

ENGINEERING DIVISION

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CITY OF TEMPE, ARIZONA
PUBLIC WORKS DEPARTMENT
DIVISION OF ENGINEERING

Contract Documents

for

48TH STREET STORM DRAIN AND PAVING

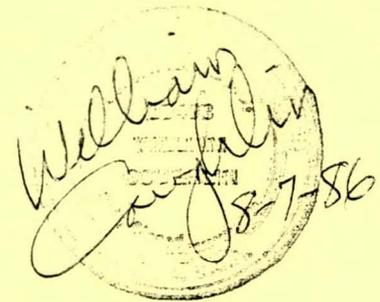
PROJECT NO. 84072

AND

PROJECT NO. 85008

Property of
Flood Control District of MC Library
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2801 W. Durango
Phoenix, AZ 85009

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Flood Control District of MC Library
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AUGUST 1986

A028.502

SPECIAL NOTICE

BIDDER'S ATTENTION IS CALLED TO THE FACT THAT NO BID
IS COMPLETE WITHOUT THE RETURN OF THIS BOOK OF SPECIAL
PROVISIONS AND CONTRACT DOCUMENTS WITH ALL PAGES INTACT.

BIDS SHALL BE SUBMITTED IN A SEALED ENVELOPE. THE
OUTSIDE LOWER RIGHT HAND CORNER SHALL BE MARKED:
BID OF _____, CONTRACTOR, FOR:
48TH STREET STORM DRAIN AND PAVING
TEMPE PROJECT NOS. 84072 AND 85008

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CITY OF TEMPE, ARIZONA
PUBLIC WORKS DEPARTMENT
DIVISION OF ENGINEERING

NOTICE TO CONTRACTORS

**48TH STREET STORM DRAIN & PAVING
(BROADWAY ROAD TO BASELINE ROAD)**

PROJECT NO. 84072 AND
PROJECT NO. 85008

SEALED BIDS will be received by the City of Tempe, Arizona, City Clerk, City Hall, 31 East 5th Street, Tempe, Arizona 85281, until 2:00 p.m. August 28, 1986. At that time bids will be opened and publicly read aloud in the Third Floor Conference Room. Bids received after the time specified will be returned unopened.

The proposed work shall consist of the following (approximate quantity) major work items:

- 97,000 S.Y. Asphalt Concrete Paving
- 13,803 L.F. Concrete Curb and Gutter
- 34,109 S.F. Concrete Sidewalk
- 15,880 S.F. Concrete Sidewalk, Driveway, Valley Gutter, and Slab Removal
- 37,234 S.F. Concrete Bicycle Path
- 3,275 L.F. 78" Pipe
- 2,740 L.F. 66" Pipe
- 2,541 L.F. 60" Pipe
- 2,392 L.F. 36" Pipe
- 1,466 L.F. 18" Pipe
- 1,227 L.F. 36" RGRCP Irrigation Pipe
- 358 L.F. 30" RGRCP Irrigation Pipe
- 619 L.F. 18" RGRCP Irrigation Pipe

Minor work items include: landscaping, landscape irrigation and traffic signal relocation 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. The work shall also conform to the latest edition of all applicable local ordinances.

A bid guarantee acceptable to the City of Tempe in the amount of 10% of the proposal shall be submitted with the proposal.

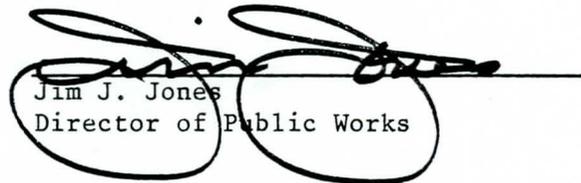
A pre-bid conference will be held on August 21, 1986 at 2:00 p.m. in the Tempe City Council Chambers.

Copies of the plans, specifications, and other contract documents are on file and may be reviewed in the office of the City Engineer. A set of such documents may be obtained from the office of the City Engineer upon payment of forty-five (\$45.00) dollars which payment will not be returned.

Work shall not start until after the date of issuance of Notice to Proceed and shall be completed within two hundred forty (240) calendar days thereafter.

All work for Phase I (I-10 Freeway to Weir Avenue) shall be completed no later than December 1, 1986.

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


Jim J. Jones
Director of Public Works

Publish: August 11, 1986 through August 15, 1986

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 plans, 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 forty-five (\$45.00) dollars, which payment will not be returned.

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 drawings or 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. 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.

General Provisions - continued

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.

AWARD OF CONTRACT

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

INSURANCE REQUIREMENTS

The Contractor's attention is directed to Section 103.6A 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. The proof of insurance shall be submitted to the City Engineer prior to execution of contract.

BONDS REQUIRED

Bonds in the following amounts will be required at the time of executing the formal contract:

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 proposal guarantee 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.

INDEMNITY

The Contractor shall indemnify and save harmless the City, their employees and agents, from and against all losses and all claims, demands, payments, suits, actions, recoveries, and judgments of every nature and description brought or recovered against them, by reason of any act, omission, negligence or claimed negligence of said Contractor, his agents or employees, in the execution of the work under this contract, or by reason of any act, omission, negligence or claimed negligence of the City, its agents or employees, arising out of the work, completed work, or product under the contract.

General Provisions - continued

PLANS TO THE SUCCESSFUL BIDDER

The successful bidder may obtain (7) sets of Plans and 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 forty-five (\$45.00) dollars each.

INSPECTION

The Contractor is responsible for complying with the plans and 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 48 hours 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.

HINDRANCES AND DELAYS

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.

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 acceptance of the project will not be given until all such information is submitted.

SPECIAL PROVISIONS

CONTRACTOR'S REPRESENTATIVE

The Contractor shall at all times be present at the job site in person or be represented by a responsible foreman or qualified agent. Instructions and job related information issued by the Engineer to the Contractor's representative on the job shall be considered as having been given to the Contractor.

CONSTRUCTION STAKING

The Contractor shall request staking from the City Engineer or his designated representative not less than forty-eight hours prior to commencing the construction for which the stakes are required. Upon proper notification by the Contractor, construction staking will be provided for the following work:

a) Paving

- One set of rough cut stakes for subgrade at 50 ft. intervals;
- One set of subgrade bluetops at 50 ft. intervals;
- One set of base course (Select and ABC) at 50 ft. intervals
- One set of curb offset (2 ft. back of curb) at 25 ft. intervals

b) Underground Utilities

- One set of cut stakes to flow line grade at 25 ft. intervals for sanitary sewer lines, storm drain lines, and irrigation pipe lines.
- One set of cut stakes to flow line at 50 ft. intervals for water mains.

c) Structure

- One set of grade stakes referring to line and grade at not less than 5 ft. from structure.

Upon completion of setting construction stakes, the City Engineer or designated representative will issue one (1) copy of cut sheets. Upon setting construction stakes by the Engineer in accordance with the Contractor's request, the Contractor shall assume full responsibility for preserving all line and grade stakes. Replacement of construction stakes that have been knocked out due to Contractors' work or lack of work, weather conditions, traffic, or vandalism will be done at the Contractor's expense.

SURVEY CONTROL POINTS

Existing survey markers or monuments (either brass caps, iron pipes or stone) shall be protected by the Contractor or removed and replaced under direct supervision of the Engineer 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.

Special Provisions - continued

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 City of Tempe landfill is not available for use. 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.

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 whole site of the work and public right-of-way in a neat and clean condition.

PERMITS

No City of Tempe permit is required for work between Broadway Road and Baseline Road.

Before work on ADOT right-of-way/facilities can be done, a permit must be obtained from ADOT District I Encroachment and Permits office. This encompasses work in 48th Street north of Broadway Road, and in Broadway Road east of 48th Street.

TRAFFIC SIGNALS

Traffic signal wire loops will be damaged during the course of this project. Twenty-four hours prior to cutting any loops the Contractor shall call the City of Tempe Traffic Engineering at 731-8284 so that arrangements can be made to modify the signal timing for traffic. Loop replacements at all locations indicated on the plans shall be the responsibility of the Contractor and installed in accordance with the City of Tempe Loop Detector Detail revised 11/83.

In the event the Contractor damages any traffic signal equipment, traffic signal conduit, and/or circuits, he shall have them repaired immediately at his expense by an electrical contractor who has had traffic signal experience, which is satisfactory to the City of Tempe.

Traffic signals shall be relocated as shown on plans in accordance with the requirements of the Arizona Department of Transportation general specs and T.S. drawings.

Special Provisions - continued

TRAFFIC CONTROL

All traffic shall be regulated in accordance with the MAG specs, the City of Tempe Traffic Barricade Manual, edition of 1976 and these special provisions. Traffic control plans shall be submitted 5 days prior to the work being started in the affected area. Traffic control plan submittal shall provide for the maintenance of 1 lane of traffic in each direction. At the time of the pre-construction conference, the Contractor shall designate an employee who is well qualified and experienced in construction traffic control and safety to be responsible for implementing, monitoring and altering traffic control measures as necessary. At the same time, the City of Tempe will designate a representative who will be responsible to see that all traffic control and any alterations are implemented and monitored to the extent that traffic is carried through the work area in an effective manner and that motorists, pedestrians, bicyclists and workers are protected from hazards and accidents.

During construction, it may be necessary to alter traffic control. Alterations shall be in accordance with the Traffic Barricade Manual. Traffic control plans must be approved by the City of Tempe Traffic Engineer forty-eight (48) hours prior to work being started within 300 feet of any signalized intersection and for every 1/2 mile section along 48th Street and affected intersecting streets in Tempe.

SPECIAL TRAFFIC REGULATIONS

During the course of construction, it will be required to have a uniformed police officer present to facilitate traffic control per the Tempe Barricade Manual and the Traffic Engineer's direction.

The Contractor shall provide the City of Tempe law enforcement officers (the number to be determined by the Engineer) to assist with traffic control 8:30 a.m. to 4:00 p.m. weekdays and from 8:00 a.m. to 6:00 p.m. Saturdays and Sundays whenever the number of lanes open to traffic is less than two. In addition, at signalized intersections when the existing lanes plus a left-turn lane are maintained in a manner other than the normally striped traffic lanes plus the left-turn lane during the hours of 6:30 a.m. to 8:30 a.m. and 4:00 p.m. and 6:00 p.m. weekdays, the Contractor shall provide the City of Tempe law enforcement officers to assist with traffic control through these areas whether the Contractor is working or not working. Officers will be paid directly by the City.

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

Special Provisions - continued

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.

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.

DUST PREVENTION

The Contractor shall take whatever steps, procedures, or means as are required to prevent abnormal dust conditions due to his construction operations in connection with this 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 the requirements of the "Maricopa County Health Department Air Pollution Control Regulations." This is not a pay item.

VALVE BOXES, MANHOLE FRAMES AND COVERS, AND SURVEY MONUMENTS, AND TRAFFIC PULL BOXES

The Contractor is to be made aware that he is solely responsible for the protection, tying out and adjusting or replacing of the above mentioned items during the construction operation. All adjustments or replacements shall be accomplished in accordance with Section 345 or 405 of the M.A.G. Specifications.

The Contractor shall replace existing non-locking or damaged valve boxes with new boxes to be furnished by the City. Valve boxes damaged by the Contractor shall be replaced by the Contractor at his own expense. Tempe valve boxes shall be adjusted or replaced as required per M.A.G. Detail 391-C.

The Contractor has the option, at his own expense, to lower and/or remove these items to facilitate his method of operation. If the Contractor does disturb the facilities, he shall be responsible to raise and/or replace the items to profile line and grade at no cost to the City. All survey monuments called for replacement shall be "in kind".

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. In the event of an unanticipated conflict between the new work and a utility and the owner thereof disclaims responsibility for relocation, the City will negotiate with the owning utility and the conflict shall be resolved without extra cost to the Contractor.

Special Provisions - continued

CLEANING CONDUITS

All conduits shall be clean and free from debris, garbage, rubbish, stones, sand deposits, and like foreign materials.

CONCRETE REMOVALS

Removal of curb and gutter, aprons, valley gutters, etc., is to be made only where called for on the plans. The successful bidder will be required to replace at his expense concrete that has been damaged.

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 payments are made.

1. Contractor's expenses for but no limited to mobilization, job site office, storage facilities, traffic control and public safety devices, sanitary facilities, utilities and telephone.
2. Clean-up including day to day clean-up.
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.

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.

SCHEDULING OF WORK

The Contractor will at any one time be required to confine his operations to a limited area so as not to create an unreasonable inconvenience for area property owners or expose large subgrade areas to potential moisture problems. The Contractor shall submit a scheduling plan to be approved by the City Engineer with his bid.

LOW BID

The low bid will be determined by the Total Bid as shown in the proposal. This is the sum of the total bids for the individual projects (Project 84072 and Project 85008).

Special Provisions - continued

START AND COMPLETION OF WORK

All work shall be completed within two hundred forty (240) calendar days after issuance of the Notice to Proceed. The contractor shall complete all of Phase I work by December 1, 1986. Phase I work includes all the work between the northerly limits of the project and Station 114+49.75 except the paving work west of the west curb returns on Broadway Rd. The contractor shall submit a schedule of work with his bid that will confirm that the work will be completed according to the specifications.

MATERIAL ORDERS

Orders for material (pipe, pump station equipment, etc.) shall be made by the Contractor upon award of the contract on August 28, 1986. Failure to order material immediately after award of contract will be considered a basis for assessment of liquidated damages if the specified time schedule is not met. The contractor shall provide a list of his material suppliers with his bid.

LIQUIDATED DAMAGES

Section 108.9 of the "Maricopa Association of Governments Uniform Standard Specification" is hereby modified as follows: The liquidated damages for failure to complete the work on time shall be \$1000 per calendar day.

PREBID CONFERENCE

A prebid conference will be held on August 21, 1986 at 2 p.m. in the City Council Chambers, 31 East 5th Street, Tempe, AZ.

SEQUENCE OF WORK

Contractor shall sequence work so that access to all commercial property adjacent to the proposed construction shall have adequate access.

Phase I work shall be completed by December 1, 1986.

Right of way may not be available in the initial stages of the project to allow for completion of all work on the north side of Broadway Road west of 48th Street or on the west side of 48th Street north of Baseline Road to approximately Station 201+00. Right of way acquisition is expected to be finalized by December 1, 1986. The Contractor will be expected to sequence his operations to avoid conflicts with areas where Right of Way acquisition has not been completed.

SUPPLEMENT TO MAG SPECIFICATIONS

The following City of Phoenix supplements to the MAG Specifications shall be apart of the specifications for this project: Section 350.3, 710, 351, 424, 430, 431, 432, 440 and 795.

EXHIBIT A

NOTE: The Salt River Project maintains energized aerial electrical power lines in the immediate vicinity of this project. Do not consider these lines to be insulated. Construction personnel working in proximity to these lines are exposed to an extreme hazard from electrical shock. Contractors, their employees, and all other construction personnel working on this project must be warned of the danger and instructed to take adequate protective measures, including maintaining a minimum ten (10) feet clearance between the lines and all construction equipment and personnel. (See OSHA Std. 1926.550(a)15) As an additional safety precaution, Contractors should also be instructed to call the Salt River Project at 273-8888 to arrange, if possible, to have these lines de-energized or relocated when the work reaches their immediate vicinity. The cost of such temporary arrangements would be borne by the Contractor. The District can often respond to such requests if two days advance notice is given, but some situations may require up to 60 day's lead time for relocation or other arrangements.

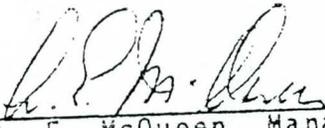
EXHIBIT B

NOTE: The Salt River Project maintains certain energized, underground electrical power lines in the immediate vicinity of this project, and these lines have been noted herein as potential conflicts. These power lines represent an extreme hazard from electrical shock to any construction personnel or equipment coming in contact with them. Arizona law requires all parties planning excavations in public rights-of-way to contact all utility firms for location of their underground facilities. Contractors must be instructed to call the Blue Stake Center (263-1100) for such location service. Contractors, their employees, and all other personnel working near any underground power lines must be warned to take adequate protective measures. (See: OSHA Std. 19265-651(a)). As an additional safety precaution, Contractors should also be instructed to call the Salt River Project at 273-8888 to arrange, if possible, to have these lines de-energized when the work reaches their immediate vicinity. The cost of such temporary arrangements would be borne by the Contractor. If de-energization is feasible, the Contractor must give the Salt River Project at least two day's advance notice of his requirement.

SALT RIVER VALLEY WATER USERS' ASSOCIATION

SPECIFICATIONS

FOR PRECAST CONCRETE PIPE

Recommended by  7/6/76
A. E. McQueen, Manager Date
Civil Engineering Department

Approved by  7-6-76
D. L. Weesner Date
Assistant General Manager-Water

SALT RIVER VALLEY WATER USERS' ASSOCIATION
SPECIFICATIONS
FOR PRECAST CONCRETE PIPE

I. DEFINITIONS:

- A. Association - Salt River Valley Water Users' Association
- B. Engineer - The Assistant General Manager-Water or his duly authorized representative.
- C. Licensee - The person, firm, or corporation responsible for installing concrete pipe under a Salt River Valley Water Users' Association License for Concrete Pipe Installation or a Salt River Project License to Use Project Right of Way.

II. PRECAST CONCRETE PIPE:

The type of concrete pipe to be used will be indicated on the license or the Association plans for the work. The types of pipe generally used shall meet the following requirements:

- A. Reinforced Concrete Pipe: Reinforced concrete pipe (RCP) shall meet the specifications in the latest revision of ASTM C-76. RCP shall withstand an internal hydrostatic pressure for 10 psi for ten minutes under conditions specified in the latest revision of ASTM C-497.
- B. Non-Reinforced Concrete Pipe: This pipe shall be manufactured to specifications in the latest revision of ASTM C-14. Non-reinforced concrete pipe shall withstand an internal hydrostatic pressure of 10 psi for ten minutes under conditions specified in the latest revision of ASTM C-497.

III. PIPE TESTS:

Prior to delivery of pipe the Licensee shall advise the Engineer of the names and addresses of the vendors for the material.

Pipe tests prescribed by these specifications may be required by the Engineer at his discretion within the following limitations:

- A. Crushing strength tests for pipe delivered from a single manufacturing run may be required for one joint when the delivery is less than 500', two joints when the delivery is 500' to 1,000', three joints when length of delivery is 1,000' to 2,000' and one additional joint for each 1,000' of length over 2,000'. When deliveries are made from different manufacturing runs the test requirements will be determined separately for the length delivered from each manufacturing run.
- B. Specimens used for crushing strength tests may also be used for the hydrostatic pipe test prescribed by ASTM C-497 or the hydrostatic joint test prescribed by ASTM C-443. The number of hydrostatic test specimens will not exceed the number required for crushing strength tests except that, for pipe deliveries of less than 500' when the hydrostatic joint test is required, one additional test specimen (two total) will be provided for the hydrostatic test only.
- C. Other tests specified by ASTM C-14 or ASTM C-76 may be required in the quantities indicated by the ASTM except that both hydrostatic tests and permeability tests will not be required.
- D. When a test unit fails, the vendor or Licensee shall be allowed a retest on two additional specimens for each specimen that failed.

The pipe shall be considered acceptable if all retest specimens meet test requirements.

Pipe tests within the above limitations will be provided for at the expense of the Licensee either at the plant of the vendor or at an independent testing facility agreed on by the Licensee and Engineer.

As part of the purchase agreement for pipe the Licensee shall require that the Engineer be given access to the vendor's manufacturing specifications and results of tests performed by the vendor as part of his quality control program during manufacture. A representative of the Engineer shall be allowed to observe the manufacture and testing of the pipe.

IV. PIPE JOINTS:

Pipe joints shall be of the mortared tongue and groove Type B (Figure 1), mortared tongue and groove Type B-1 (Figure 1) or bell and spigot rubber gasket (ASTM-443). (Figure 1-A)

A. Tongue and groove mortar joints: As each unit of pipe is laid, a sufficient amount of bedding or backfill material shall be placed carefully and tamped thoroughly about the lower portion of the pipe midway between the joints, to hold it firmly in position. Mortar joints shall be made as follows:

- (1.) Type B: The tongue end of the previously laid pipe and the groove end of the pipe to be placed shall be cleaned thoroughly of all foreign material, wet thoroughly with water applied by brush and kept clean and moist until the mortar is placed. Mortar shall be applied to the tongue and groove in a manner which will fill the entire joint and the pipe shall be firmly pushed into position until mortar is squeezed from both inside and outside the joint. After the pipe has been adjusted accurately

to line and grade and has been secured firmly in position, all excess mortar shall be removed from the inside of the pipe and the joint shall be filled, brushed, finished smooth and all debris removed.

- (2.) Type B-1: With the tongue end of the previously laid pipe and the groove end of the pipe to be placed clean and dry, the pipe groove is thrust home on the tongue until the groove shoulders rest on the beveled surface of the tongue as shown for the Type B-1 joint. After the pipe has been adjusted accurately to line and grade and has been secured firmly in position, the inside and outside of the joint is wet thoroughly and the inside joint is filled with mortar and finished smooth. Depending on size of the pipe and difficulty of access, the Engineer may permit completion of the inside mortar joint at the time each length is laid or he may require completion of the inside mortar joints at the time of banding or after banding is complete.

The following requirements apply both to Type B and Type B-1 Mortar joints:

- (1.) Pipe mortar shall be mixed in the proportion by volume of one part cement to two parts sand.
- (2.) If adjustment of the position of a length of pipe is required after it has been laid it shall be removed, cleaned and rejointed as for a new length.

- (3.) The finishing of the external joints shall be kept not more than five and not less than two lengths of pipe behind the laying of the pipe.
- (4.) The outside of the joints shall be completed by forming bands of hand-placed mortar completely around the pipe. Mortar bands may be placed by diapering when specifically authorized by the Engineer. As soon as the mortar has set sufficiently the bands shall be coated with a white pigmented sealing compound, furnished by the Licensee, conforming to Bureau of Reclamation, Specifications for Sealing Compound for Curing Concrete, June 1, 1961. An approved list of compounds will be furnished by the Engineer on request.

B. Rubber Gasket Joints: Rubber gasket joints shall be of the bell and spigot type and both the joints and gaskets will meet the requirements of ASTM C-443. Certified copies of the test reports of the physical properties of the rubber compound used in all rubber gaskets shall be furnished when required by the Engineer.

- (1.) When pipe is laid on tangent, each joint shall be fitted together so that the spigot end of one pipe is as close to being in contact with the shoulder of the bell of the adjacent pipe as practicable and so that the Distance A (Figure 1-A) is not less than one half inch.

- (2.) When pipe is laid on long-radius curves, the joints may be pulled on one side of the pipe so that the joint opening on that side of the pipe will not be more than one-half inch wider than the joint opening on the opposite side of the pipe. Provided, that the Distance A shall not be less than one-fourth inch at any point in the circumference of the joint.

V. BENDS:

Bearing test and hydrostatic test will not be required on precast elbows or fabricated bends. Pipe bends will be collared as shown on Figure 2 or 2-A as required by the Engineer.

- A. Tongue and Groove Joints: Depending on radius of curvature, bends may be made in one or more of the following ways:
1. Pulling of joints or opening of the annular space on one side of the pipe will be permitted, provided the joint opening on the outside of the bend shall not exceed the joint opening on the inside of the bend by more than 1/2".
 2. Manufactured beveled end pipe may be used, provided that the maximum end bevel shall not exceed 5° (Maximum rate of bend equals 10° per joint for pipe beveled on both ends).
 3. Bends for reinforced and non-reinforced concrete pipe shall be collared as shown on Figures 2 and 2-A.
- B. Rubber Gasket Joints: Deflections greater than those allowed under Section IV-B of these specifications shall be considered bends and shall be collared in accordance with Figures 2 and 2-A.

VI. EXCAVATION:

- A. Where pipeline trenches are excavated in natural subgrade material, and the type of material permits, trench sides will be vertical to at least six inches above the top of the pipe. Trench width will be the minimum consistent with satisfactory placing and compaction of bedding and backfill.
- B. When mechanical compaction methods are used for compaction of backfill material from springline of the pipe and below, the trench width shall be sufficiently wide to provide a minimum clearance from the outside of the bell at springline to the edge of the trench of two (2) inches plus the width of the compaction foot of the equipment used. Mechanical compaction equipment shall not be permitted to come in direct contact with any portion of the pipe.
- C. When aggregate slurry only is used for backfill material from bottom of trench to springline of pipe or above, the trench width shall be sufficiently wide to provide a minimum clearance from the outside of the bell at springline to the edge of the trench of three (3) inches.
- D. Where trenching with vertical sides is not practical (ie., installation in an existing ditch trimmed or filled to grade in non-cohesive materials which will not stand vertically) bedding and backfill on both sides of the pipe will be compacted to the density required for the type of backfill specified on the plans except in no case shall it be compacted to less than 85% of maximum dry density. Backfill will be compacted to this degree to a minimum elevation 6" above the top of the pipe. Maximum dry density will be determined by compaction control procedure AASHTO T-99 and T-191 or ASTM D-2922 and D-3017.

- E. Where trench walls or bottom have a moisture content more than 2% greater than optimum, or the maximum dry density is less than 85%, the trench shall be over excavated to no less than 2 feet each side of the pipe walls and to 4 feet below bottom of pipe grade, or to stable material meeting above criteria, whichever occurs first.
- F. If stable material is not reached 4 feet below bottom of pipe grade, the bottom 2 feet of the over excavated trench shall be filled with granular material (as defined in Par. VIII, A,2.) and the remainder of the trench to bed grade filled with granular or native material (as defined in Par. VIII, A, 1 & 2). All fill material below bottom of pipe to be compacted to meet TYPE I BACKFILL requirements.

VII. BEDDING

Classes of bedding may be specified as shown on Figure 3. The bedding requirements will depend on pipe location. In general, Class C bedding or better will be required for pipe subject to heavy traffic. Class C or better embedments will be specified on the plans or license for the job. Where no embedment is specified, Class D embedment may be used.

VIII. BACKFILL AND COMPACTION

A. Backfill material shall consist of:

1. Sound native material with a maximum of 50% retained on plus 3/4" sieves. Material to be free from broken concrete, timber, roots, and other debris.
2. Granular material with representation in all sieve sizes with 100% passing the 1 1/8" sieve and 0% to 15% passing the No. 200 sieve.
3. Aggregate slurry meeting the following specifications:
Gradation by weight shall be, 100% passing 1 1/8" sieve, 95% to 100% passing 1" sieve, 85% to 100% passing 3/4" sieve, 40% to 70% passing 1/4" sieve and 0% to 8% passing the No. 200 sieve.
Water content shall not exceed 35 gallons per ton of aggregate.

B. Backfill Placement

1. From bed to 1' above top of pipe
 - a. Native material (not meeting granular specifications) shall be placed in maximum uncompacted lifts of 8". Material shall be thoroughly compacted by mechanical means to the specified densities. The material shall contain no particles or pieces greater in dimension than 1/3 the width of trench each side of pipe and

in no case to exceed 3".

- b. Granular material shall be placed in maximum uncompacted lifts of 24". Material shall be thoroughly compacted by mechanical means to the specified densities.
 - c. Aggregate slurry shall be loaded into a mixer approved by the engineer and thoroughly mixed. Aggregate slurry will be discharged directly in the trench from the mixer, with even distribution on each side of the pipe and shall flow freely and uniformly around and under the pipe without leaving voids. Aggregate slurry shall be placed to a minimum depth of one foot above the bottom outside of the pipe barrel for pipe exceeding 18" I.D. (inside diameter) and to springline for pipe 18" I.D. and smaller.
2. From 1' above top of pipe to finish surface
 - a. The type of material used shall be placed in sufficiently thin lifts to permit the specified densities when compacted with mechanical work methods.
 - b. Native material containing 6" maximum rock may be used.
 3. All backfill shall be placed in uniform lifts, and compacted such that the pipe will not be displaced or damaged.
 4. Regardless of the method used to compact the backfill it shall be supplemented by any additional methods necessary to obtain the specified densities.
 5. When there is a deficiency of backfill material as specified, necessary suitable material shall be imported.

C. Compaction densities

1. The trench backfill shall be thoroughly compacted to not less than the specified densities when tested and determined by AASHO T-99 and T-191 or ASTM D-2922 and D-3017 with the percent of density adjusted in accordance with the rock correction procedure for maximum density determinations, AASHO T-224.
2. The required compaction density shall be as specified on Association plans or construction permits and in general will conform to the following table:

BACKFILL TYPE	LOCATION	FROM SURFACE TO 2' BELOW SURFACE	FROM 2' BELOW SURFACE TO BOTTOM OF TRENCH
I.	(See note below) Under any existing or proposed pavement* curb, gutter, sidewalk, or such construction included in the contract or when any part of the trench excavation is within 2' of the above.	100% for all granular materials 95% for non-granular soils	85%**
II.	On any street, road or alley right of way outside limits of (I)	80%***	75%***
III.	No-traffic locations	70%	70%
NOTES	*Unless otherwise shown on the plans, all concrete or bituminous surfacing will be considered pavement. **95% for projects administered by Arizona Dept. of Transportation ***85% for projects administered by " " " "		

If there is a conflict between plans, permits and table, the highest requirement shall prevail.

D. Moisture Content

1. Native material, not meeting the specifications for granular, shall be wetted or dried as necessary to bring the material to a uniform moisture content range of not less than 4% dry or more than 2% wet of optimum.
2. Granular material shall be placed at a uniform moisture content range of not less than optimum and not more than 5% wet of optimum.
3. Aggregate slurry shall be placed with a maximum water content of 35 gallons of water per ton of aggregate. The engineer may require an increase or decrease of water content to obtain the required result.
4. Moisture preparation shall be done prior to placing material in trench.
5. Moisture control of native and granular backfill shall be the sole responsibility of the contractor and material placed outside the range of specified moisture content shall be sufficient cause for its removal. Moisture content to be determined in accordance with AASHTO T-99.

E. Test Holes

Excavation ordered by the Engineer of compacted backfill for the purpose of making density tests on the lower portion of the fill shall be done by the contractor at contractor's expense.

IX. PIPE INSTALLATION:

All pipe installed in Association facilities shall be installed to elevations and alignments established by the Engineer. Alignments and elevations shall be surveyed and staked by the Association unless an exception is granted by the Engineer.

For straight alignments and grades, variation from prescribed grade and alignment shall not exceed 0.10 foot, and the rate of departure from, or return to, established grade or alignment shall be no more than 1" in 10' of pipeline unless otherwise determined by the Engineer.

Variations of the grade or alignment of curves and bends will be established by the Engineer for each job. Variation will depend primarily on right-of-way and possible conflicts with other utilities.

The pipe will be centered in the trench with the tongue end at the advancing end of tongue and groove pipe and the bell end at the advancing end of rubber gasket pipe.

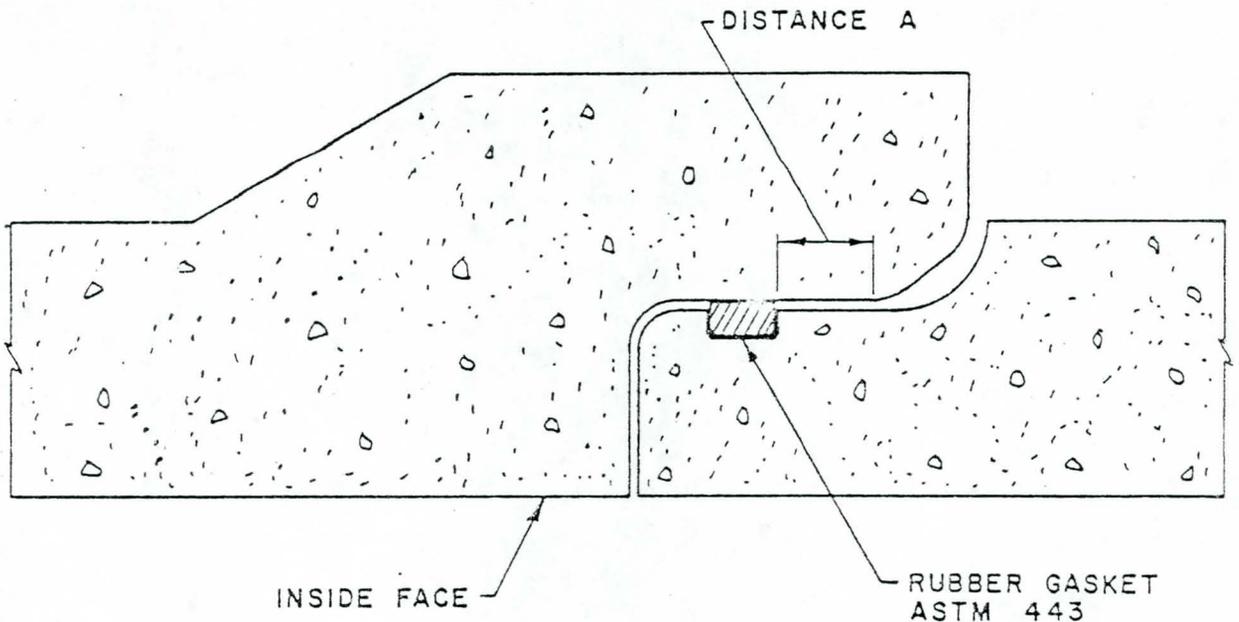
The pipe trench shall be kept free of water at all times.

Reinforced concrete pipe shall be marked as required by ASTM C-76. Pipe with elliptical reinforcing shall be marked on one end. The marks shall be along the minor axis of the reinforcing ellipse. This pipe shall be installed with the minor axis vertical (markings at the top and bottom of the joint). Variation of the minor axis from the vertical shall be no more than 10° .

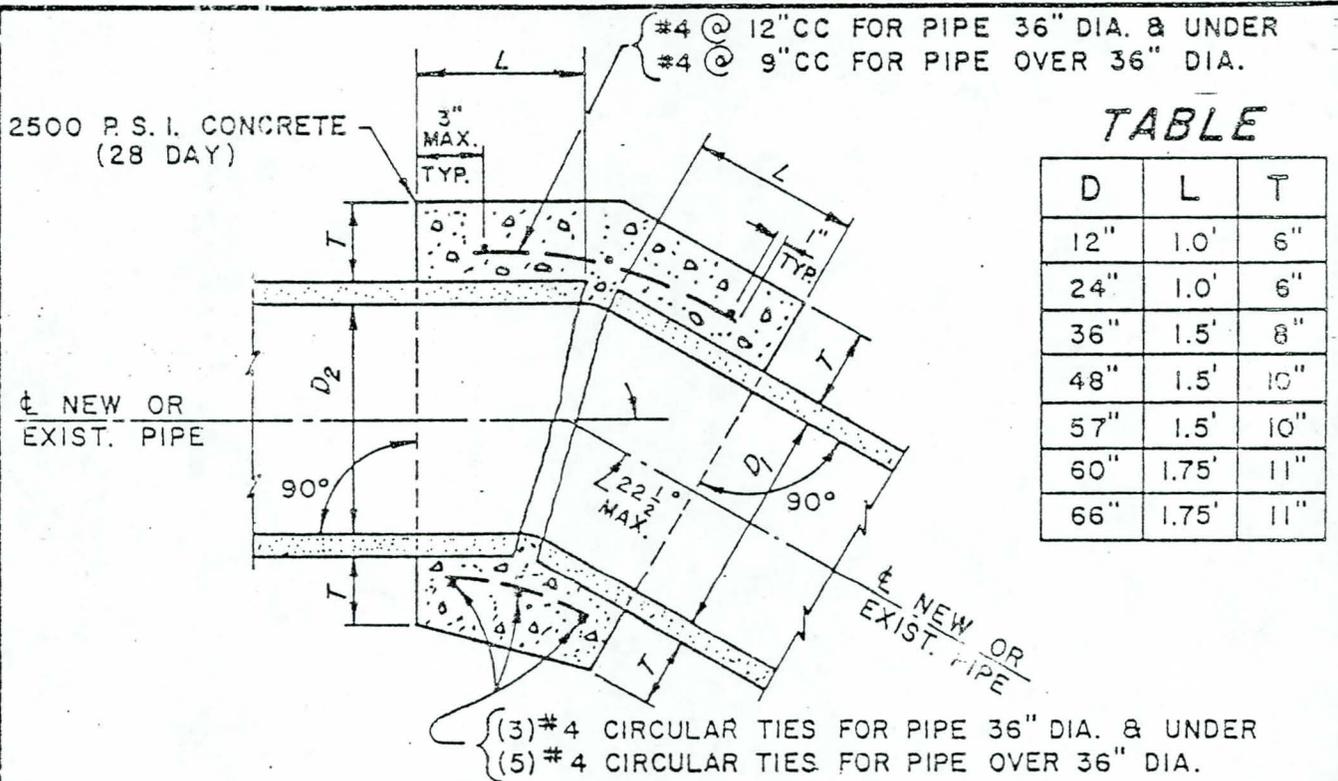
At all times, when pipe laying operations are not actually in progress, the ends of all partially completed mortar joint pipelines shall be kept closed to prevent circulation of air.

X. FIELD TESTING:

As soon after completion as practical the Engineer will inspect the pipeline either under normal operating conditions or under the maximum static head available. The Licensee will be required to repair any leaks or other deficiencies revealed by field tests prior to final acceptance of the pipeline.

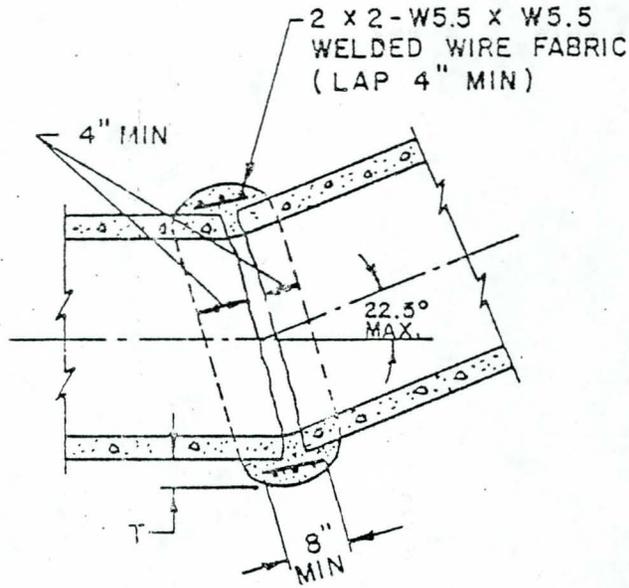


REVISED	BY	CHECKED	APPROVED	DESCRIPTION
SALT RIVER VALLEY WATER USERS' ASSOCIATION PHOENIX, ARIZONA				
RUBBER GASKET JOINTS				
DRAWN	MSV	DESIGNED	DLD	APPROVED
SCALE	NONE	CHECKED	<i>[Signature]</i>	<i>[Signature]</i>
SHEET		DATE	4-22-76	FIGURE 1-A
OF				



1. PIPE ENDS TO BE TRIMMED SUCH THAT THE MAXIMUM DISTANCE BETWEEN PIPES AT ANY POINT IS 2 INCHES.
2. A CONCRETE COLLAR IS REQUIRED WHERE PIPES OF DIFFERENT DIAMETERS OR MATERIALS ARE JOINED, OR WHERE THE CHANGE IN ALIGNMENT OR GRADE EXCEEDS THAT ALLOWED FOR AN ORDINARY JOINT.
3. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR L & T SHOULD BE THOSE OF THE LARGER PIPE. D = D₁ OR D₂, WHICHEVER IS GREATER.
4. FOR PIPE SIZES NOT LISTED USE NEXT SIZE LARGER.
5. MORTAR PIPE COLLAR, FIGURE 2-A, MAY BE USED WHEN BOTH PIPES BEING JOINED ARE NON-REINFORCED.
6. THE DIAMETER OF THE CIRCULAR TIES SHALL BE D + (2 × WALL THICKNESS) + 1/2 T.
7. FIELD CLOSURES OF PIPE OF THE SAME DIAMETER AND WITHOUT CHANGE IN GRADE OR ALIGNMENT SHALL BE MADE WITH A CONCRETE COLLAR. IF BOTH PIPES BEING JOINED ARE NON-REINFORCED A MORTAR PIPE COLLAR (FIGURE 2-A) MAY BE USED.
8. CONCRETE COLLARS SHALL BE FINISHED SMOOTH AND FLUSH WITH THE INSIDE SURFACE OF THE PIPE.

REVISED	BY	CHECKED	APPROVED	DESCRIPTION
SALT RIVER VALLEY WATER USERS' ASSOCIATION PHOENIX, ARIZONA				
CONCRETE PIPE COLLAR				
DRAWN	MSV	DESIGNED	DLD	APPROVED
SCALE	NONE	CHECKED	GAN	<i>[Signature]</i>
SHEET	OF	6-22-76	FIGURE	2

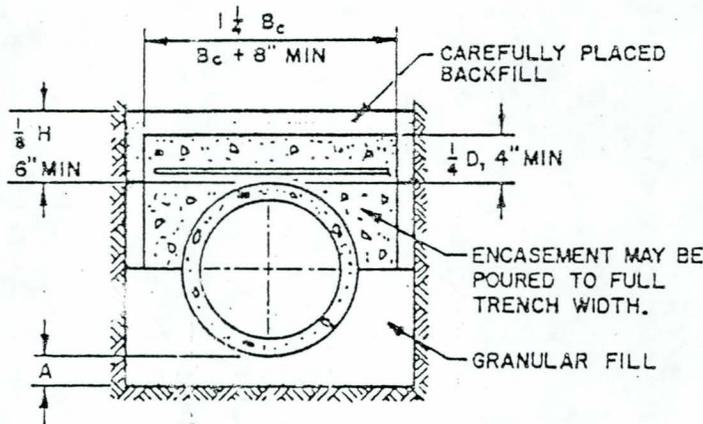


TABLE

DIA. OF PIPE	T
12" TO 16"	MIN. $1\frac{1}{2}$ "
18"	MIN. $1\frac{7}{8}$ "
21"	MIN. $2\frac{1}{4}$ "
24" TO 42"	MIN. $2\frac{1}{2}$ "
48" TO 66"	MIN. $2\frac{3}{4}$ "

1. PIPE ENDS TO BE TRIMMED SUCH THAT THE MAXIMUM DISTANCE BETWEEN PIPES AT ANY POINT IS 2 INCHES.
2. A MORTAR PIPE COLLAR MAY BE USED ONLY WHEN BOTH PIPES BEING JOINED ARE NON-REINFORCED CONCRETE PIPE.
3. MORTAR COLLARS SHALL BE FINISHED SMOOTH AND FLUSH WITH THE INSIDE SURFACE OF THE PIPE.
4. MORTAR SHALL BE MIXED IN THE PROPORTION BY VOLUME OF ONE PART CEMENT TO TWO PARTS SAND.

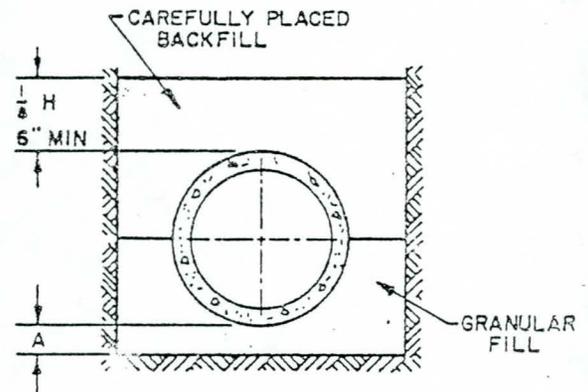
REVISED	BY	CHECKED	APPROVED	DESCRIPTION
SALT RIVER VALLEY WATER USERS' ASSOCIATION PHOENIX, ARIZONA				
MORTAR PIPE COLLAR				
DRAWN	MSV	DESIGNED	DLD	APPROVED
SCALE	NONE	CHECKED	SAW	<i>[Signature]</i>
SHEET	OF	DATE	6-22-76	FIGURE 2-A



CLASS A

ARCH ENCASUREMENT

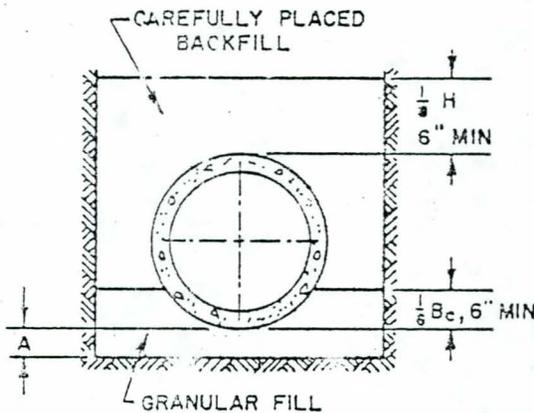
LOAD FACTOR	REINFORCED, $P = 0.40\%$	3.5
	REINFORCED, $P = 1.00\%$	4.8
	PLAIN	2.8



CLASS B

FIRST-CLASS BEDDING

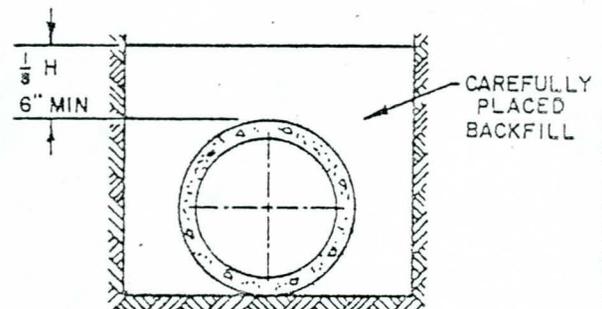
LOAD FACTOR 1.9



CLASS C

ORDINARY BEDDING

LOAD FACTOR 1.5



CLASS D

FLAT BOTTOM BEDDING

LOAD FACTOR 1.15

TABLE OF FILL DEPTHS
BELOW PIPE

DIA	A MIN
36" & SMALLER	4"
OVER 36"	1/2 O. D.

H = DEPTH OF FILL ABOVE TOP OF PIPE

Bc = O. D. OF PIPE

REVISED	BY	CHECKED	APPROVED	DESCRIPTION
SALT RIVER VALLEY WATER USERS' ASSOCIATION PHOENIX, ARIZONA				
LOAD FACTORS FOR RIGID CONDUITS IN TRENCHES				
DRAWN	M3V	DESIGNED	DLD	APPROVED
SCALE	NONE	CHECKED	<i>[Signature]</i>	<i>[Signature]</i>
SHEET	OF	4-21-76	FIGURE	3

TECHNICAL SPECIFICATIONS

48TH STREET STORM DRAIN
BASELINE ROAD TO BROADWAY ROAD

PROJECT NO. 84072

SVERDRUP CORPORATION
PHOENIX, ARIZONA

JULY 31, 1986



TECHNICAL SPECIFICATIONS

8" PVC pressure force main shall comply with AWWA C-900 Class 150 and all cast iron fittings shall comply with AWWA C-110. Concrete for thrust blocks shall conform to Section 505 of M.A.G. Specification. Pipe will be installed in conformity with manufacturer's recommendations. Pipe will be measured in linear feet and payment made at the contract price. Installed complete in place as shown on plans. No payment will be made for fittings or thrust blocks, but cost will be included in the linear foot price bid for 8" PVC pipe.

12" PIPE CULVERT shall conform to the provisions of M.A.G. Specifications for the pipe chosen as shown in the Alternate Pipe Table shown on plans. The pipe culvert shall be measured in linear feet complete in place as shown on the plans. Pipe thicknesses shall be not less than that shown in the Alternate Pipe Table.

The class of R.G.R.C.P. pipe used shall be Class III.

Payment will be made at the contract unit price per linear foot installed complete in place for 12" pipe culvert.

15" PIPE CULVERT shall conform to the provisions of M.A.G. Specifications for the pipe chosen as shown in the Alternate Pipe Table shown on plans. The pipe culvert shall be measured in linear feet complete in place as shown on the plans. Pipe thicknesses shall be not less than that shown in the Alternate Pipe Table.

The class of R.G.R.C.P. pipe used shall be Class III.

Payment will be made at the contract unit price per linear foot installed complete in place for 15" pipe culvert.

18" PIPE CULVERT shall conform to the provisions of M.A.G. specifications for the pipe chosen as shown in the Alternate Pipe Table shown on plans. The pipe culvert shall be measured in linear feet complete in place as shown on the plans. Pipe thicknesses shall be not less than that shown in the Alternate Pipe Table.

The class of R.G.R.C.P. pipe used shall be Class III. All catch basin laterals from manholes shall be precast concrete pipe.

Technical Specifications - continued

Corrugated metal pipe (CMP) shall be Type "D" smooth lined pipe. Full compensation for excavation, backfill, removal of obstructions, compacting, testing and all incidental costs, shall be considered as included in the contract unit price paid per linear foot of each size of pipe installed.

Payment will be made at the contract unit price per linear foot installed complete in place for 18" pipe culvert.

24" PIPE CULVERT shall conform to the provisions of M.A.G. Specifications for the pipe chosen as shown in the Alternate Pipe Table shown on plans. The pipe culvert shall be measured in linear feet complete in place as shown on the plans. Pipe thicknesses shall be not less than that shown in the Alternate Pipe Table.

The class of R.G.R.C.P. pipe used shall be Class III.

Corrugated metal pipe (CMP) shall be Type "D" smooth lined pipe. Full compensation for excavation, backfill, removal of obstructions, compacting, testing and all incidental costs, shall be considered as included in the contract unit price paid per linear foot of each size of pipe installed.

Payment will be made at the contract unit price per linear foot installed complete in place for 24" pipe culvert.

27" PIPE CULVERT shall conform to the provisions of M.A.G. Specifications for the pipe chosen as shown in the Alternate Pipe Table shown on plans. The pipe culvert shall be measured in linear feet complete in place as shown on the plans. Pipe thicknesses shall be not less than that shown in the Alternate Pipe Table.

The class of R.G.R.C.P. pipe used shall be Class III.

Corrugated metal pipe (CMP) shall be Type "D" smooth lined pipe. Full compensation for excavation, backfill, removal of obstructions, compacting, testing and all incidental costs, shall be considered as included in the contract unit price paid per linear foot of each size of pipe installed.

Payment will be made at the contract unit price per linear foot installed complete in place for 27" pipe culvert.

33" PIPE CULVERT shall conform to the provisions of M.A.G. Specifications for the pipe chosen as shown in the Alternate Pipe Table shown on plans. The pipe culvert shall be measured in linear feet complete in place as shown on the plans. Pipe thicknesses shall be not less than that shown in the Alternate Pipe Table.

The class of R.G.R.C.P. pipe used shall be Class III.

Technical Specifications - continued

Corrugated metal pipe (CMP) shall be Type "D" smooth lined pipe. Full compensation for excavation, backfill, removal of obstructions, compacting, testing and all incidental costs, shall be considered as included in the contract unit price paid per linear foot of each size of pipe installed.

Payment will be made at the contract unit price per linear foot installed complete in place for 33" pipe culvert.

36" PIPE CULVERT shall conform to the provisions of M.A.G. Specifications for the pipe chosen as shown in the Alternate Pipe Table shown on plans. The pipe culvert shall be measured in linear feet complete in place as shown on the plans. Pipe thicknesses shall be not less than that shown in the Alternate Pipe Table.

The class of R.G.R.C.P. pipe used shall be Class III.

Corrugated metal pipe (CMP) shall be Type "D" smooth lined pipe. Full compensation for excavation, backfill, removal of obstructions, compacting, testing and all incidental costs, shall be considered as included in the contract unit price paid per linear foot of each size of pipe installed.

Payment will be made at the contract unit price per linear foot installed complete in place for 36" pipe culvert.

36" JACKED STEEL CASING shall conform to the provisions of City of Phoenix Supplement, Section 602 of M.A.G. Specifications and shall be measured in linear feet complete in place as shown on plans. Thickness of steel casing will not be less than that shown on plans. 18" pipe culvert will be installed as shown on plans within casing and paid for at unit price for Item 3 complete in place.

48" PIPE CULVERT shall conform to the provisions of M.A.G. Specifications for the pipe chosen as shown in the Alternate Pipe Table shown on plans. The pipe culvert shall be measured in linear feet complete in place as shown on the plans. Pipe thicknesses shall be not less than that shown in the Alternate Pipe Table.

The class of R.G.R.C.P. pipe used shall be Class III.

Corrugated metal pipe (CMP) shall be Type "D" smooth lined pipe. Full compensation for excavation, backfill, removal of obstructions, compacting, testing and all incidental costs, shall be considered as included in the contract unit price paid per linear foot of each size of pipe installed.

Payment will be made at the contract unit price per linear foot installed complete in place for 48" pipe culvert.

Technical Specifications - continued

60" PIPE CULVERT shall conform to the provisions of M.A.G. Specifications for the pipe chosen as shown in the Alternate Pipe Table shown on plans. The pipe culvert shall be measured in linear feet complete in place as shown on the plans. Pipe thicknesses shall be not less than that shown in the Alternate Pipe Table.

The class of R.G.R.C.P. pipe used shall be Class III.

Corrugated metal pipe (CMP) shall be Type "D" smooth lined pipe. Full compensation for excavation, backfill, removal of obstructions, compacting, testing and all incidental costs, shall be considered as included in the contract unit price paid per linear foot of each size of pipe installed.

Payment will be made at the contract unit price per linear foot installed complete in place for 60" pipe culvert.

60" REINFORCED CONCRETE PIPE Class V. double gasketed jacked, shall conform to the provisions of M.A.G. Specification provisions 618, 735 and 765. R.C.P. pipe for jacking shall be Class V and measured in linear feet as shown in plans.

Payment will be made at the contract unit price per linear foot installed complete in-place for 60" R.C.P. jacked pipe.

66" PIPE CULVERT shall conform to the provisions of M.A.G. Specifications for the pipe chosen as shown in the Alternate Pipe Table shown on plans. The pipe culvert shall be measured in linear feet complete in place as shown on the plans. Pipe thicknesses shall be not less than that shown in the Alternate Pipe Table.

The class of R.G.R.C.P. pipe used shall be Class III.

Corrugated metal pipe (CMP) shall be Type "D" smooth lined pipe. Full compensation for excavation, backfill, removal of obstructions, compacting, testing and all incidental costs, shall be considered as included in the contract unit price paid per linear foot of each size of pipe installed.

Payment will be made at the contract unit price per linear foot installed complete in place for 66" pipe culvert.

78" PIPE CULVERT shall conform to the provisions of M.A.G. Specifications for the pipe chosen as shown in the Alternate Pipe Table shown on plans. The pipe culvert shall be measured in linear feet complete in place as shown on the plans. Pipe thicknesses shall be not less than that shown in the Alternate Pipe Table.

The class of R.G.R.C.P. pipe used shall be Class III.

Technical Specifications - continued

Corrugated metal pipe (CMP) shall be Type "D" smooth lined pipe. Full compensation for excavation, backfill, removal of obstructions, compacting, testing and all incidental costs, shall be considered as included in the contract unit price paid per linear foot of each size of pipe installed.

Payment will be made at the contract unit price per linear foot installed complete in place for 78" pipe culvert.

MANHOLES shall conform to the provisions of Section 625 of the M.A.G. Specifications and Standard Details 520 and 522. Measurement shall be per each manhole and shall include all excavation, backfill, compaction, concrete base, shaft, frame and cover. Manholes shall include frame and cover with necessary leveling rings per M.A.G. Standard Detail #424 or M.S.D. #523 (one location).

Payment will be made at the contract unit price bid per each manhole complete in place as shown on plans.

SPECIAL TRANSITION STRUCTURE shall conform to the provisions of Sections 505, 725 and 727 of the M.A.G. Specifications. Payment will be made at the contract bid price per each structure and shall be compensation in full for construction of the structure including labor, equipment, concrete, reinforcing steel, forming, vibrating, finishing, curing, excavation, backfill, and incidentals necessary to complete the work as shown on plans.

CONCRETE BOX CULVERT (8' x 4') shall conform to the provisions of Sections 505, 725, 727 and 787 of M.A.G. Specifications. Payment will be made at the contract unit price per linear foot measured parallel to the invert grade and shall be compensation in full for construction of this structure to include labor, equipment, concrete, reinforcing steel, forming, vibrating, finishing, curing, excavation, compacted backfill and incidentals necessary to complete the work as shown on plans.

SPECIAL CATCH BASIN (SVOB Park) shall conform to the provisions of Sections 505, 725, 727 and 787 of M.A.G. Specifications. Payment will be made at the contract lump sum bid price and will be full compensation for all labor, materials, tools and equipment, excavation, forming, finishing, curing, backfill and incidentals necessary to complete the work as shown on plans.

LIFT STATION shall be Gorman-Rupp 6' x 6' budget factory-built above-ground fiberglass pump station with duplex T6A3-B pumps (500 gpm) with 10 HP motors (3 phase, 50 cycle, 240 volt), check valves and plug valve, station piping, electric controls (including NEMA-1) panel, circuit breakers and operating mechanism, electric meter, starters, overload relays, control circuit with manual and automatic pump alternation selection, air bubbler level control (lead pump and lag pump start and stop levels and

Technical Specifications - continued

automatic pump alternation). Equipment is mounted on a steel base within a fiberglass enclosure. Contractor will furnish a six foot diameter wet well, concrete pad with cast iron frame and cover, concrete base, 12-inch connecting pipe to storm drain manhole and inlet and outlet piping complete as shown on plans.

Payment for this item will be made at the contract lump sum bid price for lift station complete and shall be compensation in full for the wet well, package lift station equipment, excavation, backfill, connection to storm drain manhole, concrete, reinforced steel, vibrating, finishing and incidentals necessary for completion of the work as shown on plans.

The transformer pad and primary power connection will be performed by Salt River Project. Contractor shall be responsible for furnishing and installing power to the lift station, electric disconnect and electric meter.

EXPLORATORY EXCAVATION shall conform to Section 601 of M.A.G. Specifications. Payment will be made at the cubic yard bid price and will be full compensation for all labor and equipment necessary to locate utilities. Contractor will be responsible for cost of replacement of any utilities displaced during excavation.

FLOW RESTRICTION PLUGS shall conform to Sections 511, 775 and 776 of M.A.G. Specifications. Payment will be made at the contract unit bid price per each plug and shall be full compensation for materials, equipment and labor necessary to construct the flow restriction plugs complete in place as shown on plans regardless of size.

PAVEMENT REPLACEMENT (TYPE B) shall conform to M.S.D. 200 and Sections 321, 336, 360, 702 and 710. Payment will be made at the contract unit bid price per square yard of pavement (Type B). Asphalt replacement will be based on the calculated trench widths using outside pipe diameter plus 2 feet (pipe diameter up to 48 inches). Payment will be full compensation for all labor, equipment, asphalt, aggregate base, compaction and incidentals necessary to complete Type B pavement replacement.

SOIL BORING REPORT AND DATA: The soil boring report (See Appendix A-1) is included for the Contractor's information only. The City of Tempe does not guarantee the accuracy of the boring logs and it is the Contractor's responsibility to make his own determinations and investigations into existing subsurface conditions of this project.

PIPE PLUG MAG 427

This work shall be done where called out in the plans per MAG Detail 427. Size of plug determined by pipe diameter. Measurement and payment will be for each pipe plug complete, in place at the contract unit price bid per each as stated in the proposal.

Technical Specifications - continued

PIPE SUPPORTS MAG 403-1 (TYPE A)

This work shall be accomplished in accordance with MAG Detail 403-1 (Type A) where shown on the plans. Measurement and payment will be for support complete, in place at the contract unit price bid per cubic yard as stated in the proposal.

THRUST BLOCKS

Thrust blocks for the pressure line from the pump station shall be installed as shown on the plans per MAG Detail 381. Measurement and payment will be at the contract unit price bid per cubic yard as stated in the proposal.

REMOVAL OF EXISTING IMPROVEMENTS

Removals of headwalls, pipe, etc. as shown on the plans will be accomplished in accordance with Section 350 at the MAG Specifications. Payment will be made at the contract unit price (per each, L.F., etc.) as shown in the proposal.

REMOVE & REPLACE VERTICAL CURB & GUTTER

This item is for the removal and replacement of the curb and gutter of the northeast curb return at 48th St. and Broadway Rd. Replacement shall be in kind. Measurement and payment shall be made at the contract unit price bid complete, in place as stated in the proposal.

SCUPPER MAG DETAIL 203

This item is to conform to MAG Detail 203 installed as shown on the plans. Measurement and payment shall be at the contract unit price bid per each as stated in the proposal.

30" AND 36" R.G.R.C.P. IRRIGATION (SRVWUA)

This item shall conform to the provisions of the Salt River Project specifications for R.G.R.C.P. attached hereto.

Measurement and payment for each size of pipe installed shall be made at the contract unit price bid per linear foot installed and shall include all trench excavation, pipe bedding, special backfill material, backfill compaction and all incidental work such as but not limited to removal of underground obstructions or vertical realignment of existing underground utilities performed by the Contractor or by others at the Contractor's expense.

MANHOLE - SRVWUA

This item shall conform to MAG Standard Details 520, 521, 522 and the provisions of Sections 206, 625, and 787 of the MAG Specifications, and shall be measured per each, complete in place at the locations shown on the plans including manhole steps, frame and cover.

Payment shall be made at the contract unit price bid per each storm drain manhole installed and accepted.

STRUCTURE - SRVWUA

This item shall be the exact predetermined cost participation by this project for the construction of irrigation structure.

Following the award of bid, the Contractor shall, upon demand by Salt River Project, pay directly thereto the exact sum price as affixed in the bid proposal. This shall be compensation to SRP for this item, and no additional payment shall be required, except however, damages by the Contractor to these facilities as herein described shall be at the Contractor's expense.

CITY OF PHOENIX SUPPLEMENT TO TECHNICAL SPECIFICATIONS
48TH STREET STORM DRAIN
PROJECT NO. 84072

HEL-COR CL CONCRETE LINED PIPE

This specification covers welded seam and lockseam HEL-COR concrete lined corrugated steel pipe. This pipe is an approved alternate storm sewer conduit material on this project, subject to the following specifications.

MATERIALS

A. CORRUGATED STEEL PIPE

1. Corrugated pipe, band couplers and fittings shall conform to the requirements of AASHTO Designation M-36. All exposed pipes, fittings, and couplings shall be bituminous coated.
2. Pipe shall be of full circle and shall be fabricated with helical corrugations. Welded seam or lockseam corrugated steel pipe will be accepted.
3. Each pipe end shall be fabricated with two annular corrugations for purposes of joining pipes together with band couplers.
4. The welded seam shall be continuous, utilizing ultrahigh frequency resistance equipment. Seams shall be welded in such a manner that they will develop the full strength of the pipe and not affect shape or nominal diameter of the pipe.
5. Lockseam corrugated steel pipe shall be fabricated with a continuous helical lockseam parallel to the corrugations in accordance with AASHTO Designation, M-36, Section 13.
6. Materials

The pipe shall be designed structurally for an H-20 loading according to the American Iron Steel Institute Handbook of Steel Drainage and Highway Construction Products. the pipe shall also be in compliance with the plans.

B. COUPLING BANDS

1. Pipe shall be joined together with coupling bands made from steel sheets to a specified thickness of .064".
2. Coupling bands shall be formed with two corrugations that are spaced to provide nesting in the second corrugation of each pipe end without creating more than 1/2" annular space between pipe ends when joined together.
3. Coupling bands shall be drawn together by two 1/2" galvanized bolts through the use of a bar and strap suitably welded to the band.

Technical Specifications - continued

C. GASKETS

1. Gaskets shall be used and placed in the first corrugation of each pipe end and shall be compressed by tightening the coupling band.
2. Rubber "O" Ring gaskets shall conform to the requirements of Section 5.9 in ASTM C-361.

D. CONCRETE LINING

1. Composition: Concrete for the lining shall be composed of cement, fine aggregated, and water that are well mixed and of such consistency as to produce a dense, homogeneous, nonsegregated lining. Admixtures shall not be used unless written authorization has been obtained from the Engineer.
2. Aggregates: Aggregates shall conform to MAG Section 701.
3. Mixture: The aggregates shall be sized, graded, proportioned, and thoroughly mixed with such proportions of cement and water as will produce a homogeneous concrete mixture of such quality that the pipe will conform to the design requirements of this specification. In no case, however, shall the proportions of portland cement, blended cement or portland cement plus pozzolanic admixture be less than 564 lbs. per cubic yard of concrete (6 sack mix). Portland cement shall conform to the requirements of ASTM C-150, Type II, low alkali.
4. Thickness: The lining shall have a minimum thickness of 1/8" above the crest of the corrugations.
5. Lining Procedure: The lining shall be plant applied by a machine traveling through a stationary pipe. The rate of travel of the machine and the rate of concrete placement shall be mechanically regulated so as to produce a homogeneous nonsegregated lining throughout. The lining shall be applied in a two-course application.
6. Surface Finish: The lining machine shall also mechanically trowel the concrete lining as the unit moves through the pipe.
7. Certification: Furnish manufacturer's standard Certificate of Compliance upon request of the City of Phoenix.
8. Pipe Diameter: The finished inside diameter of the pipe, after lining, shall be the design diameter + 1% or 3/8 inch.

E. JOINTS

All joints shall be mortared smooth, to a steel trowel finish, around the entire circumference of the pipe. Leakage testing shall not be performed until all the test pipe has had joints mortared.

F. LEAKAGE TESTING

1. Leakage testing shall comply with Section LEAKAGE TEST in the Special Provisions of these specifications.

G. PIPE ELONGATION AND DEFLECTION

Section 621.3.2 of the MAG Specifications, 1985 City of Phoenix Supplements, as revised to indicate that pipe elongation of 5%, + 1/2% of the nominal diameter will be optional and not mandatory.

Also, the installed pipe shall be rejected if the vertical diameter at any point along the pipe section is less than 95% of the nominal diameter of the pipe or more than 105% of the nominal diameter. Measurements shall be taken, in the presence of the Engineer, after all backfilling of the pipe trench has been completed and accepted. If any sections of the pipe are not within these tolerances, it shall be the responsibility of the Contractor to take corrective actions that will not damage the pipe or the concrete lining. If, in the opinion of the Engineer, corrective measures taken have not restored the pipe to the acceptable diameter, or have damaged the pipe or concrete lining, all such sections of pipe shall be removed and replaced at no additional cost to the City of Phoenix.

H. REPAIRS

All cracks 1/16-inch (0.06 inch) or more in width and 36 inches in length shall be filled with an approved epoxy joint filling material that will bond the two faces of the crack. The finished interior surface of the pipe at the locations where cracks are replaced shall be cleaned, with any extraneous material removed, such that the surface matches the adjacent mechanically trowelled surface. The pipe shall be inspected for cracks after all backfilling of the pipe trench has been completed and accepted. The type of material used for crack repairs shall be submitted to the Engineer for approval prior to the start of any corrective work.

Any areas indicating voids such that concrete lining is not tight to the C.M.P. (delaminated), shall be removed and repaired in a manner satisfactory to the Engineer. Any pipe not repaired to the Engineer's satisfaction shall be removed and replaced at the Contractor's expense.

CPI SMOOTHWALL METAL LINED PIPE

This specification covers Lockseam Smooth Metal Lined Corrugated Steel Pipe. this pipe is an approved alternate storm sewer conduit material on this project, subject to the following specifications.

MATERIALS

- A. Corrugated Steel Pipe

Technical Specifications - continued

MATERIALS

A. Corrugated Steel Pipe

1. The Corrugated Steel Pipe and Smooth Steel Interior Liner shall be manufactured in accordance with the requirements of AASHTO Designation M-36, Type 1A except that the lock seam shall be on the tangent of the corrugation. the lockseam of the smooth liner and corrugation shell shall be continuous from end to end of each length of pipe section and shall be formed with an internal lock rib on the liner and shall have a double thickness of metal. (See detail on P.S.-6). All exposed pipe (internal and external), fittings and couplings shall be bituminous coated.
2. Each pipe shall be fabricated with Helical Corrugations and the ends shall be reformed with two annular corrugations for purposes of joining two pipes together with band couplers.
3. The pipe shall be full circle and shall be fabricated with a continuous Helical Lockseam parallel to the corrugations in accordance with AASHTO Designation M-36, Section 13.
4. The pipe shall be designed structurally for an H-20 loading according to the American Iron and Steel Institute Handbook of Steel Drainage and Highway Construction Products. The minimum pipe gauge of the shell shall also be in compliance with the gauge shown on the plans. The minimum pipe gauge of the liner shall be 22 (0.034 inches).

B. Coupling Bands

1. Pipe shall be joined together with coupling bands made from Steel Sheets to a specified thickness of .064 inches.
2. Coupling bands shall be formed with two corrugations that are spaced to provide nesting in the second corrugation of each pipe end without creating more than 1/2" annular space between pipe ends when joined together.
3. Coupling bands shall be drawn together by two 1/2" galvanized bolts through the use of formed angles suitably welded to the band.

C. Gaskets

1. Gaskets shall be used and placed in the first corrugation of each pipe end and shall be compressed by tightening the coupling band.
2. Rubber "O" ring gaskets shall conform to the requirements of Section 5.9 in ASTM C-361.

Technical Specifications - continued

D. Joints

All joints shall have the annular space between abutting pipe sections filled with a bituminous mastic after joining. Leakage testing shall not be performed until all the joints have had the annular spaces filled.

E. Leakage Testing

Leakage testing shall comply with Section LEAKAGE TESTING, contained in these Special Provisions.

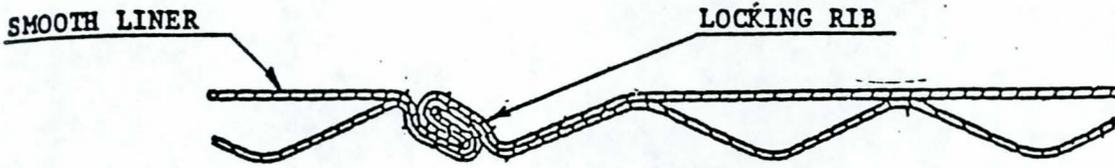
LEAKAGE TEST

Corrugated steel storm sewer pipelines, except culverts and catch basin connector pipes, shall be subjected to a test for leakage conducted in accordance with the following criteria:

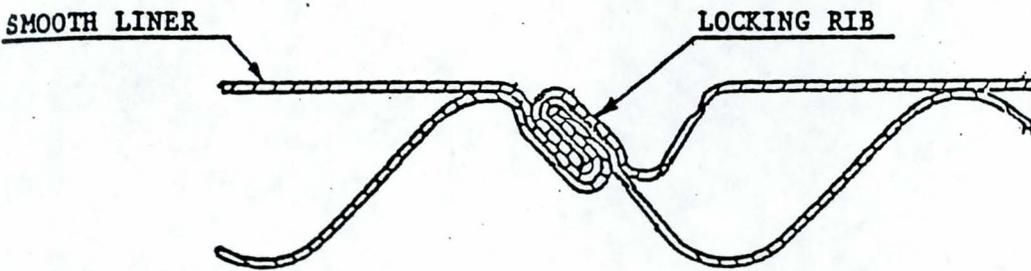
1. After bedding (1 foot above pipe), the first eight joints of each size of mainline pipe shall be tested in accordance with the following procedure:
 - a. Testing shall be accomplished by plugging the pipe test section and all branch lines and filling the pipe with water. Equipment for the test shall be furnished by the Contractor, and shall include a metal standpipe, a suitable meter, or other acceptable method of measuring the quantity of water used. A period of at least one hour shall be allowed for absorption before making the test.
 - b. The allowable water loss for corrugated steel storm sewers shall not exceed 1.0 gallons per hour per 100 feet of pipe per inch of diameter of pipe under a minimum test head of 4 feet above the top of the pipe at the upper end of the test section. A minimum test time of one hour (60 minutes) shall be required after the initial one hour for absorption.
 - c. The leakage test shall be made by the Contractor in the presence of the Engineer.
2. If the first test is within the specified leakage limit, the Engineer may require one additional leakage test at some point during the course of construction.
3. If the first test exceeds the specified leakage limit, the contractor shall repair or replace all sections that fail the leakage test at no additional cost to the City of Phoenix. All repaired or replaced pipe sections shall be retested for compliance. The Engineer will require such additional test that is deemed necessary during the course of construction to insure that the remainder of the pipeline is leak resistant.

CPI SMOOTHWALL LOCKSEAM AND JOINT DETAIL

LOCKSEAM DETAIL

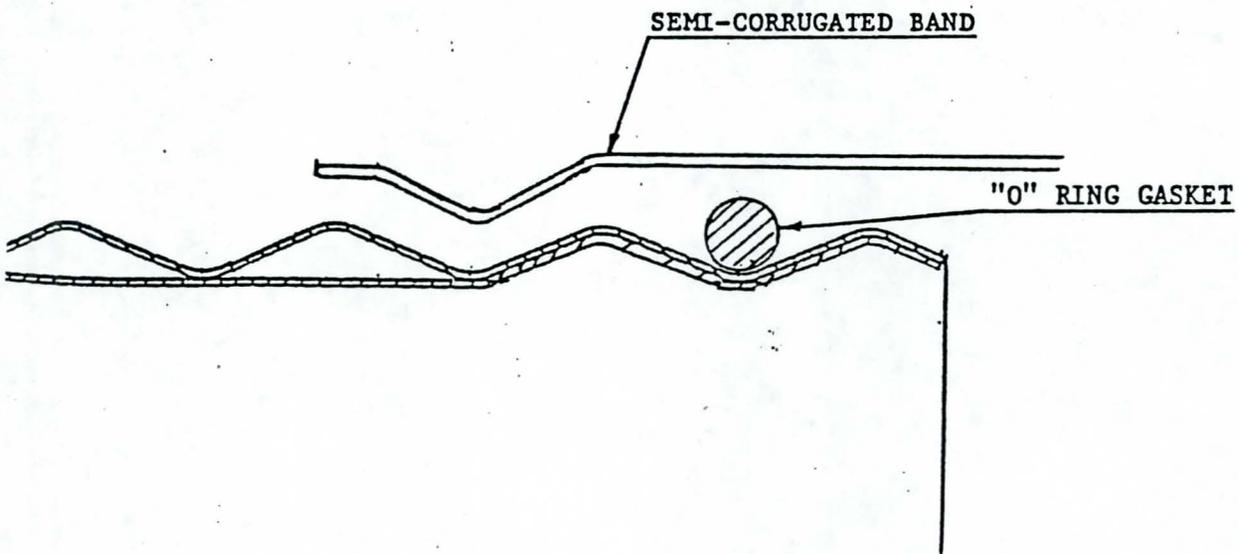


2 2/3" X 1/2" CORRUGATION



3" X 1" CORRUGATION

JOINT DETAIL



REROLLED END WITH GASKET & BAND

Technical Specifications - continued

4. There will be no separate payment for the leakage tests. Payment for leakage tests shall be included in the cost of the pipe.

STORM SEWER CONSTRUCTION MATERIAL AND LAYOUT SUBMITTALS

Prior to the manufacturing of the pipe, the Contractor shall submit material and layout drawings to the Engineer in accordance with the procedures contained in the City of Phoenix Supplement, latest edition.

Submittals shall show layout, stationing, laying length of all pipe. D-load or gauge thickness, detailed drawings of any pipe used to construct a curve, and other pertinent data. Fabrication drawings shall be submitted for concrete pipe. Catch basin connector pipe need not be included in the pipe layout, however, pipe stubs shall be included. In lieu of including catch basin connector pipe in the pipeline layout, a list of catch basin connector pipe shall accompany the layout. the connector pipe list shall contain the following information:

- A. Inside diameter and type of material to be used. (R.C.P., C.S.P.)
 1. If R.C.P. is used for connector pipe, the D-load rating shall be shown.
 2. If C.S.P. is used for connector pipe, the gauge shall be shown.
- B. Station at which pipe joins mainline.
- C. Number of sections of pipe and laying length of sections.

TECHNICAL PROVISIONS

48th STREET PAVING
PROJECT NO. 85008

MEASUREMENT AND PAYMENT

The method of measurement and payment for the various items comprising the completed work follows: Payment for the items shall be compensation in full for the furnishing of all overhead, labor, material, tools, equipment, and appurtenances necessary to complete the work in a good, neat, and satisfactory manner, as indicated in the plans or as specified, with all connections, testing, and related work completed. Each item, fixture, piece of equipment, etc. shall be complete with all necessary use of and/or operation of said item. No additional payment will be made for work related to each item unless specifically noted or specified. Measurement will be in place for the completed work, with no allowances for waste.

No payment shall be made for any item in CLEAN-UP. The cost of this work shall be included in other items of work for which payment is provided.

SUBGRADE PREPARATION

Shall conform to the provisions of Section 205, 211, 301, and 350 of the MAG Specifications, Section 301.3 of the City of Tempe MAG Supplement, City of Phoenix MAG Supplement, Section 350.3, and these special provisions. Clearing and grubbing roadway excavation, roadway fill, removal of existing asphalt concrete paving and driveway, miscellaneous removal and relocation of signs and fences shall be included as subgrade preparation. Wherever a portion of existing pavement is to be removed as indicated on the plans, the outside edge of the existing surface which is to remain in place shall be saw cut to a neat line prior to removal. Excess or unsuitable material, concrete, and broken asphaltic concrete shall be removed from the project and disposed of by the Contractor. No City of Tempe landfill is available for disposal of excess or unsuitable material, etc.

The existing uncompacted material shall be removed 6" below subgrade and recompacted in accordance with MAG Specifications and City of Tempe MAG Supplements. The material should be placed in lifts and in accordance with MAG Specifications and be compacted to 95% of maximum density. Refer to the enclosed soils report dated December 2, 1985.

Subgrade preparation will be measured in square yards and shall be based on the area between back of the future curbs and gutters and to the dimensions as indicated on the plans and as staked in field. Additional grading between the curb and the property line will be considered incidental to subgrade preparation and no additional measurement will be made for this work.

Payment for all work specified above will be made at the contract unit price per square yard for subgrade preparation.

ASPHALTIC CONCRETE SURFACE COURSE, ASPHALTIC CONCRETE BASE COURSE AND ASPHALTIC CONCRETE SINGLE COURSE

Shall be Types D-1/2, A 1-1/2 and C-3/4, respectively, and designated in the MAG Specifications Section 710 and current supplements thereto, City of Phoenix MAG Supplement Section 710, and shall conform to the provisions of Sections 313, 321 and 322 of the MAG Specifications.

The measurement and payment of the asphaltic concrete finishing course and asphaltic concrete base course will be measured in square yards and shall be based on the area between the future curb and gutter lip and to the dimensions as indicated on the plans and as staked in the field.

Payment for all work specified above will be made at the contract unit price per square yard.

AGGREGATE BASE COURSE

Shall be classified as crushed aggregate, in accordance with MAG Specification 702.2, and shall conform to the provisions of Section 310 of the MAG Specifications.

Aggregate base course shall be measured in square yards, complete in place, to the thickness indicated on the plans and will be based on the area between curb and gutter lip, and to the dimensions as indicated on the plans and staked in the field.

Payment will be made at the contract unit price per square yard for aggregate base course.

EMULSIFIED ASPHALT TACK COAT

SS-1h, shall conform to the provisions of Section 321, 322, and 713 of the MAG Specifications. The application rate is to be 0.08 Gal/S.Y. diluted. Tack coat to be used at the direction of the Engineer.

OFFSET MANHOLES FOR SANITARY SEWER

Sewer manholes shall conform to MAG Specifications Section 625, Standard Details 421 and 424. Manholes shall be 48" inside diameter. Measurement shall be per each type of manhole and shall include all excavation, backfill, compaction, concrete base, shaft, frame and cover.

Payment shall be made at the contract unit price bid per each type of manhole including final adjustment.

VERTICAL CURB AND GUTTER, TYPE "A" & SINGLE CURB TYPE "A" & ROLL CURB & GUTTER

Shall conform to MAG Standard Details 220, 221, and 222 MODIFIED (City of Phoenix), and ADOT Standard Drawings C-05.10 respectively, and to the MAG Specifications Section 340, Section 301.3 of the City of Tempe MAG Supplement and Section 908 of the ADOT Standard Specifications.

Vertical curb and gutter and single curb shall be measured by the lineal foot, in accordance with MAG Section 340.5.

Payment shall be made at the contract unit price bid in the proposal for each item, as specified herein.

CONCRETE DRIVEWAY AND ALLEY ENTRANCES AND VALLEY GUTTER WITH APRONS

Shall conform to MAG Standard Details 240, 250, and 260 mod (9" thick), City of Phoenix Standard Detail P-1255, and ADOT Standard Drawing C-05.20, respectively, and to the MAG Specifications Section 340, City of Phoenix MAG Supplement Section 340, City of Tempe MAG Supplement Section 301.3 and ADOT Standard Specifications Section 908.

Driveway and alley entrances and valley gutters with aprons shall be measured to the nearest square foot, in accordance with MAG Section 340.5 and based on the area within the limits indicated on the plans.

Payment shall be made at the contract unit price bid in the proposal for each item, as specified herein.

CONCRETE SIDEWALK AND BICYCLE PATHS

This item shall conform to City of Phoenix Standard Detail P-1230, City of Tempe Standard Detail T-345 and T-349, ADOT Standard Drawing, C-05.20 respectively, and the MAG Specifications Section 340, City of Phoenix MAG Supplement Section 340, City of Tempe MAG Supplement Section 301.5 and ADOT Standard Specifications Section 900.

Sidewalks and bicycle paths shall be measured to the nearest square foot, in accordance with MAG Section 340.5, and based on the area within the limits indicated on the plans.

Payment shall be made at the contract unit price bid in the proposal for each item, as specified herein.

CONCRETE BUS BAY WORK

Shall conform to City of Phoenix Standard Detail P-1256, MAG Specifications Section 725, and to the City of Phoenix MAG Supplement 725.

Concrete bus bay work shall be measured to the nearest square foot, complete in place, and based on the area within the limits indicated on the plans.

Payment shall be made at the contract unit price bid in the proposal for each item, as specified herein.

SURVEY MONUMENT TYPE "A" AND "B"

Shall conform to Sections 405, 725, and 786 of the MAG Specifications, Standard Detail 120-1, and shall be measured per each, complete in place, as indicated on the plans.

Payment will be made at the contract price per each.

ADJUSTMENT OF EXISTING WATER VALVES, AND WATER METER, BOX FRAMES AND COVERS TO GRADE

Shall conform to the provisions of Section 345 of the MAG Specifications and shall be measured per each unit adjusted to finish grade as indicated on the plans.

Payment shall be made at the unit price bid for each item bid.

ADJUSTMENT OF EXISTING SANITARY SEWER, TELEPHONE AND STORM DRAIN MANHOLES

Shall conform to the provisions of Section 345 and 625 of MAG Specifications and shall be measured per each unit, complete in place, and adjusted to finish grade as indicated on the plans.

Payment will be made at the contract unit price per each unit for Adjustment of Existing Sanitary Sewer, Telephone and Storm Drain Manholes.

CONCRETE CATCH BASINS

Shall conform to MAG Standard Details 530, 531, 532 and 534, City of Phoenix Standard Details P-1569 and P-1571, ADOT Standard Drawing C-15.30; respectively, MAG Specifications Section 505, and ADOT Standard Specifications Section 503.

Payment shall be made at the contract unit price bid in the proposal for each item, as specified herein and includes all required fabricated steel.

REMOVE CONCRETE LINED DITCH, BACKFILL & COMPACT

This item shall consist of removing existing concrete lined ditch; loading, hauling, and disposing concrete debris; importing backfill material, placing and compacting in maximum layer specified in Section 211 of the MAG Specifications; and grading and shaping to subgrade cross sections as indicated on the contract plans. Measurement and payment shall be made at the contract unit price bid per linear foot.

CLEAR, GRUB, MUCK-OUT, BACKFILL & COMPACT EXISTING IRRIGATION DITCH

This item shall consist of clearing existing ditch of all vegetation, and debris; importing backfill material, placing and compacting in layers specified in Section 211 of the MAG Specifications and grading to the subgrade cross sections indicated on the contract drawings. Measurement and payment shall be made at the contract unit price bid per linear foot.

18", 24", 30" AND 36" R.G.R.C.P. IRRIGATION (SRVWUA)

This item shall conform to the provisions of the Salt River Project specifications for R.G.R.C.P. attached hereto.

Measurement and payment for each size of pipe installed shall be made at the contract unit price bid per linear foot installed and shall include all trench excavation, pipe bedding, special backfill material, backfill compaction and all incidental work such as but not limited to removal of underground obstructions or vertical realignment of existing underground utilities performed by the Contractor or by others at the Contractor's expense.

MANHOLE - SRVWUA

This item shall conform to MAG Standard Details 520, 521, 522 and the provisions of Sections 206, 625, and 787 of the MAG Specifications, and shall be measured per each, complete in place at the locations shown on the plans including manhole steps, frame and cover.

Payment shall be made at the contract unit price bid per each storm drain manhole installed and accepted.

CONCRETE IRRIGATION HEADWALL WITH TRASH RACK - SRVWUA

This item shall consist of the construction of concrete irrigation headwall, including all equipment, tools, labor and materials necessary for construction of the concrete irrigation headwall with trash rack where shown on SRVWUA plans per their specifications and details.

Measurement and payment shall be made at the contract unit price bid per each for concrete irrigation headwall with trash rack complete in place.

RUBBER GASKET REINFORCED CONCRETE PIPE (R.G.R.C.P.)

Shall consist of placing the specified size of rubber gasket reinforced concrete pipe according to the alignment and grades as indicated on the plans and in accordance with the applicable requirements of the MAG Specifications, Section 618, Storm Line Construction with Concrete Pipe. All pipe shall conform to ASTM C-76, Class IV Specifications, latest revisions.

Payment will be made at the contract unit price bid per linear foot, to the nearest foot of each size specified of rubber gasket reinforced concrete pipe (RGRCP) (Class IV) installed, which price shall be full compensation for the item complete in place as described and specified herein and on the plans, including removal of obstructions, excavation, bedding, backfilling, compacting, testing, joint materials, installation and removal of plugs, and all incidental costs not specifically covered in other items in the Proposal.

REMOVAL OF PIPE - BACKFILL AND COMPACT

Shall consist of the removal of existing pipe, regardless of size or class, as specified in the plans or as necessary. The work also consists of the disposal of all pipe, any broken concrete and debris, and backfilling and compacting trench.

Backfilling material and compaction of trench shall be according to Section 601 of the MAG Specifications. Density of compaction shall be Type I of Section 601.

Measurement and payment for this work will be made at the contract price per linear foot, and this price shall be full compensation for the items complete, as described and specified herein and on the plans.

NO. 5 PULL BOX & NO. 3 1/2 PULL BOX

Shall conform to the current edition of the ADOT General Specifications for Traffic Signals and Detail Drawings and shall be measured per each, complete in place.

The contract unit price paid for Pull Box installation shall be full compensation for all work involved in installing, complete in place, including excavation and backfill, as shown on the plans, as specified in the MAG Specifications and these special provisions or as directed by the Engineer.

1", 2", 3" P.V.C. PIPE WITH #8 PULL WIRE

Shall conform to the current edition of the ADOT General Specifications for Traffic Signals and Detail Drawings and shall be measured per linear foot complete in place.

The contract unit price paid for PVC installation shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for all work involved in installing, complete in place, including #8 pull wire, excavation, bedding, compaction, and backfill, as shown on the plans, and as specified in the MAG Specifications and these special provisions or as directed by the Engineer.

REMOVAL ITEMS

Shall conform to the provisions of Section 350 of the MAG Specifications and shall be measured in linear feet, each or square yard as specified in the Engineer's Estimate and as shown on the plans.

Where no joint exists between concrete curbs and gutter to be removed and concrete curbs and gutter to remain in place, the concrete shall be cut in a neat line before concrete is removed.

All concrete removal items shall be removed from the project and disposed by the Contractor. Concrete removal shall be accomplished in a manner that will not damage that portion of the work which is to remain in that place. Any damages to portions not to be removed shall be repaired by the Contractor, to the satisfaction of the Engineer, at the Contractor's expense.

Payment for each removal item shall be made at the contract unit price per linear foot, each, square foot, or square yard as shown on the plans, specifications, and as directed by the Engineer and shall include all labor, materials, tools, equipment, and incidentals, and for doing all work involved including backfill and compaction and no separate payment will be made therefore.

TEMPORARY BARRICADES

Temporary barricades shall be regulated in accordance with the City of Tempe Traffic Barricade Manual, latest revision and Manual of Uniform Traffic Control Devices.

No additional payment will be made for temporary barricades but will be considered incidental to those items for which payment is made.

FINAL ACCEPTANCE AND 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.

TRAFFIC SIGNAL WORK (48TH & BROADWAY) - TEMPE

TRAFFIC SIGNAL WORK (48TH & SOUTHERN) - TEMPE

All work done under this contract shall be accomplished in accordance with the Arizona Department of Transportation, Highways Division, Supplemental Specifications to Standard Specifications for Road and Bridge Construction, October, 1985 and latest revision of Standard Drawings and these special provisions.

The Contractor shall submit to the Traffic Engineer, for approval, six (6) copies of a complete list of traffic signal materials that he proposes to incorporate into the project prior to ordering material.

The work shall consist of furnishing and installing the following equipment per the plans and specifications:

Traffic Signal Poles & Mastarms including anchor bolts, internal wiring and other incidentals.

Traffic Signal Pole Foundations including all excavations and backfill, the furnishing and placing of all anchor bolts, conduit elbows, concrete, grounding wire and connections.

Polycarbonate Vehicle Signal Heads including louvered back plates, tunnel visors, lamps, internal wiring and mounting assemblies. Polycarbonate signal heads with Type I and II mountings shall have metal reinforcing plates installed.

Pedestrian Signals including solid state neon display with international man/hand symbols in a single housing, Z-crate visor and mounting assemblies.

Pedestrian Push Buttons including internal wiring and other incidentals.

Luminaires including 250 watt high pressure sodium vapor lamp, built-in ballast, 90 degree light cutoff, Type III distribution pattern equal to G.E. M400A cutoff fixture.

CONTROL CABINET FOUNDATION (TYPE IV)

The work under this item consists of installing a control cabinet on a new foundation. The Type IV control cabinet and all necessary equipment will be supplied by the City of Tempe Traffic Engineering Department. The new foundation, pad, anchor bolts, all required excavation, backfill and other incidentals in accordance with the project plans and these Special Provisions are to be provided by the Contractor. The City furnished cabinet shall be picked up at the City of Tempe Traffic Operations Facility and taken to the job site.

LOOP DETECTORS FOR TRAFFIC SIGNALS

The work consists of furnishing and installing loop detectors for traffic signals in accordance with the project plans, the Specifications, and the City of Tempe Loop Detector Detail, 1982.

ELECTRICAL SERVICE (120/240 VOLT)

The work under this item consists of installing an electrical service for the traffic signal. This work shall include all enclosures, equipment and mounting hardware. The work shall be performed in accordance with the project plans and these Special Provisions.

The electrical service for the traffic signal will include the installation of electrical disconnects in an enclosure to be mounted on the back of the traffic signal control cabinet. The service will be 120/240 volt and will not be metered. The Contractor shall provide and install conduit, conductors, and pull boxes to the SRP electrical point. The pull box shall be installed within two feet of the SRP service point. The Contractor shall coordinate with SRP and the Engineer for the service location.

REMOVE & SALVAGE ELECTRICAL EQUIPMENT

The work shall consist of removing existing traffic signal equipment and foundations in accordance with the project plans and specifications. All poles, mast arms, signal faces, pedestrian indications, control cabinet, mounting assemblies, luminaires (on combination poles), and push button assemblies shall be salvaged and delivered to the City of Tempe Traffic Operations Facility.

The existing signal pole concrete foundations shall be removed and disposed of in a manner acceptable to the Engineer. Resulting holes or cavities shall be backfilled with suitable material, as approved by the Engineer, and compacted to a density of not less than 85% of maximum density.

All salvaged material, shall remain the property of the City of Tempe. Material broken or damaged by the Contractor shall be replaced with new and like material at the Contractor's expense.

At the time specified by the Engineer, the Contractor shall carefully remove and salvage the signal equipment and shall load, haul, unload and stockpile the salvaged materials at the City of Tempe Traffic Operations Facility.

Measurement and payment will be for all equipment, tools, labor, and materials required to provide a complete system at each intersection specified per the plans and specifications at the Lump Sum price bid for each intersection as shown in the Proposal.

TRAFFIC SIGNAL WORK (48TH & BASELINE) - PHOENIX

Measurement and payment for all pay items in the Bid Proposal shall be as indicated in the applicable Standard Specification, City of Phoenix Supplement, Special Provision and Proposal Sheet.

The work under this item consists of furnishing all equipment (except City furnished items) tools, labor and materials necessary to install pole foundations, underground conduit, junction boxes and other appurtenances as shown on plans and indicated in City of Phoenix Section 351 MAG Supplemental.

PRECAST SAFETY CURBS

The work under this item consists of furnishing and placing precast safety curbs adjacent to existing parking areas throughout the project in accordance with the requirements of Standard Detail 150 at locations shown on the plans and at locations determined by the Engineer.

Payment for this work will be made at the contract price per each in the proposal item "PRECAST SAFETY CURB", Type B-3, which price shall be full compensation for the item complete, as described and specified herein and on the plans.

FIRE HYDRANT RELOCATIONS

Fire hydrant relocations shall be paid for at the unit price bid per each. The unit prices bid shall be full compensation for removing and reinstalling the fire hydrants at the new locations shown on the plans and in accordance with new construction standards. Prior to removing the fire hydrant from service and prior to reactivating the fire hydrant, the Contractor shall notify the Engineer. The Contractor shall minimize the time the fire hydrant is out of service but in no event shall the out-of-service time exceed 24 hours. If in the opinion of the Engineer, the fire hydrant should be replaced, Water Distribution (Division) will provide a replacement fire hydrant at no cost to the Contractor. It shall be the Contractor's responsibility to pick up the replacement hydrant and to return all old hydrants to the Water Distribution (Division), 3045 S. 22nd Ave.

WATER METER RELOCATION AND ADJUSTMENT

Water meter relocation and adjustment shall be paid for at the unit bid price per each. The unit prices bid shall be full compensation for removing, relocating and adjusting existing meters and boxes which are shown on the plans to be relocated. The meters and boxes shall be relocated and adjusted to grade in accordance with standard details.

Any water meter boxes and/or covers damaged by the Contractor during course of construction shall be replaced in kind at his expense.

It is anticipated that some meter boxes and/or covers may require replacement due to prior damages not due to the fault of the Contractor. The Water and Wastewater Department will furnish these for installation by the Contractor. No additional payment will be made for this installation.

Water meter boxes and covers shall be Type 1 or 2 in accordance with either MAG Details 310, 311 and 320.

LANDSCAPING - WEST SIDE OF 48TH ST. & BROADWAY RD. WEST OF 48TH ST. ONLY

Shall conform to MAG Specification Sections 424, 425, 430, 440, 795 and City of Phoenix MAG Supplemental Sections 424, 430, 431, 432, 440 and 795 as applicable.

In addition, the following shall apply:

MAG Subsection 430.5.6 Tree and Shrub Pits: Delete the second paragraph and substitute the following:

Prepared soil mix shall consist of one part organic soil conditioner, two parts topsoil and the quantity of additive soil fertilizing material as shown below. All material shall conform to Section 795.

For a One Gallon Container	1 pound
For Five Gallon Container	2 1/2 pounds
For a 15 Gallon or Larger Container	5 pounds

MAG Subsection 795.3 SOIL FERTILIZING MATERIAL: Delete this entire subsection and substitute the following:

795.3 SOIL FERTILIZING MATERIAL:

Fertilizing material shall comply with the applicable requirements of the State Agricultural Code. All fertilizing material shall be in five pound packages, first grade, commercial quality products identified as to source, type of material, weight and manufacturer's guarantee analysis. It shall not contain toxic ingredients or fillers in quantities harmful to human life, animals or plants. It shall be delivered in unopened five pound containers and shall have the chemical analysis as specified below. Material which has become caked or otherwise damaged shall not be used.

The fertilizing material shall be processed sewage sludge granules, similar to the product Milorganite, with the following additive ingredients (% by weight): 3% Nitrogen, 10% Sulfur, 4% Iron, 1% Zinc, 0.80% Manganese and .0125% Viterra.

The additive ingredients shall be derived from:

- (1) Nitrogen from Urea Formaldehyde and M.A.P.
- (2) Sulfur from Potassium Sulfate
- (3) Iron from Sequestrene 138 Iron
- (4) Zinc from Sequestrene Zinc
- (5) Manganese from Sequestrene Manganese
- (6) Viterra from a synthetic, superabsorbent co-polymer

CLEAN FILL

Clean fill shall be free of weeds, boulders, refuse, clods or heavy clay. It shall be especially free from roadway materials such as aggregate bases, asphaltic or concrete pavement or any other deleterious materials. Any undesirable materials placed in planters shall be removed by the Contractor at no cost to the City of Phoenix, and replaced with clean fill as described above.

REVISED PAVEMENT MARKERS TYPE "J" DAGMARS

The pavement markers shall be per A.D.O.T. Detail 4-M-2.02 Type "J" Dagmars installed as shown on the plans.

Measurement and payment shall be at the contract unit price bid per each as stated in the proposal.

SIDEWALK RAMPS

Ramps to be constructed on the Phoenix portion of the project shall be per Phoenix Standard Details and paid for as CONCRETE SIDEWALK P-1230.

Ramps to be constructed on the Tempe portion of the project shall be per MAG Detail 231 and paid for as SIDEWALK RAMPS MSD 231.

All ramps shall be measured complete in place and paid for at the contract unit price per square foot as stated in the proposal.

P R O P O S A L

Place: Tempe, Arizona

Date: August 28, 1986

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 materials, labor, construction equipment, services and transportation for the
48th Street Storm Drain and Paving (City of Tempe Project No. 84072 & 85008) and
to install the material therein for the Owner in a good and workmanlike and sub-
stantial manner and to the satisfaction of the Owner, or their properly au-
thorized agents 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:

ITEM NO.	DESCRIPTION	BASE BID		UNIT COST	CONSTRUCTION COST
		QUANTITY	UNIT		
1	12in. R.G.R.C.P	548	L.F.	_____	_____
2	24in. PIPE	140	L.F.	_____	_____
3	27in. PIPE	140	L.F.	_____	_____
4	36in. PIPE	2,626	L.F.	_____	_____
5	18in. PIPE	1,835	L.F.	_____	_____
6	48in. PIPE	102	L.F.	_____	_____
7	60in. PIPE	2,541	L.F.	_____	_____
8	66in. PIPE	2,740	L.F.	_____	_____
9	78in. PIPE	3,228	L.F.	_____	_____
10	33in. PIPE	40	L.F.	_____	_____
11	8in. PVC PIPE	127	L.F.	_____	_____
12	15in. PIPE	127	L.F.	_____	_____
13	12in. PIPE	5	L.F.	_____	_____
14	36in. STEEL CASING	45	L.F.	_____	_____
15	60in. BORING AND JACKING	80	L.F.	_____	_____
16	18in. PIPE PLUG	3	EA.	_____	_____
17	24in. PIPE PLUG	1	EA	_____	_____

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	CONSTRUCTION COST
18	27in. PIPE PLUG	1	EA	_____	_____
19	30in. PIPE PLUG	2	EA	_____	_____
20	33in. PIPE PLUG	1	EA	_____	_____
21	48in. PIPE PLUG	1	EA	_____	_____
22	18in. FLOW RESTRICTIONS	8	EA	_____	_____
23	SPECIAL TRANSITION STRUCTURE (ELBOWS)	2	EA	_____	_____
24	8ft x 4ft BOX CULVERT	48	L.F.	_____	_____
25	PIPE SUPPORTS	4	C.Y.	_____	_____
26	CATCH BASIN W/ GRATE	1	EA	_____	_____
27	THRUST BLOCKS	3	C.Y.	_____	_____
28	PUMP STATION COMPLETE	1	L.S.	_____	_____
29	REMOVE HEADWALL	3	EA	_____	_____
30	SCUPPER PER MSD 203	1	EA	_____	_____
31	REMOVE EXISTING 12in. PIPE	500	LF	_____	_____
32	REMOVE EXISTING 18in. PIPE	268	L.F.	_____	_____
33	REMOVE & REPLACE CURB AND GUTTER	20	L.F.	_____	_____
34	PAVEMENT REPLACEMENT TYPE B MSD 200	219	S.Y.	_____	_____
35	STORM DRAIN MANHOLE MSD 520 & 522	27	EA	_____	_____
36	30in. R.G.R.C.P (SRVWUA)	331	L.F.	_____	_____
37	36in. R.G.R.C.P (SRVWUA)	841	L.F.	_____	_____
38	IRRIGATION MANHOLE (SRVWUA)	3	EA	_____	_____

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	CONSTRUCTION COST
39	STRUCTURES (SRVWUA)	2	EA	<u>18,000.00</u>	<u>36,000.00</u>
PROJECT 84072				TOTAL	<u> </u>

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BASE BID

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	CONSTRUCTION COST
1	SAWCUT AND REMOVE CONCRETE CURB & GUTTER	6,834	L.F.	_____	_____
2	REMOVE CONCRETE DRIVEWAY	1,725	S.F.	_____	_____
3	REMOVE CONCRETE SIDEWALK	10,217	S.F.	_____	_____
4	REMOVE CONCRETE DITCH	1,270	L.F.	_____	_____
5	REMOVE CONCRETE CURB	325	L.F.	_____	_____
6	REMOVE EXISTING SINGLE CATCH BASIN	3	EA	_____	_____
7	REMOVE 24in. PIPE	339	L.F.	_____	_____
8	REMOVE 18in. PIPE	80	L.F.	_____	_____
9	REMOVE VALLEY GUTTER	1,710	S.F.	_____	_____
10	REMOVE IRRIGATION STRUCTURE	1	L.S.	_____	_____
11	REMOVE EXISTING CONCRETE STRUCTURE	1	L.S.	_____	_____
12	REMOVE EXISTING BICYCLE PATH	1,216	S.F.	_____	_____
13	REMOVE EXISTING A.C. CURB	687	L.F.	_____	_____
14	REMOVE CONCRETE BARRIER	44	L.F.	_____	_____
15	REMOVE EXISTING SCUPPER	1	EA	_____	_____
16	FILL & COMPACT DIRT DITCH	1,174	L.F.	_____	_____
17	RELOCATE FIRE HYDRANT PER MSD 362	8	EA	_____	_____

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	CONSTRUCTION COST
18	RELOCATE WATER METER & BOX	5	EA	_____	_____
19	REBUILD CATCH BASIN MSD 534-1 TYPE E	3	EA	_____	_____
20	7in. CURB & GUTTER ADOT C-05.10 TYPE A	1,546	L.F.	_____	_____
21	7in. CURB & GUTTER MSD 220	5,704	L.F.	_____	_____
22	6in. CURB & GUTTER MSD 220	6,561	L.F.	_____	_____
23	CONCRETE SIDEWALK ADOT C-05.20	733	S.F.	_____	_____
24	CONCRETE SIDEWALK P-1230	25,036	S.F.	_____	_____
25	BICYCLE PATH T-345	32,859	S.F.	_____	_____
26	SIDEWALK RAMPS MSD 231	426	S.F.	_____	_____
27	CATCH BASIN TYPE 4 ADOT C-15.30	4	EA	_____	_____
28	CATCH BASIN MSD 532	20	EA	_____	_____
29	CATCH BASIN MSD 531 TYPE B	1	EA	_____	_____
30	CATCH BASIN P-1569	11	EA	_____	_____
31	CATCH BASIN P-1571	4	EA	_____	_____
32	CATCH BASIN MSD 530	1	EA	_____	_____
33	CONCRETE DRIVEWAY ADOT C-05.20	550	S.F.	_____	_____
34	CONCRETE DRIVEWAY P-1255	2,310	S.F.	_____	_____
35	CONCRETE DRIVEWAY MSD 250	1,550	S.F.	_____	_____
36	SURVEY MONUMENT TYPE A MSD 120-1	5	EA	_____	_____
37	SURVEY MONUMENT TYPE B MSD 120-1	24	EA	_____	_____
38	7in. SINGLE CURB (BUS BAY) P-1256	345	L.F.	_____	_____

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	CONSTRUCTION COST
39	6in. SINGLE CURB (BUS BAY) P-1256	358	L.F.	_____	_____
40	BUS BAY PAVEMENT CLASS A P-1256	5,754	S.F.	_____	_____
41	SEWER MANHOLE MSD 421	2	EA	_____	_____
42	ADJUST WATER VALVE FRAME & COVER	66	EA	_____	_____
43	ADJUST SEWER MANHOLE FRAME & COVER	25	EA	_____	_____
44	18in. R.G.R.C.P	83	L.F.	_____	_____
45	15in. R.G.R.C.P	36	L.F.	_____	_____
46	RAISED PAVEMENT MARKERS TYPE J DAGMARS ADOT 4-N-2.02	9	EA	_____	_____
47	2in. AC(C-3/4)/6in. ABC TAPER	502	S.Y.	_____	_____
48	AC OVERLAY (D-1/2)	3,068	S.Y.	_____	_____
49	1.5in. AC SURFACE COURSE (D-1/2)	96,900	S.Y.	_____	_____
50	3.5in. AC BASE COURSE (A-1 1/2)	96,900	S.Y.	_____	_____
51	12in. AGGREGATE BASE COURSE	96,900	S.Y.	_____	_____
52	SUBGRADE PREPARATION	104,077	S.Y.	_____	_____
53	TACK COAT TYPE SS-1H	7,748	GAL	_____	_____
54	ROLL CURB & GUTTER TYPE C MSD 220	35	L.F.	_____	_____
55	ALLEY ENTRANCE MSD 260	476	S.F.	_____	_____
56	VALLEY GUTTER MSD 240	195	S.F.	_____	_____
57	5in. AC(A-1 1/2) TAPER	1,208	S.Y.	_____	_____
58	PRECAST SAFETY CURB MSD 150 TYPE B-3	4	EA	_____	_____

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	CONSTRUCTION COST
59	TRAFFIC SIGNALIZATION-BROADWAY RD.	1	L.S.	_____	_____
60	TYPE A SIGNAL POLE FOUNDATION-BASELINE RD.	3	EA	_____	_____
61	TYPE M SIGNAL POLE FOUNDATION-BASELINE RD.	2	EA	_____	_____
62	NO. 3-1/2 JUNCTION BOX-BASELINE RD.	5	EA	_____	_____
63	NO. 5 JUNCTION BOX-BASELINE RD.	3	EA	_____	_____
64	1in. PVC CONDUIT FOR TRAFFIC SIGNAL-BASELINE RD.	414	L.F.	_____	_____
65	2in. PVC CONDUIT FOR TRAFFIC SIGNAL-BASELINE RD.	81	L.F.	_____	_____
66	3in. PVC CONDUIT FOR TRAFFIC SIGNAL-BASELINE RD.	556	L.F.	_____	_____
67	TYPE R SIGNAL POLE W/ MAST ARMS AND FOUNDATION-BASELINE RD.	1	EA	_____	_____
68	WATER SERVICE TAP & METER (1in.)	6	EA	_____	_____
69	ATMOSPHERIC BACKFLOW PREVENTION UNIT (1in.)	1	EA	_____	_____
70	PRESSURE BACKFLOW PREVENTION UNIT (1in.)	1	EA	_____	_____
71	REDUCED PRESSURE BACKFLOW PREVENTION UNIT (1in.)	3	EA	_____	_____
72	REDUCED PRESSURE BACKFLOW PREVENTION UNIT (1-1/4in.)	1	EA	_____	_____
73	ELECTRIC REMOTE CONTROL VALVE & ASSEMBLY (1in.)	8	EA	_____	_____
74	ELECTRIC REMOTE CONTROL VALVE & ASSEMBLY (1-1/4in.)	4	EA	_____	_____
75	SPRINKLER CONTROLLER 5 & 6 STATION	2	EA	_____	_____
76	PULL BOX	22	EA	_____	_____
77	BUBBLER AND RISER ASSEMBLY	803	EA	_____	_____

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	CONSTRUCTION COST
78	PVC IRRIGATION PIPE (SDR 13.5) (1/2in.)	3,260	L.F.		
79	PVC IRRIGATION PIPE (SDR 21) (3/4in.)	2,180	L.F.		
80	PVC IRRIGATION PIPE (SDR 26) (1in.)	2,220	L.F.		
81	PVC IRRIGATION PIPE (SDR 26) (1-1/4in.)	1,180	L.F.		
82	PVC IRRIGATION SLEEVE (SCHEDULE 40) (2in.)	960	L.F.		
83	PVC IRRIGATION SLEEVE (SCHEDULE 40) (4in.)	120	L.F.		
84	DECORATIVE PAVEMENT	5,996	S.F.		
85	DECOMPOSED GRANITE TYPE A	184	C.Y.		
86	DECOMPOSED GRANITE TYPE B	47	C.Y.		
87	CLEAN FILL	114	C.Y.		
88	SHRUBS (1 GALLONS)	687	EA		
89	TREES (15 GALLON)	116	EA		
90	REDWOOD HEADER	107	BD.F		
91	CONCRETE CURB MSD 222-B MODIFIED (6in. X 6in.)	180	L.F.		
92	CONCRETE CURB MSD 222-B (4in. X 6in.)	558	L.F.		
93	BOULDERS	4	EA		
94	MANUAL REMOTE CONTROL VALVE & ASSEMBLY (1in.)	1	EA		
95	TRAFFIC SIGNALIZATION-SOUTHERN AVE.	1	L.S.		
96	18in. R.G.R.C.P (SRVWUA)	1,567	L.F.		
97	24in. R.G.R.C.P (SRVWUA)	8	L.F.		
98	30in. R.G.R.C.P (SRVWUA)	325	L.F.		

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	CONSTRUCTION COST
99	36in. R.C.R.C.P (SRVWUA)	90	L.F.	_____	_____
100	IRRIGATION MANHOLE (SRVWUA)	3	EA	_____	_____
101	HEADWALL W/ TRASHRACK (SRVWUA)	1	EA	_____	_____
PROJECT 85008				TOTAL	_____

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TOTAL BID _____

Proposal - continued

The Undersigned hereby declares that he has visited the work 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.

Performance shall not begin until after receiving the Notice to Proceed, and the Project will be completed within two hundred forty (240) consecutive calendar days thereafter. Work for Phase I shall be completed by December 1, 1986.

The Undersigned hereby acknowledges receipt of the following Addenda:

_____ and his bid has been adjusted to reflect any changes.

Respectfully submitted,

ATTEST:

Name and Title

Witness: If Bidder is an Individual

Give Bidder's Full Address and Phone #.

C O N T R A C T

THIS AGREEMENT, made and entered into this _____ day of _____, 198__, 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, required for performing all work for the installation of the

48TH STREET STORM DRAIN AND PAVING

Project Nos. 84072 and 85008

for the sum of _____ Dollars.

(\$ _____), 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 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 and Title

ATTEST:

Authorized Officer

Official Title

(Corporate Seal)

APPROVED AS TO FORM:

City Attorney

Contractor-Party of the Second Part

Name and Title

ATTEST:

Name and 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. 84072 and Project No. 85008

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 OF RECORD

AGENCY ADDRESS

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 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. 84072 and Project No. 85008

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
or 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 provisions 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 they 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 OF RECORD

AGENCY ADDRESS

CITY OF TEMPE

CERTIFICATE OF INSURANCE

CITY OF TEMPE PROJECT NO. 84072 & 85008

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
<u>GENERAL LIABILITY:</u>				\$500,000.00
Comprehensive Form				per occurrence
Premises/ Operations				Bodily Injury
Products/ Completed Operations				\$100,000.00 per occurrence
Contractual				Property Damage
Broad Form Property Damage				
Independent Contractors				
<u>AUTOMOBILE LIABILITY:</u>				Same as above
Owned/Non-owned				
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. Damage 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 cancelled or changed so as to affect this certificate until ten (10) days 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 of Firm

SIGNATURE

ADDRESS

TELEPHONE NUMBER

APPENDIX NO. 1

SOIL REPORT

SPEEDIE AND ASSOCIATES

GEOTECHNICAL AND SITE ENGINEERS

11029 N. 24th AVE., SUITE 805 • PHOENIX, ARIZONA 85029 • (602) 997-6391
540 W. IRON AVE., SUITE 109 • MESA, ARIZONA 85202 • (602) 969-6700

JAMES A. SPEEDIE, P.E.
GREGG A. CREASER, P.E.
GARY E. STOCKER, P.E.
STEVEN A. GRIESS, P.E.

REPORT ON SOIL INVESTIGATION

DESIGNATION: 48th Street Storm Drain
LOCATION: 48th Street from Broadway Road
to Baseline Road
Phoenix, Arizona
CLIENT: Sverdrup & Parcel and Associates
PROJECT NO: 860088SA
DATE: March 31, 1986

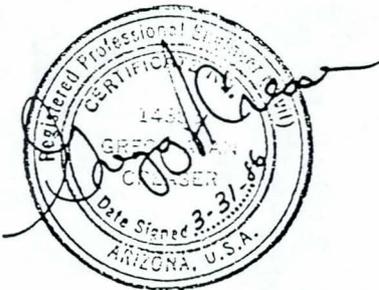


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Route Conditions	1
General Subsurface Conditions	1
ANALYSIS AND RECOMMENDATIONS	2
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INTRODUCTION

This report presents the results of a subsoil investigation carried out along the route of the proposed 48th Street Storm Drain. The storm drain, which varies in diameter from 36 to 78 inches, will extend from Baseline Road north to Broadway Road. In addition, a short segment will extend from a point approximately 2,300 feet west of 48th Street along Baseline Road to the main line at 48th Street.

GENERAL ROUTE AND SOIL CONDITIONS

Route Conditions - The alignment of the proposed storm drains are within the right-of-ways of 48th Street and Baseline Road and are slightly off-set from centerline. The roadways are asphalt paved. Surrounding land usage is generally residential and commercial with some open undeveloped areas.

General Subsurface Conditions - Subsoil conditions along the route are relatively uniform. The pavement sections vary from 1.5 to 4.0 inches of asphalt on 5.0 to 12.0 inches A.B.C. Fill was encountered beneath the A.B.C. in several of the borings. The fill extends to depths of 2.0 to 4.0 feet and consists generally of gravelly sand with occasional cobbles. In general, the native subsoils consist of loose to very dense brown clayey sand or firm to hard brown sandy clay. The subsoils are weakly to moderately cemented in some areas. Moisture contents are on the order of 4 to 16 percent which is generally well below the plastic limits of 17 to 24 percent. In-place dry densities range from 97 to 105 PCF. The more clayey soils should be considered to have a moderate swell potential. These soils exhibit a Standard Penetration Resistance (SPT) of 5 to 50-plus blows per foot.

Several of the Test Borings encountered medium dense to very dense brown gravelly sand or gravel with cobbles. Auger refusal was met in only two Test Borings, No. 1 and No. 11, on cobbles or cemented gravel. This material exhibits a Standard Penetration Resistance (SPT) of 23 to 50-plus blows per foot.

All borings were dry upon completion and groundwater is not reported to be shallow in this area. Therefore, groundwater should not be a factor in the design or construction of the proposed storm drain.

ANALYSIS AND RECOMMENDATIONS

Analysis - Fine-grained soils along the majority of the route should result in relatively trouble-free trenching and, bore and jack operations. Since there should not be any significant disturbances due to cobbles or strongly cemented soils in most areas, excavations should result in relatively neat trenches.

Trenching in the coarse sand, gravel and cobble material, particularly in the vicinity of Test Boring Nos. 1, 11 and 12, may become difficult and the excavation will require bracing to maintain an open trench and protect workmen. In all cases where trenches are deeper than shoulder height bracing will be required to protect workmen.

In order to provide uniform support, we recommend that the pipe be supported on a minimum of 6.0 inches of A.B.C. bedding. This bedding should extend up to the springline of the pipe to ensure proper backfill in tight trench situations. Bedding materials, backfill and compaction should meet M.A.G. Section 601 Specifications. Cobbles and other oversize materials should not be used as backfill within 2.0 feet of the pipe. A shrinkage value of approximately 10 percent can be expected for the sandy to clayey native soils.

Soil Corrosion - The results of resistivity tests at the Test Boring sites are presented in Figure No. 15. Values range from 2,221 to 12,352 ohm-cm which indicate a low to moderate potential for corrosion.

GENERAL

The scope of this investigation and report does not include regional considerations such as seismic activity and ground fissures resulting from subsidence due to groundwater withdrawal.

Our analysis of data and the recommendations presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific sample locations. Our work has been performed in accordance with generally accepted engineering principles and practice; this warranty is in lieu of all other warranties expressed or implied.

We recommend that a Soils Engineer monitor the earthwork and foundation portions of this project to ensure compliance to project specifications and the field applicability of subsurface conditions which are the basis of the recommendations presented in this report. If any significant changes are made in the scope of work or type of construction that was assumed in this report, we must review such revised conditions to confirm our findings if the conclusions and recommendations presented herein are to apply.

Respectfully submitted,

Richard A. Schooler

Richard A. Schooler, Geologist

Gregg A. Creaser



Gregg A. Creaser, P.E.

March 31, 1986

APPENDIX

FIELD AND LABORATORY INVESTIGATION Page 1 of 1

SOIL BORING LOCATION PLAN Plate 1

SOIL LOG LEGEND Plate 2

LOG OF TEST BORING: Boring No. B-1 Figure No. 1

Boring No. B-2 Figure No. 2

Boring No. B-3 Figure No. 3

Boring No. B-4 Figure No. 4

Boring No. B-5 Figure No. 5

Boring No. B-6 Figure No. 6

Boring No. B-7 Figure No. 7

Boring No. B-8 Figure No. 8

Boring No. B-9 Figure No. 9A & B

Boring No. B-10 Figure No. 10

Boring No. B-11 Figure No. 11

Boring No. B-12 Figure No. 12

Boring No. B-13 Figure No. 13

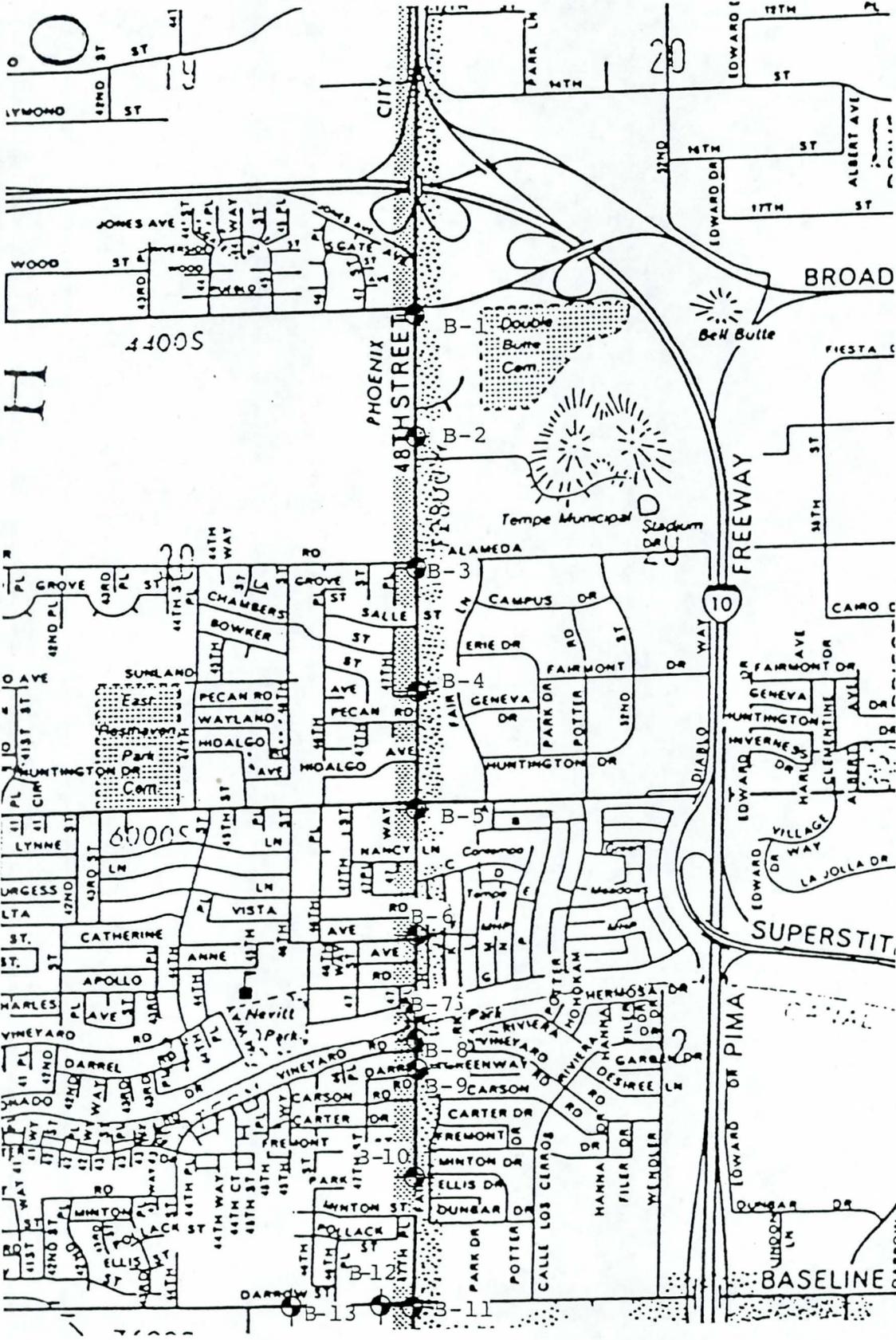
TABULATION OF TEST DATA Figure No. 14

RESISTIVITY TEST DATA Figure No. 15

FIELD AND LABORATORY INVESTIGATION

On March 11 and 12, 1986, thirteen soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plan, Plate 1. All exploration work was carried out under the full-time supervision of our engineer, who recorded subsurface conditions and obtained samples for laboratory testing. The soil borings were advanced with a truck-mounted Mobile B-61 drill rig utilizing 6.5-inch diameter hollow stem flight augers. Detailed information regarding the borings and samples obtained can be found on an individual Log of Test Boring prepared for each drilling location.

Laboratory testing consisted of moisture content, dry density, grain-size distribution and plasticity (Atterberg Limits) tests for classification and pavement design parameters. All field and laboratory data is presented in this Appendix as Figures No. 1 through 15.



SOIL BORING LOCATION PLAN
 48TH STREET STORM DRAIN
 BROADWAY RD. TO BASELINE RD.
 PHOENIX, ARIZONA

**SPEEDIE
 AND ASSOCIATES**
 PROJECT NO. 860088SA

SOIL BORING LOCATION

SOILS CLASSIFICATION CHART

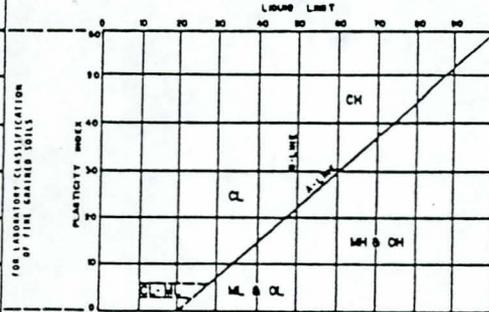
MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAR GRAVELS (LITTLE OR NO FINES)		GW	WELL-SORTED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVEL WITH FINES (APPRECIABLE AMOUNT OF FINES)		GP	POORLY-SORTED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND SILT MIXTURES
	SAND AND SANDY SOILS	CLEAR SAND (LITTLE OR NO FINES)		SW	WELL-SORTED SANDS, SANDY SILT MIXTURES, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
		CLAYEY SANDS (APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, MUCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
		LIQUID LIMIT GREATER THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		LIQUID LIMIT GREATER THAN 50		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		MH	INORGANIC SILTS, MARGINEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
		LIQUID LIMIT GREATER THAN 50		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
		LIQUID LIMIT GREATER THAN 50		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, MUCK, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

GRADATION CHART

MATERIAL SIZE	PARTICLE SIZE				
	LOWER LIMIT		UPPER LIMIT		
	MILLIMETERS	SIEM SIZE	MILLIMETERS	SIEM SIZE	
SAND	FINE	.075	#200*	0.425	#40*
	MEDIUM	0.425	#40*	2.00	#10*
	COARSE	2.00	#10*	4.75	#4*
GRAVEL	FINE	4.75	#4*	191	3/4"*
	COARSE	191	3/4"*	76.2	3"
COBBLES		76.2	3"	304.8	12"
BOWLDERS		304.8	12"	914.4	36"

*U.S. Standard *Clear Square Openings

PLASTICITY CHART



CONSISTENCY			RELATIVE DENSITY	
CLAYS & SILTS	BLOWS/FOOT*	STRENGTH †	SANDS & GRAVELS	BLOWS/FOOT*
VERY SOFT	0-2	0-2	VERY LOOSE	0-4
SOFT	2-4	2-4	LOOSE	4-10
STIFF	4-8	4-1	MEDIUM DENSE	10-30
VERY STIFF	8-16	1-2	DENSE	30-50
HARD	16-32	2-4	VERY DENSE	OVER 50
	OVER 32	OVER 4		

* Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1-3/8 inch I.D.) split spoon (ASTM D-1586).
 † Unconfined compressive strength in tons/sq ft. Read from a pocket penetrometer.

SAMPLE DESIGNATION	PENETRATION RESISTANCE SYMBOL	DESCRIPTION
Bag	-	Large Bulk Sample
BS	-	Misc. Grab Sample - Bottle or Bag
AS	-	Auger Sample - A grab sample taken directly from auger flights
S	•	Spoon Sample - Standard Penetration Test (ASTM D-1586)-Driving a 2.0-inch outside diameter, 1 3/8-inch inside diameter, split spoon sampler into undisturbed soil for three successive 6-inch increments of penetration by means of a 140-pound weight falling freely through a distance of 30 inches. The cumulative number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).
LS	•	Liner Sample - Standard Penetration Test-Driving a 2.0-inch outside diameter split spoon, equipped with two, 3-inch long by 1 3/8-inch inside diameter brass liners, separated by a 1-inch long spacer, into undisturbed soil as above.
RS	o	Ring Sample - Driving a 3.0-inch outside diameter spoon, equipped with a series of 2.42-inch inside diameter, 1-inch long brass rings, into undisturbed soil for one 12-inch increment by means of a 140-pound weight falling freely through a distance of 30 inches. The blows required for the 12 inches of penetration are recorded.
ST	-	Shelby Tube - A 3.0-inch outside diameter thin-walled tube continuously pushed into undisturbed soil by a rapid motion, without impact or twisting. (ASTM D-1587)
-	■	Continuous Penetration Resistance (Bullnose) - Driving a 2.0-inch outside diameter "Bullnose penetrometer" continuously into undisturbed soil by means of a 140-pound weight falling freely through a distance of 30 inches. The blows for each successive 12-inch increment are recorded.

NOTE: The stratification lines shown on the Logs of Test Borings and/or Test Pit represent the approximate boundary between soil types, and the transition may be gradual.

ELEVATION (FEET)

Station 100+90 on centerline
 GROUND SURFACE ELEVATION: 1139.6
 SOIL DESCRIPTION

±3.0 Inches Of Asphalt On
 ±8.0 Inches Of ABC. 0.9'

Very Dense Brown GRAVELLY SAND
 (SW - Moist) With A Trace
 Of Clay. 6.0'

Very Dense Brown GRAVEL (GP -
 Dry) With A Trace Of Sand
 And A Trace Of Silt. P.I. =
 N.P., -200 = 3%. 10.0'

END OF BORING - Auger Refusal
 On Cobbles

NOTE: Boring advanced with
 Mobile B-61 drill rig with
 6.5 inch hollow stem auger.

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT
AS-1	1134.6	-	-	0 25 50
AS-2	1129.6	1.0	-	

BORING STARTED: 3-11-86
 BORING COMPLETED: 3-11-86
 FIELD ENGINEER/TECHNICIAN: R. Fleck
 DRILLER: M. Holt
 CONTRACTOR: Heber Mining
 A-11

≡ WATER LEVEL IN HOLE AT Dry

NUMBERS OF HOURS AFTER COMPLETION:

SPEEDIE AND ASSOCIATES

LOG OF TEST BORING NUMBER B-1

48TH STREET STORM DRAIN
 BROADWAY RD. TO BASELINE RD.
 PHOENIX, ARIZONA

APPROVED: <i>RAS</i>	DATE: 3-24-86
PROJECT NO: 860088SA	FIGURE NO: 1

ELEVATION (FEET)

Station 114+15 on centerline
 GROUND SURFACE ELEVATION: 1141.3

SOIL DESCRIPTION	
±1.5 Inches Of Asphalt On ±8.5 Inches Of A.B.C.	0.9'
Fill: Dense Brown CLAYEY SAND (SC - Moist) With Fragments Of Burnt Wood.	3.5'
Very Stiff Brown SANDY CLAY (CL - Dry).	7.0'
Medium Dense Brown SILTY SAND (SM - Moist).	13.0'
Very Dense Brown GRAVELLY SAND (SW - Dry).	14.0'

END OF BORING

NOTE: Boring advanced with
 Mobile B-61 drill rig with
 6.5 inch hollow stem auger.

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT		
				0	25	50
S-1	1135.8	-	-			
S-2	1130.8	-	-			
S-3	-	No Recovery			50/3"	

BORING STARTED: 3-11-86
 BORING COMPLETED: 3-11-86
 FIELD ENGINEER/TECHNICIAN: R. Fleck
 DRILLER: M. Holt
 CONTRACTOR: Heber Mining

≡ WATER LEVEL IN HOLE AT Dry ^{A-12}
 NUMBERS OF HOURS AFTER COMPLETION:

SPEEDIE AND ASSOCIATES	
LOG OF TEST BORING NUMBER <u>B-2</u>	
48TH STREET STORM DRAIN BROADWAY RD. TO BASELINE RD. PHOENIX, ARIZONA	
APPROVED: <i>PAS</i>	DATE: 3-24-86
PROJECT NO: 860088SA	FIGURE NO: 2

ELEVATION (FEET)

Station 127+70 on centerline
 GROUND SURFACE ELEVATION: 1145.3
 SOIL DESCRIPTION

	±2.0 Inches Of Asphalt On ±8.0 Inches Of ABC. 0.9'	
	Fill: Dense Brown GRAVELLY SAND (SW - Dry). 3.5'	
	Very Stiff Brown SANDY CLAY (CL - Moist). P.I. = 22, -200 = 71%. 7.0'	
	Hard Brown SANDY CLAY (CL - Moist) With A Trace Of Gravel And Weak Cementation. 10.5'	
	Medium Dense Brown GRAVELLY SAND (SW - Dry) With A Trace Of Clay. 15.5'	

END OF BORING

NOTE: Boring advanced with
 Mobile B-61 drill rig with
 6.5 inch hollow stem auger.

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT		
				0	25	50
RS-1	1140.3	16.0	101.4			
S-2	1135.6	-	-			76/9" →
S-3	1129.8	-	-			

BORING STARTED: 3-11-86
 BORING COMPLETED: 3-11-86
 FIELD ENGINEER/TECHNICIAN: R. Fleck
 DRILLER: M. Holt
 CONTRACTOR: Heber Mining
 A-13

≡ WATER LEVEL IN HOLE AT Dry

NUMBERS OF HOURS AFTER COMPLETION:

SPEEDIE AND ASSOCIATES	
LOG OF TEST BORING NUMBER <u>B-3</u>	
48TH STREET STORM DRAIN BROADWAY RD. TO BASELINE RD. PHOENIX, ARIZONA	
APPROVED: <i>PAS</i>	DATE: 3-24-86
PROJECT NO: 860088SA	FIGURE NO: 3

ELEVATION (FEET)

Station 140+65 on centerline
 GROUND SURFACE ELEVATION: 1151.0
 SOIL DESCRIPTION

11.5 inches Of Asphalt On
 ±8.0 Inches Of ABC. 0.8'

Hard Light Brown SANDY CLAY
 (CL - Dry) With A Trace Of
 Gravel. P.I. = 24, -200 =
 61%.

Very Dense Brown CLAYEY
 SAND (SC - Moist) With
 Some Gravel. 14.8'

END OF BORING

NOTE: Boring advanced with
 Mobile B-61 drill rig with
 6.5 inch hollow stem auger.

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT
S-1	1145.5	-	-	0 25 50
RS-2	1141.0	12.9	102.4	
S-3	1136.2	-	-	65/9"

BORING STARTED: 3-12-86
 BORING COMPLETED: 3-12-86
 FIELD ENGINEER/TECHNICIAN: R. Fleck
 DRILLER: M. Holt
 CONTRACTOR: Heber Mining

≡ WATER LEVEL IN HOLE AT Dry A-14

NUMBERS OF HOURS AFTER COMPLETION:

SPEEDIE AND ASSOCIATES	
LOG OF TEST BORING NUMBER <u>B-4</u>	
48TH STREET STORM DRAIN BROADWAY RD. TO BASELINE RD. PHOENIX, ARIZONA	
APPROVED: <i>RAS</i>	DATE: 3-24-86
PROJECT NO860088SA	FIGURE NO: 4

Station 153+80 on centerline
 GROUND SURFACE ELEVATION: 1160.2
 SOIL DESCRIPTION

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT
---------------	-------------------------	---------------------------	-------------------------------	--

±2.0 Inches Of Asphalt On
 ±10.0 Inches Of ABC. 1.0'

				0 25 50
--	--	--	--	---------

Stiff Brown SANDY CLAY (CL - Dry) With A Trace Of Gravel.
 8.0'

S-1	1154.7	-	-	
-----	--------	---	---	--

Medium Dense Brown CLAYEY SAND (SC - Dry).
 11.5'

S-2	1149.7	-	-	
-----	--------	---	---	--

Hard Light Brown SANDY CLAY (CL - Dry). P.I. = 13, -200 = 60%.
 20.5'

RS-3	1145.2	4.4	103!2	
S-4	1139.7	-	-	58/12" →

ELEVATION (FEET)

END OF BORING
 NOTE: Boring advanced with Mobile B-61 drill rig with 6.5 inch hollow stem auger.

BORING STARTED: 3-12-86
 BORING COMPLETED: 3-12-86
 FIELD ENGINEER/TECHNICIAN: R. Fleck
 DRILLER: M. Holt
 CONTRACTOR: Heber Mining

≡ WATER LEVEL IN HOLE AT Dry

NUMBERS OF HOURS AFTER COMPLETION: A-15

SPEEDIE AND ASSOCIATES	
LOG OF TEST BORING NUMBER B-5	
48TH STREET STORM DRAIN BROADWAY RD. TO BASELINE RD. PHOENIX, ARIZONA	
APPROVED: <i>RAS</i>	DATE: 3-24-86
PROJECT NO: 860088SA	FIGURE NO: 5

Station 167+00 on centerline

GROUND SURFACE ELEVATION: 1167.7

SOIL DESCRIPTION

±1.5 Inches Of Asphalt On
±6.0 Inches Of ABC. 0.6'

Fill: Dense Brown GRAVELLY
SAND (SW - Dry) With
Cobbles. 2.0'

Stiff Brown SANDY CLAY (CL -
Dry). 7.0'

Very Stiff Brown SANDY CLAY
(CL - Dry) With A Trace Of
Gravel. P.I. = 14, -200 =
58%. 15.5'

END OF BORING

NOTE: Boring advanced with
Mobile B-61 drill rig with
6.5 inch hollow stem auger.

ELEVATION (FEET)

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT
S-1	1162.2	-	-	25
S-2	1157.2	11.9	-	50
S-3	1152.2	-	-	

BORING STARTED: 3-12-86
BORING COMPLETED: 3-12-86
FIELD ENGINEER/TECHNICIAN: R. Fleck
DRILLER: M. Holt
CONTRACTOR: Heber Mining

☐ WATER LEVEL IN HOLE AT Dry

NUMBERS OF HOURS AFTER COMPLETION: A-16

SPEEDIE AND ASSOCIATES

LOG OF TEST BORING NUMBER B-6

48TH STREET STORM DRAIN
BROADWAY RD. TO BASELINE RD.
PHOENIX, ARIZONA

APPROVED: *RAS* DATE: 3-24-86

PROJECT NO: 860088SA FIGURE NO: 6

Station 175+70 on centerline
 GROUND SURFACE ELEVATION: 1178.4
 SOIL DESCRIPTION

ELEVATION (FEET)

±2.5 Inches Of Asphalt On
 ±10.0 Inches Of ABC. 1.0'

Stiff Brown SANDY CLAY (CL -
 Dry) With Occasional Soft,
 Wet Seams.

8.0'

Medium Dense Light Brown
 CLAYEY SAND (SC - Dry).

12.5'

Dense Light Brown CLAYEY
 SAND (SC - Dry).

17.5'

Hard Light Brown SANDY CLAY
 (CL - Dry) With A Trace Of
 Gravel And Weak Cementation.

20.5'

END OF BORING

NOTE: Boring advanced with
 Mobile B-61 drill rig with
 6.5 inch hollow stem auger.

BORING STARTED: 3-12-86
 BORING COMPLETED: 3-12-86
 FIELD ENGINEER/TECHNICIAN: R. Fleck
 DRILLER: M. Holt
 CONTRACTOR: Heber Mining

≡ WATER LEVEL IN HOLE AT Dry A-17

NUMBERS OF HOURS AFTER COMPLETION:

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N)	
				BLOWS PER FOOT	
				0	25 50
S-1	1172.9	-	-		
S-2	1167.9	-	-		
RS-3	1163.4	12.1	97.6		
S-4	1157.9	-	-		53/12"

SPEEDIE AND ASSOCIATES

LOG OF TEST BORING NUMBER B-7

48TH STREET STORM DRAIN
 BROADWAY RD. TO BASELINE RD.
 PHOENIX, ARIZONA

APPROVED: *RAS* DATE: 3-24-86

PROJECT NO: 860088SA FIGURE NO: 7

Station 177+00 on centerline
 GROUND SURFACE ELEVATION: 1179.5
 SOIL DESCRIPTION

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT
				0 25 50

±3.5 Inches Of Asphalt On 0.8' ±5.0 Inches Of ABC.

Stiff Light Brown SANDY CLAY (CL - Dry).
 7.5'

S-1	1174.0	-	-	
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Medium Dense Light Brown CLAYEY SAND (SC - Dry).
 11.5'

S-2	1169.0	-	-	
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Very Dense Light Brown CLAYEY SAND (SC - Dry) With Weak Cementation.
 15.5'

RS-3	1164.5	9.5	105.6	
------	--------	-----	-------	--

Hard Light Brown SANDY CLAY (CL - Dry) With Weak Cementation.
 20.5'

S-4	1159.0	-	-	
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ELEVATION (FEET)

END OF BORING
 NOTE: Boring advanced with Mobile B-61 drill rig with 6.5 inch hollow stem auger.
 BORING STARTED: 3-12-86
 BORING COMPLETED: 3-12-86
 FIELD ENGINEER/TECHNICIAN: R. Fleck
 DRILLER: M. Holt
 CONTRACTOR: Heber Mining

≡ WATER LEVEL IN HOLE AT Dry
 NUMBERS OF HOURS AFTER COMPLETION: A-18

SPEEDIE AND ASSOCIATES

LOG OF TEST BORING NUMBER B-8

48TH STREET STORM DRAIN
 BROADWAY RD. TO BASELINE RD.
 PHOENIX, ARIZONA

APPROVED: <i>RAS</i>	DATE: 3-24-86
PROJECT NO: 860088SA	FIGURE NO: 8

ELEVATION (FEET)

Station 180+15 on centerline		SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT
GROUND SURFACE ELEVATION: <u>1180.8</u>						
SOIL DESCRIPTION						
±4.0 Inches Of Asphalt On ±11.0 Inches Of ABC. 1.3'						25 50
Hard Light Brown SANDY CLAY (CL - Dry). 7.5'		S-1	1175.3	-	-	
Loose Brown SILTY SAND (SM - Dry) With A Trace Of Gravel. 11.5'		S-2	1170.3	-	-	
Very Dense Light Brown CLAYEY SAND (SC - Dry) With Some Gravel And Moderate Cementation. P. I. = 17, -200 = 29%. 20.0'		S-3	1165.3	9.5	-	64/12" →
CONTINUED ON NEXT SHEET		S-4	1161.3	-	-	50/6" →

SHEET 1 OF 2

BORING STARTED: 3-12-86
 BORING COMPLETED: 3-12-86
 FIELD ENGINEER/TECHNICIAN: R. Fleck
 DRILLER: M. Holt
 CONTRACTOR: Heber Mining

☐ WATER LEVEL IN HOLE AT Dry

NUMBERS OF HOURS AFTER COMPLETION: A-19

SPEEDIE AND ASSOCIATES	
LOG OF TEST BORING NUMBER <u>B-9</u>	
48TH STREET STORM DRAIN BROADWAY RD. TO BASELINE RD. PHOENIX, ARIZONA	
APPROVED: <i>RAE</i>	DATE: 3-24-86
PROJECT NO: 860088SA	FIGURE NO: 9a

Station 180+15 on centerline
 GROUND SURFACE ELEVATION: 1180.8
 SOIL DESCRIPTION

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N)	
				0	50
S-5	1155.3	-	-		

20.5'
 Hard Brown SANDY CLAY (CL - Dry).
 25.5'

END OF BORING

NOTE: Boring advanced with Mobile B-61 drill rig with 6.5 inch hollow stem auger.

ELEVATION (FEET)

SHEET 2 OF 2

BORING STARTED: 3-12-86
 BORING COMPLETED: 3-12-86
 FIELD ENGINEER/TECHNICIAN: R. Fleck
 DRILLER: M. Holt
 CONTRACTOR: Heber Mining

≡ WATER LEVEL IN HOLE AT Dry A-20

NUMBERS OF HOURS AFTER COMPLETION:

SPEEDIE AND ASSOCIATES

LOG OF TEST BORING NUMBER B-9

48TH STREET STORM DRAIN
 BROADWAY RD. TO BASELINE RD.
 PHOENIX, ARIZONA

APPROVED: *RAS* DATE: 3-24-86

PROJECT NO: 860088SA FIGURE NO: 9b

Station 193+40 on centerline
 GROUND SURFACE ELEVATION: 1195.0
 SOIL DESCRIPTION

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT
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	±3.0 Inches Of Asphalt On ±12.0 Inches Of ABC.	1.3'
	Very Stiff Brown SANDY CLAY (CL - Dry).	7.0'
	Stiff Brown SANDY CLAY (CL - Dry).	13.0'
	Very Dense Brown CLAYEY SAND (SC - Dry) With Some Gravel And Moderate Cementation. P. I. = 24, -200 = 35%.	17.5'

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT
S-1	1189.5	-	-	
S-2	1184.5	-	-	
S-3	1180.0	7.7	-	72/12" →

END OF BORING

NOTE: Boring advanced with Mobile B-61 drill rig with 6.5 inch hollow stem auger.

ELEVATION (FEET)

BORING STARTED: 3-12-86
 BORING COMPLETED: 3-12-86
 FIELD ENGINEER/TECHNICIAN: R. Fleck
 DRILLER: M. Holt
 CONTRACTOR: Heber Mining

≡ WATER LEVEL IN HOLE AT Dry
 NUMBERS OF HOURS AFTER COMPLETION: A-21

SPEEDIE AND ASSOCIATES	
LOG OF TEST BORING NUMBER <u>B-10</u>	
48TH STREET STORM DRAIN BROADWAY RD. TO BASELINE RD. PHOENIX, ARIZONA	
APPROVED: <i>BAE</i>	DATE: 3-24-86
PROJECT NO: 860088SA	FIGURE NO: 10

ELEVATION (FEET)

Station 206+60 on centerline
 GROUND SURFACE ELEVATION: 1212.7
 SOIL DESCRIPTION

	±4.0 Inches Of Asphalt On ±8.0 Inches Of ABC. 1.0'
	Fill: Dense Brown GRAVELLY SAND (SC - Dry) With Some Clay. 4.0'
	Medium Dense Brown CLAYEY SAND (SC - Dry) With A Trace Of Gravel. 7.5'
	Loose Brown CLAYEY SAND (SC - Dry) With Some Gravel. 13.0'

END OF BORING - Auger Refusal
On Cemented Gravel

NOTE: Boring advanced with
Mobile B-61 drill rig with
6.5 inch hollow stem auger.

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT	
				0	25 50
S-1	1207.2	-	-		
S-2	1202.2	-	-		

BORING STARTED: 3-12-86
 BORING COMPLETED: 3-12-86
 FIELD ENGINEER/TECHNICIAN: R. Fleck
 DRILLER: M. Holt
 CONTRACTOR: Heber Mining

WATER LEVEL IN HOLE AT Dry A-22

NUMBERS OF HOURS AFTER COMPLETION:

SPEEDIE AND ASSOCIATES	
LOG OF TEST BORING NUMBER <u>B-11</u>	
48TH STREET STORM DRAIN BROADWAY RD. TO BASELINE RD. PHOENIX, ARIZONA	
APPROVED:	DATE: 3-24-86
PROJECT NO: 860088SA	FIGURE NO: 11

ELEVATION (FEET)

Station 12+00 On Baseline Rd.
on centerline
GROUND SURFACE ELEVATION: 1211.0

SOIL DESCRIPTION
±4.0 Inches Of Asphalt On
±7.0 Inches Of ABC. 1.0'

Medium Dense Light Brown
CLAYEY SAND (SC - Dry).
5.5'

Very Dense Light Brown
GRAVELLY SAND (SW - Dry)
With A Trace Of Clay And
Moderate Cementation. P.I.
= N.P., -200 = 14%.
14.6'

END OF BORING

NOTE: Boring advanced with
Mobile B-61 drill rig with
6.5 inch hollow stem auger.

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N) BLOWS PER FOOT	
				0	25 50
S-1	1205.5	-	-		
S-2	1202.0	No Recovery		50/1"	→
S-3	1196.4	6.8	-	86/8"	→

BORING STARTED: 3-12-86
BORING COMPLETED: 3-12-86
FIELD ENGINEER/TECHNICIAN: R. Fleck
DRILLER: M. Holt
CONTRACTOR: Heber Mining

≡ WATER LEVEL IN HOLE AT Dry A-23
NUMBERS OF HOURS AFTER COMPLETION:

SPEEDIE AND ASSOCIATES	
LOG OF TEST BORING NUMBER <u>B-12</u>	
48TH STREET STORM DRAIN BROADWAY RD. TO BASELINE RD. PHOENIX, ARIZONA	
APPROVED: <u>PAS</u>	DATE: 3-24-86
PROJECT NO: 860088SA	FIGURE NO: 12

ELEVATION (FEET)

Station 22+00 On Baseline Rd.
on centerline of sewer
GROUND SURFACE ELEVATION: 1210.7
SOIL DESCRIPTION

\pm 3.5 Inches Of Asphalt On \pm 8.0 Inches Of ABC.	1.0'
Fill: Dense Brown GRAVELLY SAND (SC - Dry) With Some Clay.	2.0'
Firm Brown SANDY CLAY (CL - Dry).	6.0'
Very Dense Light Brown CLAYEY SAND (SC - Dry) With Strong Cementation.	10.0'

END OF BORING

NOTE: Boring advanced with
Mobile B-61 drill rig with
6.5 inch hollow stem auger.

SAMPLE NUMBER	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (%)	IN-PLACE DRY DENSITY (P.C.F.)	STANDARD PENETRATION NUMBER (N)
				BLOWS PER FOOT
				0 25 50
S-1	1205.2	-	-	●
S-2	1200.7	-	-	72/12" →

BORING STARTED: 3-12-86
BORING COMPLETED: 3-12-86
FIELD ENGINEER/TECHNICIAN: R. Fleck
DRILLER: M. Holt
CONTRACTOR: Heber Mining

≡ WATER LEVEL IN HOLE AT Dry

NUMBERS OF HOURS AFTER COMPLETION: A-24

SPEEDIE AND ASSOCIATES	
LOG OF TEST BORING NUMBER <u>B-13</u>	
48TH STREET STORM DRAIN BROADWAY RD. TO BASELINE RD. PHOENIX, ARIZONA	
APPROVED: <i>PAS</i>	DATE: 3-24-86
PROJECT NO: 860088SA	FIGURE NO: 13

TABULATION OF TEST DATA

TEST BORING OR TEST PIT NUMBER	SAMPLE NUMBER	DEPTH OF SAMPLE TIP	ELEVATION OF SAMPLE TIP	NATURAL WATER CONTENT (PERCENT OF DRY WEIGHT)	IN-PLACE DRY DENSITY (POUNDS PER CUBIC FOOT)	PARTICLE SIZE DISTRIBUTION							ATTERBERG LIMITS			UNIFIED SOIL CLASSIFICATION	COHESION - ONE-HALF OF UNCONFINED COMPRESSIVE STRENGTH (PSF)
						COLLOIDS (PERCENT)	CLAY (PERCENT)	SILT (PERCENT)	FINE SAND (PERCENT)	MEDIUM SAND (PERCENT)	COARSE SAND (PERCENT)	GRAVEL (PERCENT)	LIQUID LIMIT (PERCENT)	PLASTIC LIMIT (PERCENT)	PLASTICITY INDEX (PERCENT)		
B-1	AS-2	10.5	1129.1	1.0	-	←	3	→	1	1	1	94	-	-	NP	GP	-
B-3	RS-1	5.0	1140.3	16.0	101.4	←	71	→	22	6	1	0	39	17	22	CL	-
B-4	RS-2	10.0	1141.0	12.9	102.4	←	61	→	20	16	2	1	41	17	24	CL	-
B-5	RS-3	15.0	1145.2	4.4	103.2	←	60	→	26	12	2	0	33	20	13	CL	-
B-6	S-2	10.5	1157.2	11.9	-	←	58	→	18	14	3	7	38	24	14	CL	-
B-7	RS-3	15.0	1163.4	12.1	97.6	-	-	-	-	-	-	-	-	-	-	SC	-
B-8	RS-3	15.0	1164.5	9.5	105.6	-	-	-	-	-	-	-	-	-	-	SC	-
B-9	S-3	15.5	1165.3	9.5	-	←	29	→	17	29	12	13	40	23	17	SC	-
B-10	S-3	15.0	1180.0	7.7	-	←	35	→	12	23	11	19	47	23	24	SC	-
B-12	S-3	15.0	1196.4	6.8	-	←	14	→	13	24	15	34	-	-	NP	SW	-

SPEEDIE & ASSOCIATES

GEOTECHNICAL AND SITE ENGINEERS

11029 NORTH 24TH AVENUE SUITE 805 • PHOENIX, ARIZONA 85029 • (602) 997-6391

Project No. 860088SA

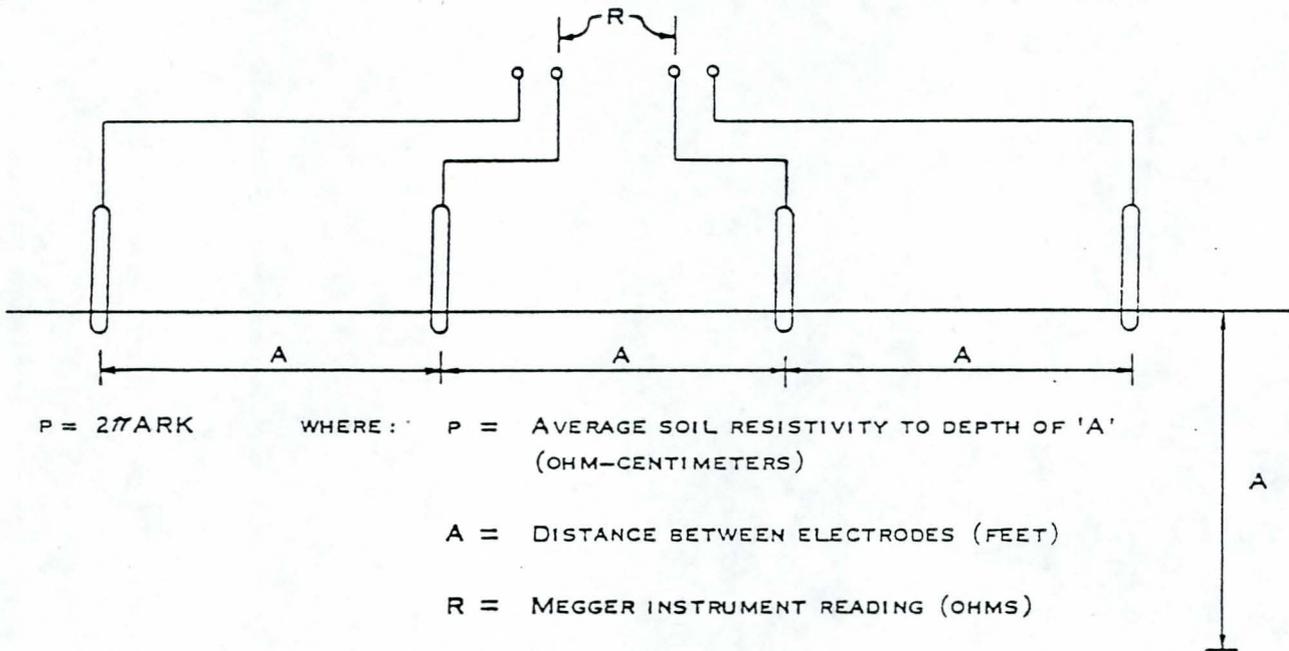
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SOIL RESISTIVITY DETERMINATION

PROJECT 48th Street Storm Drain

LOCATION 48th Street - Broadway Rd. to Baseline Rd. - Phoenix, AZ

INSPECTOR RKF DATE 3-19-86 CHK. BY RAS DATE 3-20-86



$P = \frac{27}{K} R A K$

WHERE: P = AVERAGE SOIL RESISTIVITY TO DEPTH OF 'A' (OHM-CENTIMETERS)

A = DISTANCE BETWEEN ELECTRODES (FEET)

R = MEGGER INSTRUMENT READING (OHMS)

K = 30.48 CM/FT

TEST NUMBER	A (FEET)	R (OHMS)	P (OHM-CM)
B-1	15	0.43 x 10	12,352
B-2	15	0.16 x 10	4,596
B-3	15	0.13 x 10	3,734
B-4	15	0.18 x 10	5,170
B-5	20	0.58 x 1	2,221
B-6	15	0.17 x 10	4,883
B-7	20	0.58 x 1	2,221
B-8	20	0.10 x 10	3,830
B-9	25	0.80 x 1	3,830
B-10	20	0.70 x 1	2,681
B-11	20	0.20 x 10	7,660
B-12	15	0.29 x 10	8,330
B-13	10	0.27 x 10	5,170

REMARKS: