ± N INTERSECTION OF 1ST ST (RM OF HANDWELL PANEL PT)
57	284591.1000	292858.4872	148.72	1/2' NEAR FLUSH W/ GROUND 50' ± OF N FENCE TEMPE BEACH PARK 800' ± N. OF OLD MILL BRIDGE
527	28424.7598	294198.229	861.90	1/2' NEAR FLUSH W/ GROUND IN ACCESS ROAD S. BANK OF BORGATERCANAAL NEAR S. BORDER PAPAGO PARK (PANEL PT)
1	285853.95	290632.78		1/2' NEAR FLUSH W/ GROUND IN UPPER LEVEE
2	284891.86	290470.88		1/2' NEAR FLUSH W/ GROUND IN UPPER LEVEE
3	286000.00	300250.00		1/2' NEAR FLUSH W/ GROUND IN UPPER LEVEE
4	284887.93	300548.25		1/2' NEAR 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



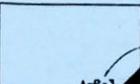
DEPARTMENT OF PUBLIC WORKS			
CITY OF TEMPE			
DIVISION OF ENGINEERING			
P.O. BOX 5032 TEMPE, ARIZONA 85280			
SURVEYED	DESCRIPTION	SCHEDULE A GENERAL	DATE APRIL 1996
DRAWN BY	CHECKED BY	SCALE 1"=400'	PROJECT NO. 946523A
OVERALL PROJECT PLAN			SHEET 6 OF 8
			DWG NO. A-C-6

PRELIMINARY 50% REVIEW



CONSTRUCTION NOTES

LEGEND

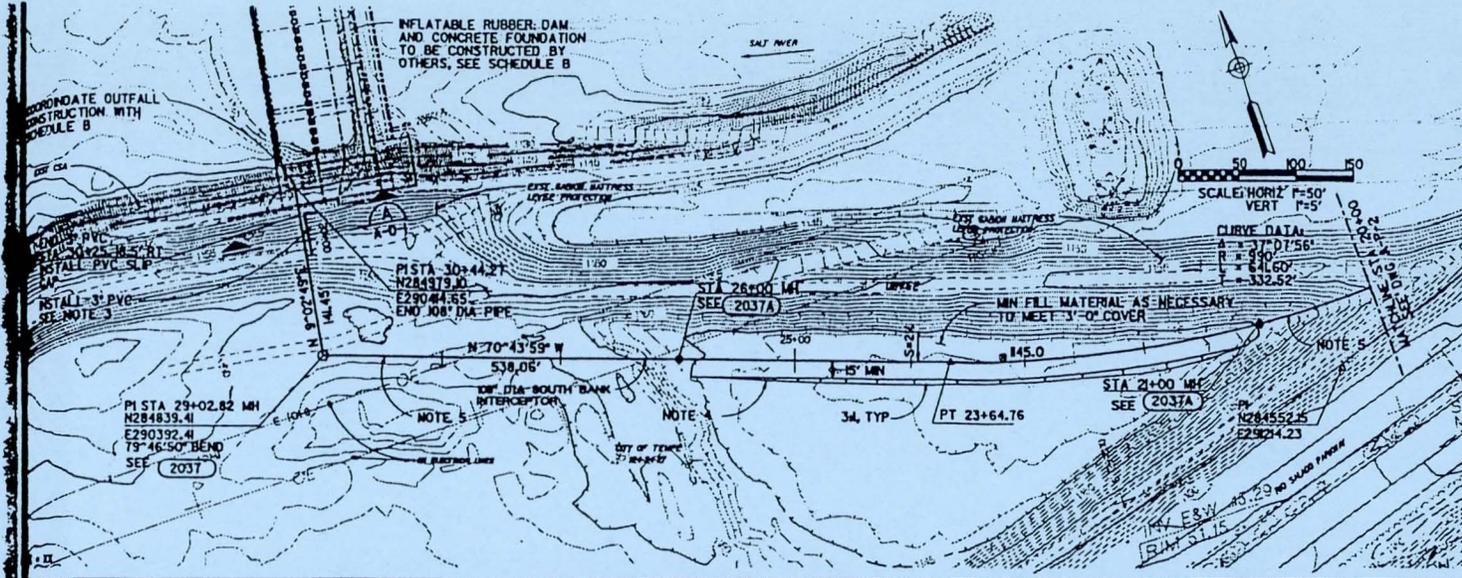
- EXISTING STORM DRAINS TO BE MODIFIED, SEE A-D-3
-  SHEET WINDOW AREA
-  DRAWING NO.
-  LOWER RIGHT HAND CORNER

3496001.dgn  
14-FEB-1996

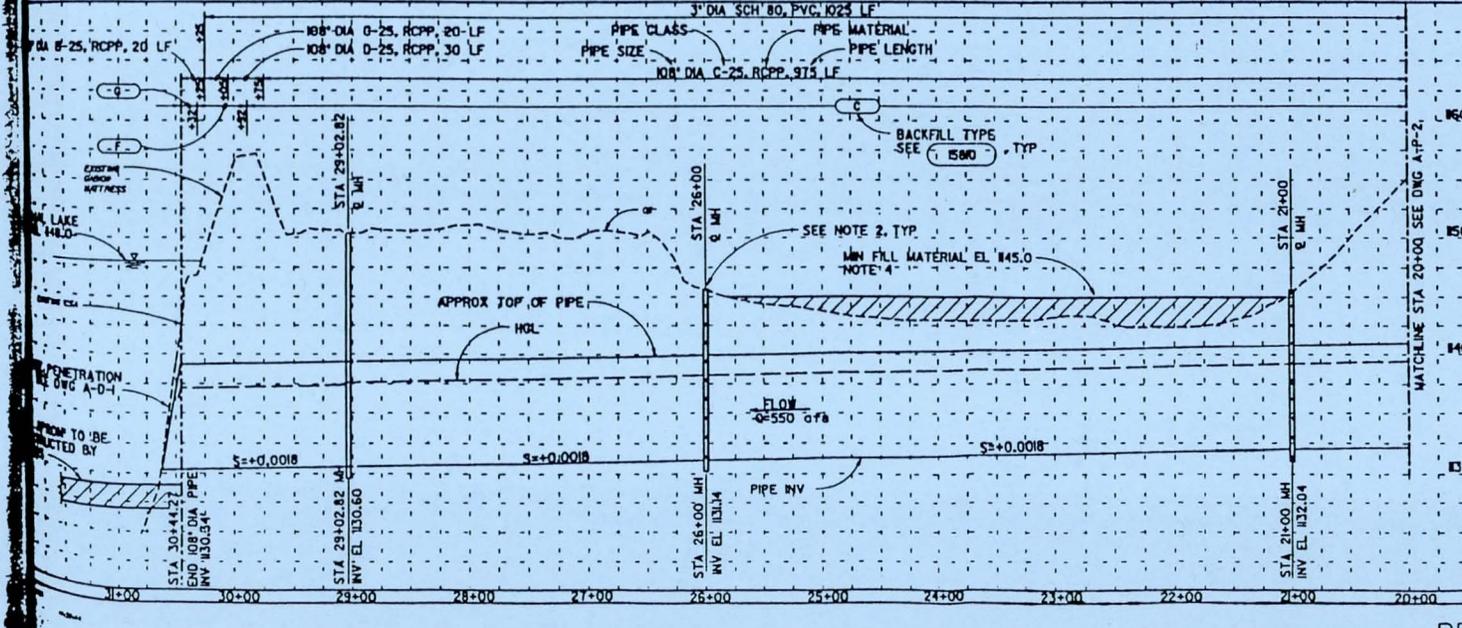


DEPARTMENT OF PUBLIC WORKS <b>CITY OF TEMPE</b> DIVISION OF ENGINEERING			
P.O. BOX 5008 TEMPE, ARIZONA 85280			
SUPERVISOR: SCHEDULE A DESIGNED: GENERAL DRAWN: STORMWATER DIVERSION CHECKED: PLAN WEST SCALE: 1"=200'	DATE: APRIL 1996 PROJECT NO.: 946523A SHEET X OF X DWG NO. A-D-7		

PRELIMINARY 90% REVIEW

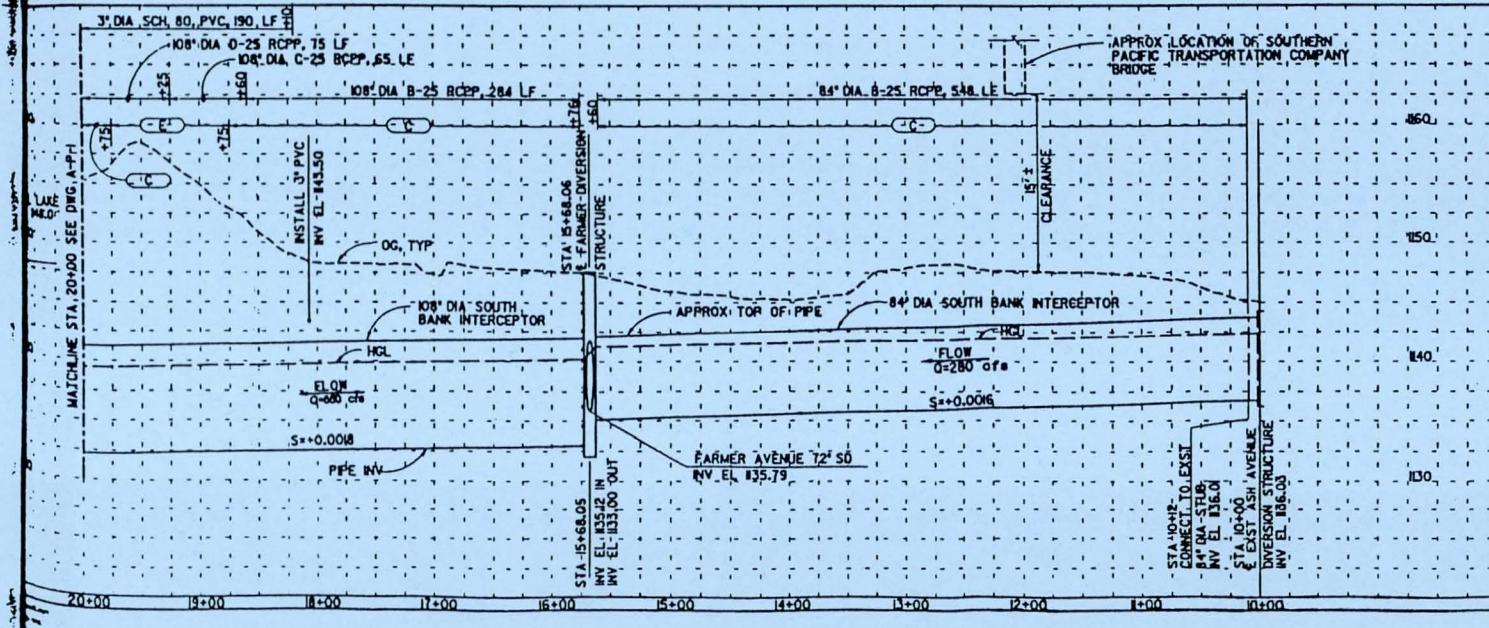
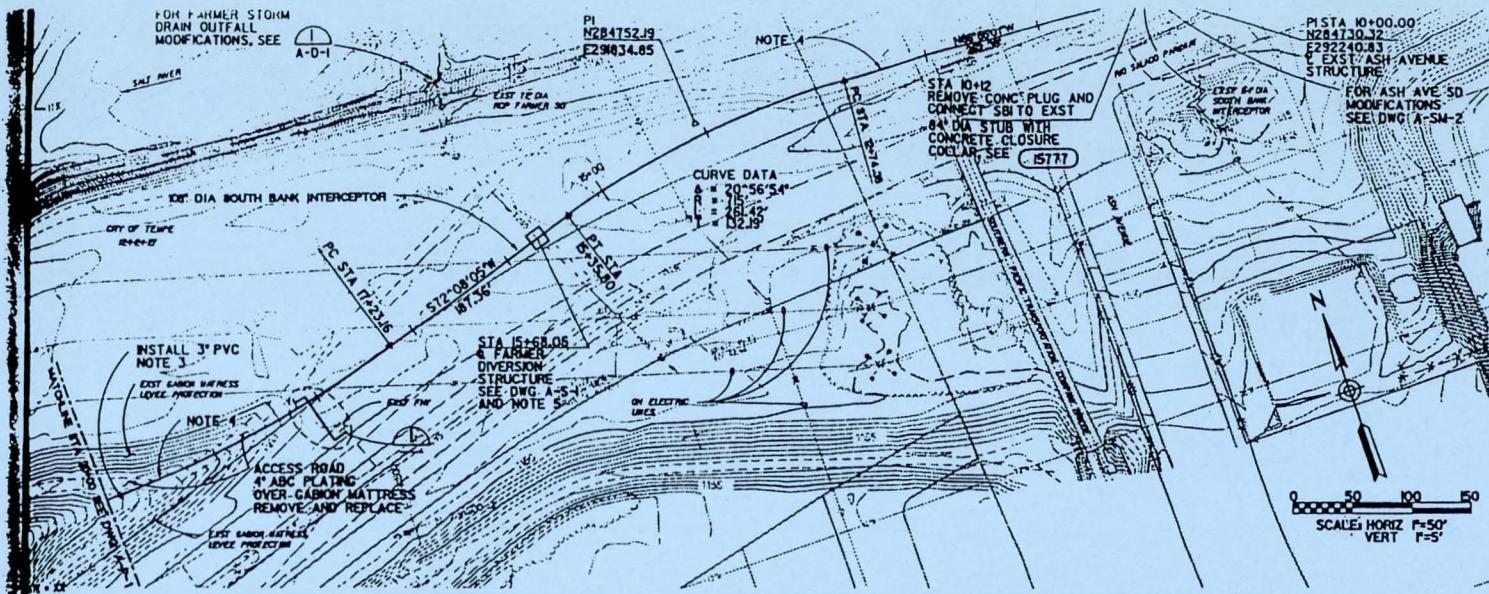


- NOTES:
- EXCAVATE TEST PITS OR BORINGS ALONG CENTERLINE OF SB ALIGNMENT AT 50' INTERVALS FROM STA 15+50 TO STA 29+00 PRIOR TO EXCAVATING TRENCH. REFER TO SPECIFICATIONS FOR DETAILS OF TEST PIT OR BORING REQUIREMENTS.
  - TOP OF MH RISERS SHALL MATCH THE FINISHED GRADE ALONG THE PIPELINE ALIGNMENT.
  - 3" PVC WATER LINE SHALL BE PLACED IN THE SAME TRENCH AS THE 108" SB FROM STA 18+00 TO STA 30+25. REFER TO THE PIPE BACKFILL DETAIL ON DWG A-D-8.
  - RECENT GRADING ACTIVITIES MAY HAVE ALTERED GROUND SURFACE ELEVATIONS IN THIS AREA. CONTRACTOR SHALL FIELD VERIFY GROUND SURFACE ELEVATIONS.
  - LIMIT EQUIPMENT TRAFFIC OVER NEW PIPELINE FACILITIES TO HS20 LOADS. CONTRACTOR SHALL SUBMIT ACCESS PLANS FOR EQUIPMENT THAT EXCEEDS HS20 LOADS.



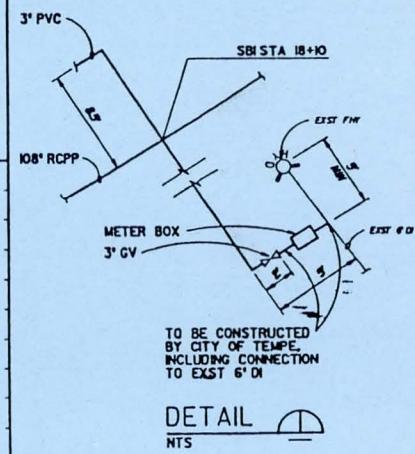
DEPARTMENT OF PUBLIC WORKS			
CITY OF TEMPE			
DIVISION OF ENGINEERING			
215 BOX 5002 TEMPE, ARIZONA 85280			
SURVEYED BY	DESIGNER	SCHEDULE	DATE
DESIGNED BY	DATE	A	APRIL 1996
DRAWN BY	DATE	DATE	PROJECT NO.
CHECKED BY	DATE	DATE	946523A
SCALE	1"=50'	DATE	SHEET X OF X
SOUTH BANK INTERCEPTOR PLAN AND PROFILE			DATE
			DATE

DDCI MINIA DV 100 100 100 100



CONSTRUCTION NOTES

- NOTES:
- EXISTING FARMER SD AND ASH AVE SD SHALL REMAIN IN-SERVICE UNTIL SCHEDULES A AND B ARE SUBSTANTIALLY COMPLETE.
  - 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" PVC WATER LINE SHALL BE PLACED IN THE SAME TRENCH AS THE 108" SBI FROM STA 18+0 TO STA 30+25. REFER TO THE PIPE BACKFILL DETAIL ON DWG A-D-8.
  - LIMIT EQUIPMENT TRAFFIC OVER NEW PIPELINE FACILITIES TO HS20 LOADS. CONTRACTOR SHALL SUBMIT ACCESS PLANS FOR EQUIPMENT THAT EXCEEDS HS20 LOADS.
  - LOCATION OF EXST 72" SD IS APPROXIMATE BASED ON THE BEST AVAILABLE RECORDS. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATION PRIOR TO MATERIALS PURCHASE.



DEPARTMENT OF PUBLIC WORKS			
CITY OF TEMPE			
DIVISION OF ENGINEERING			
P.O. BOX 1002 TEMPE, ARIZONA 85280			
SURVEYED BY	DESCRIPTION	SCHEDULE A	DATE APRIL 1996
DESIGNED BY		CIVIL	PROJECT NO.
DRAWN BY			946523A
CHECKED BY			SHEET X OF X
SCALE 1"=50'			DWG NO. A-P-2

SOUTH BANK INTERCEPTOR  
PLAN AND PROFILE

**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 SHORELINE IMPROVEMENTS SCHEDULE C (PROJECT NO. 946523C)** 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 C BID LIST

The following are the bid items for Schedule C:

Item	Description	Quan.	Unit	Unit Price	Extended Total Amount
1.	Mobilization/Demobilization, Diversion and Care of Water, and Miscellaneous Items	1	LS	\$	\$
2.	Demolition of Cement Stabilized Alluvium	7,270	CY	\$	\$
3.	Alluvium Overburden Removal	14,700	CY	\$	\$
4.	Shoreline Curb Wall	8,043	CY	\$	\$
5.	Shoreline Seat Wall	2,584	CY	\$	\$
6.	Shoreline Retaining Wall	262	CY	\$	\$
7.	Boat Tie Ups	421	CY	\$	\$
8.	Typical Marinas	535	CY	\$	\$
9.	Marinas with Ramps	382	CY	\$	\$
10.	Boat Beach	248	CY	\$	\$
11.	Boat Launch Ramp	50	CY	\$	\$
12.	Access Ramp Modifications	325	CY	\$	\$
TOTAL OF EXTENDED AMOUNT				\$	\$

Proposal - continued

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 five-hundred forty-six (546) 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)

\_\_\_\_\_  
Witness: If Bidder is an Individual

(Corporate Seal)

\_\_\_\_\_  
(Company Name)

Address: \_\_\_\_\_

\_\_\_\_\_  
Phone: \_\_\_\_\_





## 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 SHORELINE IMPROVEMENTS SCHEDULE C PROJECT NO. 946523C**

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.

Contract - continued

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

APPROVED AS TO FORM:

\_\_\_\_\_  
City Attorney

(Corporate Seal)

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. 946523C 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. 946523C 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. 946523C

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

Products/  
Completed  
Operations

Property  
Damage

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 SHORELINE IMPROVEMENTS SCHEDULE C, PROJECT NO. 946523C

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