

ENGINEERING DIVISION

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CITY OF PHOENIX SUPPLEMENT

TO

MARICOPA ASSOCIATION
OF GOVERNMENTS

UNIFORM STANDARD SPECIFICATIONS



City of Phoenix

1994

-1003

ENGINEERING DIVISION

**1992 CITY OF PHOENIX SUPPLEMENTS TO THE MAG
UNIFORM STANDARD, SPECIFICATIONS AND DETAILS**

The City of Phoenix Engineering Department will establish the 1994 City of Phoenix Supplements to the Maricopa Association of Governments (MAG) Uniform Standard Specifications and Detail, on July 1, 1994 with an effective date of August 1, 1994. The 1994 Supplements will supersede and replace the 1992 edition.

All construction contracts advertised and all permits issued on or after February 1, 1995 will be governed by the 1994 Supplements.

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ENGINEERING DIVISION

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PART 100
GENERAL CONDITIONS

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SECTION 102

BIDDING REQUIREMENTS AND CONDITIONS

Section 102.10 WITHDRAWAL OF REVISION OF PROPOSAL is changed to read:

102.10 WITHDRAWAL OR REVISION OF PROPOSAL:

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

Pursuant to the provisions of Section 2-188 of the City Code, the low bidder may file a request to withdraw his or her bid with the City Clerk.

SECTION 104

SCOPE OF WORK

Subsection 104.1.1 General: is modified to add:

All existing concrete or bituminous surfaced sidewalks, driveways and alleys which were necessarily disturbed by the operations of the contractor in accordance with the requirements of the plans or at the direction of the Engineer, shall be replaced. Private concrete or bituminous surfaced sidewalks and driveways which were necessarily disturbed by construction shall be removed to a distance required to maintain a slope as indicated by City of Phoenix Detail P-1164 for driveways and/or not to exceed a slope of one inch per foot for sidewalks and these materials shall be replaced. Payment for such work will be made under the respective pay items provided for in the contract.

Subsection 104.1.3 Cleanup and Dust Control: is modified to add:

At disposal sites other than City Landfills, the contractor shall be responsible for all required dust control measures.

104.2.2 Due to Physical Conditions: Paragraph *B) is changed to read:

*B) If at the time of opening up any portion of the work, material from which the subgrade is to be constructed contains and excess: of moisture so that the required compaction cannot be obtained without additional manipulation, the Engineer will determine the cause of such condition. If the cause of such condition is determined to have been unforeseeable and beyond the control of and without fault or negligence of the contractor, the Engineer will determine whether the material shall be aerated or removed and replaced. Such work shall be done as directed and will be paid for as provided in Section 109.

SECTION 106

106.2 Samples and Tests of Materials:

The procedures and methods used to sample and test materials will be determined by the Engineer. Unless otherwise specified, samples and tests will be made in accordance with the following: The City of Phoenix Minimum Sampling Frequency Guide, The City of Phoenix Materials Testing Manual, and the standard methods of AASHTO or ASTM, which were in effect and published at the time of advertising for bids.

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SECTION 107

LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

Subsection 107.5 SAFETY, HEALTH AND SANITATION PROVISIONS: is modified to add:

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

107.5.2 Hoist Certification: Prior to the final acceptance (MAG Section 105), the contractor shall schedule a hoist, crane acceptance inspection through the Engineer. This inspection and load test will be performed by an agency approved by the Engineer. This inspection and acceptance will not relieve the contractor from his contractual responsibility nor from his warranty for this installation.

107.6 PUBLIC CONVENIENCE AND SAFETY: is modified to add:

107.6.1 Contractor's Marshaling Yard: Contractors shall obtain approval of the City Engineer when using vacant property to park and service equipment and store material for use on City construction contracts.

- (A) The contractor shall notify adjacent property owners/residents of this proposed use.
- (B) Any use of vacant property adjacent to or near the project for parking or servicing equipment and/or storing of material will require the contractor to obtain written approval from the property owner. This approval shall contain any requirements which are a condition of this approval.
- (C) A copy of the property owner's approval shall be submitted along with the contractor's request to the City Engineer for approval for the use of the marshaling yard in connection with the project. An appropriate distance from adjacent property will be set by the City Engineer on a case by case basis on the size and type of equipment to be used on the project.
- (D) The yard shall be fenced and adequately dust-proofed in a manner such as to preclude tracking of mud onto paved City streets.
- (E) Work in the yard shall be scheduled so as to comply with the City Noise Ordinance.
- (F) Equipment, materials, etc., shall be located so as to minimize impact on adjacent properties. A sound barrier may be required if deemed necessary by the City Engineer.
- (G) The contractor shall clean up property promptly upon completion of use.
- (H) Contractor's request for approval shall specify in detail how he or she proposed to comply with (D) through (G) above.

107.6.2 City Code Section 23-14 (h): The Contractor shall comply with the City Code concerning work hours and noise level during construction.

SECTION 109

MEASUREMENTS AND PAYMENTS

Subsection 109.5.1 Equipment: is changed to read:

109.5.1 Equipment: Equipment which the Engineer considers necessary for the performance of work will be eligible for payment at the established rates only during the hours that it is operated except as otherwise allowed elsewhere in these specifications. Equipment hours will be recorded to the nearest one-half hour. The equipment rental rates established herein include allowance for overhead and profit except where otherwise specified. For the use of equipment approved by the Engineer, the contractor will be paid the rental rates, as modified herein, set forth in the Rental Rate Blue Book for Construction Equipment which is published by the Equipment Guide-Book Company, a division of Nielson-Dataquest, 1290 Ridder Park Drive, San Jose, California 95131, Phone (800) 227-8444. All rate determinations will be based on the Blue Book rental rate chapter revisions that are applicable at the time the equipment is being used.

A) Rental Rates (Without Operators):

The rental rate for each item of equipment will be the sum of the base machine rate, attachment rate and operating rate(s). All rates will be rounded to the nearest five cents.

The base rate for the machine and attachments represents the major cost of equipment ownership, such as depreciation, interest, taxes, insurance, storage, and major repairs.

The hourly operating rate represents the major costs of equipment operation, such as fuel and oil, lubrication, field repairs, tires, expendable parts and supplies.

For all equipment utilized on Actual Cost Work, the hourly rate for each piece of equipment and attachments will be paid at the Blue Book monthly rate for the make and model multiplied by the appropriate rate adjustment factor, divided by one hundred and seventy-six, plus the hourly operating costs, is applicable. Rate adjustment factors will be furnished in the special provisions.

The rate adjustment factor assigned to any attachment will be the yearly factor as determined for the base equipment.

The contractor shall furnish to the Engineer, serial numbers and year of manufacture for all pieces of equipment used on Actual Cost Work.

When Multiple attachments are included with the rental equipment, only the attachment having the higher rental rate will be eligible for payment, provided the attachment has been approved by the Engineer as being necessary to the Actual Cost Work.

The Blue Book regional adjustment factors will not apply in determining the rental rates.

Rental charges will not be allowed for small tools that show a daily rate less than five dollars or for unlisted equipment that has a value of less than four hundred dollars.

The above provisions apply to approved equipment of modern design and in good working condition. The equipment shall be handled and used to provide normal output or production. Equipment that is not in good working condition or is not of proper size for efficient performance of the work may be rejected by the Engineer. Equipment ordered for Actual Cost Work will be paid for

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until such time as the Engineer directs that the use of such equipment be discontinued or until completion of the work.

For any equipment not listed in the Blue Book, rental rates shall be agreed to in writing prior to the use of such equipment on Actual Cost Work or paid for by invoices in the case of outside rented equipment.

B) Stand-By Time:

Equipment that is in operational condition and is standing by with the Engineer's approval for participation in Actual Cost Work will be paid for at fifty percent of the appropriate hourly rate as determined by the provisions set forth in Subsection 109.04 (B) (3) (a) less operating costs. Payment for such "stand-by" will be limited to not more than eight hours in a twenty-four hour day or forty hours in a normal work week. Stand-by time will only be paid if approved in writing prior to start of work.

No compensation will be allowed for equipment that is inoperable due to breakdown.

No payment will be allowed for equipment that is not operating because the work has been suspended by the contractor for the contractor's own reasons.

PART 200
EARTHWORK

NO CHANGES

PART 300
STREETS AND RELATED WORK

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SECTION 301

SUBGRADE PREPARATION

Subsection 301.2 PREPARATION OF SUBGRADE: is modified to add:

The contractor's grading operations will proceed in an orderly sequence and shall be followed directly with the placement of base course. At no time shall the contractor's total grading operations precede the placement of base course by more than 1200 feet without specific written approval of the Engineer. At the end of each day's operation, the first lift of base course shall have been placed to within a maximum distance of 300 feet behind the finished subgrade area. Drop-offs on opposite sides of the pavement at the same time will not be allowed.

Existing pavement under proposed median islands shall be removed. Payment for the item shall be incidental to pay item "Subgrade Preparation."

When excavating for concrete work, such as curb and gutter and sidewalk, the contractor shall place the excavated material in uniform windows. The windows shall not interfere with property access and traffic flow on the streets.

SECTION 312

CEMENT TREATED BASE

Subsection 312.5 INVERTED SECTION: is changed to read:

Where the cement treated base is to be covered with an aggregate base material, the minimum thickness of the aggregate base shall be 5 inches, unless otherwise specified in the special provision. In order to provide for free internal drainage of the aggregate base course overlaying the cement treated material, it shall be non-plastic and the percentage of material passing the No. 200 sieve shall not exceed 6. The cement treatment shall be held back approximately 1 foot from each curb line.

Subsection 312.6 CURING: is modified to add:

The bituminous curing seal specified in the first two paragraphs will not be used. Only the water curing and overlaying with the aggregate base course will be allowed.

SECTION 321

ASPHALT CONCRETE PAVEMENT

Subsection 321.3 WEATHER AND MOISTURE CONDITIONS: is changed to read:

For base paving two inches thick or greater, atmospheric temperature shall be 40 degrees Fahrenheit and rising.

For surface paving or pavement less than two inches thick, the surface temperature shall be 50 degrees Fahrenheit or greater.

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SECTION 336

PAVEMENT MATCHING AND SURFACING REPLACEMENT

Subsection 336.2.2 PAVEMENT TO BE REMOVED: Delete the third paragraph of this Subsection in its entirety.

Delete all references to MAG Specification number 329 from this section.

The contractor shall do the required seal coating using an asphalt overlay, slurry seal, microsurfacing, or a modified asphalt emulsion, as directed by the Engineer. Slurry seals are not permitted on major and collector streets.

Subsection 336.2.3 TEMPORARY PAVEMENT REPLACEMENT: is changed to read:

336.2.3 Temporary Pavement Replacement: Temporary pavement replacement as required in Section 601 may be made using a cold mix asphalt concrete. The cold mix shall be MC-70 or MC-250 liquid asphalt (6.0 plus-minus 0.4 percent) combined with the aggregate gradation shown below. Paving asphalt AC 2.5 (5.5 percent) may be substituted for the liquid asphalt. AC 2.5 must be heated for mixing.

| Sieve Size | % - Passing | Tolerance |
|------------|-------------|-----------|
| 3/4" | 97-100 | +/- 7% |
| 1/2" | 88 | +/- 7% |
| 3/8" | 78 | +/- 7% |
| #4 | 60 | +/- 7% |
| #8 | 47 | +/- 5% |
| #30 | 25 | +/- 5% |
| #200 | 5 | +/- 2% |

Temporary pavement shall be used in lieu of immediate placement of single course permanent replacement or the first course of two course pavement replacement only on transverse lines such as spur connections to inlets, driveways, road crossings, etc., when required by the Engineer, by utilities or others who subcontract their permanent pavement replacement, under special prior arrangement; or for emergency conditions where it may be required by the Engineer. Temporary pavement replacement shall be placed during the same shift in which the backfill to be covered is completed.

The cold mix shall be placed in two inch increments and compacted with a roller that has not less than 60 p.s.i. contact pressure. Each layer shall be compacted to 96 percent of the laboratory compacted density for like materials. On small areas where the use of the equipment specified above is impractical, the Engineer will approve the use of small vibrating rollers or vibrating plate type compactors provided comparable compaction is obtained. The surface of the temporary pavement shall be flush with the adjacent pavement.

Subsection 336.3 TYPES AND LOCATIONS OF PAVEMENT AND SURFACING REPLACEMENT: is changed to read:

336.3 TYPES AND LOCATION OF PAVEMENT AND SURFACING REPLACEMENT:

Normally, the type of pavement replacement and backfill required for the trench excavation will be noted on the plans or specified in the special provisions and construction will be in accordance with

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MAG Detail 200.

(A) The "T" top as shown in MAG Detail 200 will not be required within the City of Phoenix. If the project is in or extends into another municipality/county the "T" top will be required for their portion of the project.

(B) When the trench excavation is not being accomplished in conjunction with a paving project, the following backfill and pavement replacement requirements apply:

(1) When the trench is transverse (45 to 90 degrees to street centerline) the backfill material required by MAG Detail 200 for Type B will be used. Permanent pavement replacement is required.

(2) When the trench is parallel or less than 45 degrees to the street centerline, the backfill material required by MAG Detail 200 for Type A will be used. Permanent pavement replacement is required.

(3) When the trench crosses an intersection, the backfill materials required by MAG Detail 200 for Type A will be used, unless the requirement for Type B backfill material is noted on the plans. Permanent pavement replacement is required.

(C) When the trench excavation is being accomplished in conjunction with a paving project and the new street paving is to be placed immediately after trench backfilling, the following backfill and pavement replacement requirements apply:

(1) When the trench is transverse (45 to 90 degrees to street centerline) the backfill material required by MAG Detail 200 for Type B will be used. Permanent pavement replacement is not required.

(2) When the trench is parallel or less than 45 degrees to the street centerline, the backfill material will be native material in accordance with Section 601. Permanent pavement replacement is not required.

(3) When the trench crosses an intersection, the backfill material required by MAG Detail 200 for Type A will be used unless the requirement for Type B backfill is noted on the plans. Permanent pavement replacement is not required.

(4) Temporary pavement replacement (MAG 336.2.3) will be required at intersections for traffic control and at existing partial paved areas when the total pavement is not scheduled for immediate removal. In addition to the above, the Engineer may require temporary pavement at any area where public safety and welfare warrants. This will be a non-pay item considered incidental to the project.

(5) If the excavation extends beyond the limits of the paving project, the contractor shall provide permanent pavement replacement in accordance with paragraph (B) for this extension.

(D) When the trench excavation is made in Portland cement concrete pavement, MAG Detail 200 Type C backfill and pavement replacement applies.

(E) When the condition of the existing pavement does not justify the use of Type A or Type B, MAG Detail 200 Type D backfill and pavement replacement applies. Prior written approval of the Engineer is required.

(F) When the trench excavation is made in ABC or decomposed granite pavement, MAG Detail 200 Type F backfill and pavement replacement applies.

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(G) When the trench excavation is made in asphalt concrete pavement which has a soil cement base course, concrete treated base course or bituminous treated base course, the contractor has the option of matching the existing pavement structure, including all courses, or replacing the pavement structure with equivalent full depth asphalt concrete pavement. For computing the equivalent asphalt concrete pavement required, 1 inch of asphalt concrete is equivalent to 3.25 inches of ABC or 1.4 inches of soil cement, cement treated base or bituminous treated base. After computations are completed, the equivalent depth will be rounded off to the next higher 1/2 inch, i.e., 6.15 inches computed would be rounded to 6.5 inches.

If the contractor elects to match the pavement structure in kind, backfill shall be native material. If the contractor uses the full depth equivalent asphalt concrete pavement, backfill shall be native material with the final 6 inches being ABC or Select Type B (Table 702). Compaction shall be in accordance with MAG 601, as modified by City of Phoenix Supplement.

Subsection 336.4 MEASUREMENT: change first paragraph to read:

Measurement and payment for permanent pavement replacement will be by the square yard, **for the thickness specified**. In computing the pay quantity, the field measurement along the centerline of the trench, , and the trench pay width as listed in MAG 336 will be used. When the longitudinal trench is only partially in the pavement, adjustments in the pay width will be made by the Engineer.

There will be no separate measurement and payment for trench back-fill. The cost of the backfill will be included in the cost of the pipe.

SECTION 340

CONCRETE CURB, GUTTER, SIDEWALK, DRIVEWAY AND ALLEY ENTRANCE

Subsection 340.3 CONSTRUCTION METHODS: change the 3rd, 4th, and 5th paragraphs on page 113 to read:

Expansion joints, unless otherwise specified, shall be constructed in accordance with the City of Phoenix Detail P-1230. They shall be in a straight line and vertical plane perpendicular to the longitudinal line of the sidewalk or curb and gutter, except in case of a curved alignment when they will be constructed along the radial lines of the curve. The expansion joints shall be constructed to the full depth and width of the concrete and shall match the joints in the adjacent pavement, sidewalk or curb and gutter. The expansion joint material shall extend from the surface of the concrete to one inch into the subgrade. Joints shall be constructed at all radius points, driveways, alley entrances and at adjoining structures with a maximum interval of 100 feet between joints.

Contraction joints, unless otherwise specified, shall be constructed in accordance with City of Phoenix Detail P-1230 and in a straight line and vertical plane perpendicular to the longitudinal line of the sidewalk or curb and gutter, except in case of a curved alignment when they will be constructed along the radial lines of the curb. They shall be constructed to a depth of 1-1/2" at 10' intervals on all sidewalks regardless of the width. Unless an expansion joint is required, a contraction joint will coincide with each form joint. Sidewalk score marks, at least 1/2 inch deep are required at the mid-point of the contraction joint.

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SECTION 342

DECORATIVE PAVEMENT CONCRETE PAVING STONE OR BRICK

Subsection 342.3.1 AGGREGATE BASE COURSE: delete in its entirety and substitute the following:

The base course for decorative pavement shall consist of a cement-enriched aggregate base slurry consisting of one sack of Type II Portland cement per cubic yard of aggregate base course material. Aggregate base slurry shall be installed over subgrade soil compacted to a minimum of 95% density. The surface elevation of the aggregate base slurry shall be set to bring the 1-inch sand laying course, plus the thickness of the paving stones or bricks to the desired finished elevation of decorative pavement. The surface of the aggregate base slurry shall not vary more than + 1/8 inch in 10 feet.

Subsection 342.4 MEASUREMENT AND PAYMENT: delete in its entirety and substitute the following:

Measurement will be by the square foot. Payment will be made at the unit bid price per square foot including subgrade compaction, cement-enriched aggregate base slurry, and sand base. This payment shall be full compensation for all labor, materials, tools and equipment required to complete the work.

SECTION 345

ADJUSTING FRAMES, COVERS, VALVE BOXES AND WATER METER BOXES

Subsection 345.1 DESCRIPTION: is amended to add the following paragraphs:

Adjustment of frames, covers, valve boxes and water meter boxes to finish grade shall not start until the project is ready for the surface course. Once started, the adjustments shall be continuous throughout the project and shall not precede the placement of the surface course by more than four working days.

Prior to commencing work on the adjustments, the contractor shall submit a written schedule to the Engineer for approval. This schedule shall include the paving and all adjustment including utility companies. It shall be based on specific calendar dates.

If the contractor fails to start the placement of the surface course within four working days or does not continue the placement of the surface course after adjustment of frames, covers, valve boxes and water meter boxes to final grade, the sum of \$40.00 per calendar day per protruding structure may be deducted from monies due to the contractor as a penalty. This penalty amount is established since the value of the actual inconvenience, nuisance, and traffic delay created for the public and the Contracting Agency, by this failure to maintain an established schedule, is impractical to ascertain.

SECTION 350

REMOVAL OF EXISTING IMPROVEMENTS

Subsection 350.3 MISCELLANEOUS REMOVAL AND OTHER WORK: delete the first sentence and substitute the following:

The work shall include all items as stated in MAG Subsection 350.3 and City of Phoenix

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Supplement. Any other miscellaneous removal not listed or not shown on the plans will be considered incidental and no additional payment will be made.

Subsection 350.3 MISCELLANEOUS REMOVAL AND OTHER WORK: is modified to add:

(K) Landscape Irrigation System Removal and Restoration: The contractor shall remove the conflicting portion of all underground landscape irrigation systems that are within the right of way and/or easements that conflict with new work or any portion which may remain under proposed curb, gutter or sidewalk regardless of whether shown or not shown on the plans.

The contractor shall restore all affected landscape irrigation systems to an operational condition at least as good as existed prior to removal. Bubbler and/or sprinkler heads shall be installed behind the new sidewalk in areas where watering was accomplished by landscape irrigation heads which were removed. Specifically, all areas behind the new sidewalk which were watered by the existing irrigation system before relocation shall be watered after relocation without any accumulation of water on the sidewalk or pavement.

The contractor shall have the option of either providing all new materials or salvaging and reusing existing materials. Either new or salvaged irrigation heads shall be installed in a new location, as close as practical to the existing location. Either new or salvaged pipe shall be installed and all the necessary connections made to put the system back into operation.

In the event it is not feasible to reinstall removed irrigation heads, the contractor shall then make all the necessary connections to make the remaining portion of the system operational. Irrigation heads and pipe not reinstalled shall be given to the owner.

The contractor shall furnish all new irrigation heads, new pipe and fittings, and pipe compound necessary to supplement salvaged materials.

The contractor shall notify the affected property owners, at least fourteen days prior to removing and replacing underground landscape irrigation systems because some of the owners may desire to do this work themselves.

(L) Lawn Restoration: When any construction by the contractor encroaches into an improved yard, in or outside the right of way, the contractor shall level any disturbed ground, resod all grass covered areas, and restore rock-covered areas with material to match existing in type and quality.

(M) Precast Safety Curbs Inside Right of Way: Existing precast concrete safety curbs inside the right of way and approximately parallel to the new curb line shall be reset by the contractor directly opposite their existing location, with the back edge on the right-of-way line.

All other precast concrete safety cubs inside the right of way shall be salvaged and stockpiled by the contractor at a location on the adjacent property agreeable to the property owner.

(N) Encroachments Inside the Right of Way: The contractor shall notify property owners, who have encroaching walls, fences, planters, plants, bushes, small diameter trees, and other improvements in the right of way that interfere with construction, at least fourteen days before clearing is necessary.

Any encroaching items, not timely removed by the owner, shall be removed and disposed of by the contractor in accordance with the Contract Documents.

(O) Restoration of Temporary Construction Easements: The contractor shall leave the easements in as good a condition or better after work is completed. Special care must be taken to replace any

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asphalt, trees, sprinklers, lights, walls, fences, etc., which were disturbed as a result of construction. Where grass is located within the easement such as a lawn, the contractor shall remove the sod which would be in the path of any construction, store it, keep it moist, and replace it immediately after construction is complete.

(P) Any removals called for on the Traffic Signal Plans.

(Q) Any and all items not specifically set forth as a separate pay item.

Subsection 350.4 PAYMENT: change to read:

Measurement will be on a lump sum basis for the work done as described above and as included in MAG Section 350. Payment will be made on a lump sum price for proposal item - MISCELLANEOUS REMOVAL AND OTHER WORK which shall be full compensation for all work complete and to the satisfaction of the Engineer.

SECTION 351

TRAFFIC SIGNAL MATERIAL AND CONSTRUCTION

351.1 TRAFFIC SIGNALS:

Traffic signal work consists of furnishing all equipment (except City-furnished items listed herein) tools, labor, and materials necessary to install pole foundations, underground conduit, junction boxes and other appurtenances as shown on the plans.

351.2 GENERAL CONSTRUCTION PROVISIONS:

In the initial phase of construction, the contractor shall install the new traffic signal pole foundations, conduit and junction boxes on all corners at locations shown on the plans. The contractor shall be required to provide and install temporary overhead signal cable to operate the traffic signals during an interim period until all main conduit runs are installed across the intersection.

After a minimum seven-day curing period for the pole foundation, the City of Phoenix Traffic Signal Shop will set signal poles, hang mast arms and signal heads.

The contractor will then install the temporary overhead signal cable as specified by the City's Traffic Signal Shop. The temporary overhead signal cable shall include cable runs from the top of the combination poles to the hand hole at the base of the pole. All temporary cable runs across streets, alleys and driveways shall be installed with a minimum of 25 feet clearance above the traveled way and shall not hang in front of any operational traffic signal heads.

When the contractor has completed placement of the temporary overhead signal cable as directed, the City's Traffic Signal Shop personnel will hang mast arm heads, hook up the temporary cable system and activate the new signal system.

The temporary overhead cable shall stay in place and remain activated until such time as the contractor has installed all conduit and junction boxes as required in the plans and specifications. Traffic Signal Shop personnel will then pull wire, hook up and activate the ultimate traffic signal system.

It shall be the responsibility of the contractor to remove all temporary overhead cable once the ultimate traffic signal system is activated.

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The City will be responsible for the removal of all non-used existing signal foundations, junction boxes, and conduit.

The City of Phoenix shall furnish all foundation anchor bolts. All other items shall be contractor-furnished. The contractor shall pick up the City-furnished items at the City of Phoenix Traffic Signal Shop, located at 2631 South 22nd Avenue (262-6733). Twenty-four hour notice is required.

Sidewalk and valley gutter apron and pavement removal and replacement, where necessary, shall be considered as included in the cost of installing the underground conduit. Saw cutting, if necessary for the installation of underground conduit or signal pole bases, shall be included in the cost of installation. Asphalt concrete pavement crossings shall be replaced in accordance with MAG Detail 200, Type B, without the "T" top. Conduit splices shall be included in the cost of conduit.

351.3 MATERIALS AND CONSTRUCTION DETAILS:

Materials and construction details shall conform to the Arizona Department of Transportation, Highways Division, Supplemental Specifications to Standard Specifications for Road and Bridge Construction, latest edition, and the Arizona Highway Department Traffic Signal and Highway Lighting Systems Standard Drawings, latest edition and the current National Electrical Code Standards, unless otherwise specified herein or on the plans.

351.3.1 Underground Conduit: All underground conduit shall be rigid polyvinyl chloride (PVC) and shall conform to Section 732-2.02 - Electric Underground Material, of the Arizona Department of Transportation, latest edition, and shall be placed at locations shown on the plans.

All conduits shall be installed in straight lines (unless otherwise shown on the plans) junction box to junction box or junction box to pole base with one 90 degree sweep on each end as specified in the plans. All conduits entering junction boxes shall be vertical, with the top of the conduit six inches below the bottom of the junction box cover when it is in place. Prior to trenching for the installation of the underground conduit, the contractor shall contact the City of Phoenix Traffic Signal Shop (262-6733).

Conduit for loop lead-in wires shall be installed in accordance with the Traffic Signal Legend and Detail Sheet of the project plans.

351.3.2 Junction Boxes: All junction boxes shall conform to Section 732-2.03 - "Pull Boxes" of the ADOT, latest edition, and shall be placed at locations shown on the plans. All junction boxes shall be installed in Class 'B' concrete and shall be flush with finished grading. Covers shall be marked as follows: "Traffic Signal." Markings shall be clearly defined and uniform in depth and shall be placed parallel to the long side of the cover. Letters shall be one inch high.

351.3.3 Traffic Signal Cable: All temporary signal cable shall be standard IMSA 20-1, self supporting figure 8 aerial cable (1973 spec. 20 conductor). The temporary cable shall be run overhead as required and down the outside of the new traffic signal poles. The cable installed on the traffic signal poles shall terminate at the handhole at the bottom of the pole and shall have 1 foot of slack stripped and ready for connection at the terminus end.

351.3.4 Controller Bases: Controller bases shall be installed by the contractor at locations as shown on the plans. Exact dimensions of controller foundations shall be obtained from the Traffic Signal Shop. (See Standard Detail Sheet.)

351.3.5 Pole Foundation: Pole foundations shall conform in size, type and location as shown on the plans. The pole foundation anchor bolts shall be installed square with the intersection. The top of the

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pole foundations shall be set at the finished grade of the back of sidewalk for each location unless otherwise shown on the plans. A minimum of four inches of thread on "A" and five inches of thread on "M" poles shall extend above the finished grade. Bolts shall not extend more than five inches above the finished grade for "A" and six inches above the finished grade for "M" poles.

351.3.6 Inductive Loop Lead-In Cable: Lead-in cable from the loop stub-out junction box to the terminal in controller cabinet shall be Belden 8720, or approved equal, and shall be continuous without splices from the loop stub-out junction box to the controller cabinet. A minimum of five (5) feet of slack shall be provided in the controller cabinet and a minimum of three (3) feet of slack shall be provided in each junction box.

Each 5' x 100' or 5' x 80' loop shall be connected to a separate lead-in cable. No more than two (2) 5' x 40' loops shall be connected to the same lead-in. All splices shall be soldered. Splices to the lead-in cable shall not be soldered until field tests have been completed. The field loop conductors shall be spliced to the lead-in cable at the loop stub-out junction box. Lead-in cable shall conform as described above.

351.3.7 Inductive Loop: Conductor for each inductive detector loop shall be continuous, unspliced, 14 A.W.G. Stranded XHHW single conductor, or approved equal, run to the nearest junction box as shown on the project plan.

Inductive loops shall be installed in saw cut slots in the final asphalt concrete base course lift. Slots shall be cut into the pavement in the manner depicted on the Quadrupole Loop Configuration Detail on the Standard Detail Sheet and positioned in accordance with the approved plans. Slots shall be one-fourth (1/4) inch wide and deep enough to provide a minimum of one (1) inch slot sealant coverage. Slots shall be blown out and dried before installation loop conductors.

Loop conductors shall be installed and tested ONLY in the presence of an authorized representative of the City of Phoenix traffic Signal Shop. Conductors installed without said representative in attendance, for any reason, shall be removed from the pavement and new conductors installed, all at the contractor's expense. Each loop slot shall have the number of conductors laid in the directions indicated on the loop configuration detail. The beginning conductor shall be banded in the junction box with the symbol "S" and a minimum of three (3) feet of slack for each conductor shall be provided in each junction box.

Loop installations shall be made permanent (sealed) ONLY after successful testing. The loop conductors shall be temporarily spliced to the lead-in cables, as directed by the City representative, and each loop circuit shall then be tested at the controller cabinet.

Test:

1. Megger: a 600-volt megger test shall measure not less than ten (10) megohms resistance to ground.
2. Continuity: Loop circuit resistance shall not exceed two (2) ohms.

After successful testing, the loop conductor/lead-in cable splices shall be made permanent and the loop slots sealed. Conductor/lead-in splices shall be secured with wire nuts and then injected with a clear silicon sealant. Loop sealant shall be injected into all slots, and before setting, surplus sealant shall be struck of flush with and removed from the roadway surface.

Slot sealant shall be 3-M Decetor Loop Sealant.

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351.4 MEASUREMENT:

Measurement for foundations, junction boxes and loops shall be of the number of units of each satisfactorily constructed.

Measurement for conduit shall be the linear feet of conduit satisfactorily installed as measured along the centerline of the conduit through fittings from end of conduit to end of conduit. Measurement shall be made to the nearest 0.5 feet.

Measurement for the temporary signal cable and the lead-in cable shall be the linear feet of cable satisfactorily installed as measured along the centerline of the cable from end to end. Measurement shall be to the nearest 0.5 feet. The temporary signal cable is a contingency item and may be eliminated without compensation by the Engineer.

351.5 PAYMENT:

Payment for traffic signal work will be made at the unit prices bid in the applicable proposal pay item, which price shall be full compensation for all material and labor required to complete the work, as described and specified herein and on the plans.

ADD NEW SECTION 361.0 MICROSEAL SPECIFICATIONS

MICRO SEAL SPECIFICATIONS

1. SCOPE

The intent of this guideline is to specify the design, testing methods, and quality control procedures for the application of a "quick traffic solid/polymer microsurface."

2. DESCRIPTION

This specification covers the materials, equipment and construction procedures for rut filling and/or resurfacing of existing paved surfaces. The microsurface shall be a mixture of cationic polymer modified asphalt emulsion, mineral aggregates, mineral filler, water and other additives properly proportioned, mixed and spread on the pavement surface in accordance with this guideline and as directed by the engineer.

3. SUPPLY OF MATERIALS

The contractor shall supply all materials necessary for the performance of the work in accordance with the specifications.

The contractor shall be responsible for the safety of all materials of which he has taken delivery, until they are in place on the road and shall take all necessary precaution to avoid loss by fire or theft or damage by water and shall bear the cost of replacing any such material that is lost, split, destroyed or damaged after delivery is effected.

4. MATERIALS

Materials shall be approved by the Engineer prior to the start of construction. Certificates of Compliance will accompany each delivery of emulsion.

4.1 ASPHALT EMULSION OF MICROSEAL

The polymerized Cationic Emulsion is herein classified as CSS-1H, quick-setting, cationic type emulsion for mixing applications and seal coat. A minimum of 4% of saturated polymer shall be high sheared into the asphalt prior to the emulsification process. The Agency may choose to sample the polymerized asphalt for testing. The amount of polymer will be based on weight of polymer and asphalt (total wt.) and be certified by supplier. The polymerized emulsion will meet the following specifications listed in Table 1.

TABLE 1

| <u>TEST</u> | <u>AASHTO METHOD</u> | <u>SPECIFICATION LIMITS</u> |
|--|----------------------|-----------------------------|
| <u>Tests on Emulsion</u> | | |
| Viscosity, SSF @ 77°F. sec. | T-59 | 15-100 |
| Sieve Test, % Particle Charge | T-59 | 0.10 Max Positive |
| Storage Stability Test. 24 h. % | T-59 | 0.1 Max |
| Evaporation Residue % | Ariz 512 | 60 Min. |
| <u>Tests on Evaporation Residue</u> Ariz 504 | | |
| Kinematic Viscosity 275°F. cst | T-201 | 650 Min. |
| Penetration, 77°F 100 g. @ 5 sec. | T-49 | 40-90 |
| Softening Point degrees F. | T-53 | 140 Min. |
| Ductibility, 77% 5 cm/Min | T-51 | 60 Min. |
| <u>Tests on Evaporation Residue after RFTO</u> | | |
| Kinematic Viscosity 275°F. aging ratio, cst | T-201 | 2.5 Max. |
| Softening Point degrees F. | T-53 | 140 Min. |

* The emulsion upon standing undisturbed for a period of twenty-four (24) hours, shall show no white or milky colored substance on its surface, and shall be a homogeneous brown color throughout.

4.2 MODIFIER TYPE AND CONTENT

The modifier shall be saturated. The asphalt cement shall contain a minimum of 4% solid polymer by weight of asphalt residue, sheared into the asphalt prior to emulsification.

4.3 AGGREGATE

The mineral aggregate shall consist of sound, durable crushed stone or crushed gravel and approved material filler. The material shall be free from vegetable matter and other deleterious substances. Aggregates shall be 100% crushed with no rounded particles. No natural sand will be allowed.

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The percentage of composition by weight of the aggregate shall conform to the nominated gradation selected from the following:

| <u>SIEVE SIZE</u> | <u>PERCENT PASSING</u> | | |
|--|------------------------|-----------------|----------------|
| | <u>RUT FILLING</u> | <u>TYPE III</u> | <u>TYPE II</u> |
| 1/2 | 100 | 100 | 100 |
| 3/8 | 85-95 | 100 | 100 |
| No.4 | 55-75 | 70-90 | 85-100 |
| No.8 | 45-55 | 45-70 | 65-90 |
| No.16 | 25-10 | 28-50 | 45-70 |
| No.30 | 19-34 | 19-34 | 30-50 |
| No.50 | 10-20 | 12-25 | 18-30 |
| No.100 | 7-18 | 7-18 | 10-21 |
| No.200 | 5-15 | 5-15 | 5-15 |
| Application Rate Pounds per Square Yard | 30-35 | 24-35 | 18-24 |

The mineral aggregate and mineral filler shall have a sand equivalency value not less than 50 (ASTM D 2419) and be non-plastic.

If more than one kind of aggregate is used, the correct amount of each kind of aggregate to produce the required grading shall be proportioned separately in a manner that will result in a uniform and homogeneous blend. The final blended aggregate shall meet requirements for grading, sand equivalency and plasticity per above.

4.4 MINERAL FILLER

Mineral filler, required by the mix design, shall be any recognized brand of nonairentrained Type I normal Portland cement that is free of lumps and clods, with a minimum of 85% passing the #200 sieve added by weight of aggregate as specified by the mix design.

4.5 WATER

The water is to be potable water free from any injurious impurities. The contractor shall state the source of water at the time of tendering.

4.6 ADDITIVES

Additives may be used to accelerate or retard the breaking point and set times of the microsurface mix, or improve the resulting finished surface.

The use of additives in the microsurface mix shall be supplied to quantities predetermined by the laboratory mix design.

4.7 PROPORTIONING

The microsurface shall be proportioned in accordance with the mix design. Calibrated sign flowmeters shall be provided to measure both the addition of water and additives to the pugmill. Emulsion and cement flow shall be tied directly to aggregate flow. All additive flows shall be calibrated.

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4.7.1 The microsurface mixture shall be proportioned per the mix design to ensure:

- a. Trafficability - with a relative humidity at not more than 50% and ambient air temperature of at least 77 degrees F, the material will permit controlled traffic without damage to the surface within thirty (30) minutes and uncontrolled traffic without damage within sixty (60) minutes.
- b. Prevent development of bleeding, raveling, separation or other distress for seven (7) days after placing the microsurface.
- c. The finished mixture will be warranted against material defects for one year; existing conditions excluded.

5. **MIX DESIGN**

5.1.1 The contractor shall provide a job mix formula from an approved laboratory and present certified test results for the engineer's approval. Compatibility of the aggregate and polymer modified emulsion shall be certified by the emulsion manufacturer. All the materials used in the job mix formula shall be representative of the materials proposed by the Contractor for use in the project.

5.1.2 All the products used in the construction shall have certifications from the suppliers and shall be given to the engineer upon delivery of the project.

5.1.3 Mix design and proportioning will be approved by the engineer prior to the start of the project.

5.2 **SPECIFICATIONS**

5.2.1 The engineer shall approve the mix design prior to use. The specification limits are as follows:

| | |
|----------------------|------------------------------------|
| Residual Asphalt | 6%- 11.5% by dry weight of agg. |
| Mineral Filler | .1% - 1% by dry weight of agg. |
| Polymer Content/Type | 4% min. (see Section 5.2) |
| Additive | As required for mix properties |
| Water | As required for mix properties |
| Aggregate Grading | Type as specified meeting Sec. 5.3 |
| Consistency | 2.5 to 3.0 cm |
| Traffic Time | See Section 6.2.2 |

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The mixing machine shall be a self-propelled or truck-mounted mixing machine which shall be able to accurately deliver and proportion the aggregate, mineral filler, water, additive, and polymer-modified asphalt emulsion to a revolving multi-blade mixer capable of minimum speeds of 200 RPM and discharge the product on a continual flow basis. The machine shall have sufficient storage capacity for aggregate, polymer modified asphalt emulsion, mineral filler, water, and additive to maintain an adequate supply to the proportioning controls.

7.3 MATERIAL CONTROL

7.3.1 CALIBRATION

Each mixing unit to be used in the performance of the work shall be calibrated prior to construction. Calibration data, if done within the calendar year, using the same material, may be used, providing a verification of the aggregate feed agrees.

7.3.2 Individual volume or weight controls for proportioning each material to be added to the mix shall be provided, and shall be accessible to the engineer. Each material control device shall be calibrated prior to work and documented for inspection by the engineer.

7.3.3 AGGREGATE FEED

The aggregate feed to the mixer shall be equipped with a revolution counter or similar device so the amount of aggregate used may be determined at any time.

7.3.4 EMULSION PUMP

The emulsion pump shall be the positive displacement type with a jacketed housing for uniform heating. A revolution counter or similar device shall be fitted so that the amount of emulsion used may be determined at any time.

7.3.5 FINES FEEDER

An approved fines feeder is required that will provide a uniform, positive, accurately metered range of 0 - 1 percent by dry aggregate weight. The fines feeder shall have a counter so the amount of mineral filler can be filler determined at any time.

7.3.6 LIQUID ADDITIVE

The mixing machine shall be equipped with a liquid additive system that provides a pre-determined amount of additive to the mixing chamber. This additive system must be equipped with a counter that can determine the amount used at any time.

7.3.7 WATER SYSTEM

The mixing machine shall be equipped with a water system that provides a pre-determined amount of water to the mixing chamber. This water system must be equipped with a counter that can determine the amount used at any time.

7.4 OPERATOR CONTROLS

- 7.4.1 Controls will allow the operator to sequence and proportion the material per the mix design.

7.5 SPRAY BARS

The mixing machine shall be equipped with a water pressure system that provides a water spray immediately ahead of and outside the spreader box.

7.6 SPREAD EQUIPMENT

- 7.6.1 The paving mixture shall be spread uniformly by means of mechanical type laydown box attached to the mixer, equipped with agitation, to spread the materials throughout the box without any dead zones. The paddles shall be designed and operated so all the fresh mix will be agitated. Flexible seals, front and rear, shall be in contact with the road surface to prevent loss of mixture from the box. The spreader box shall be equipped with hydraulic cylinders for controlling the thickness of the spread mixture.
- 7.6.2 The rut filling spreader box shall have 6 to 8 skids to provide for leveling and filing uneven depressed areas. The rut filling spreader box will require two adjustable steel strike-off plates. The rear flexible seal shall act a final strike-off and shall be adjustable. The steel strike-offs shall be controlled by hydraulic cylinders placed at the rear of the spreader box.
- 7.6.3 The spreading equipment shall be maintained free from build-up of the mixture on the paddles or side walls. Skips, lumps, or tears will not be allowed in the finished product.

8. APPLICATION

8.1 GENERAL

The microsurface shall be of the desired consistency when deposited in the spreading box and nothing more shall be added to it. The mixing time shall be sufficient to produce a complete and uniform coating of the aggregate and the mixture shall be chuted into the moving spreader box at a sufficient rate to maintain an ample supply across the full width of the strike-off squeegee at all times.

8.2 WEATHER

The microsurfacing shall be placed when the temperature is at least 45 degrees F and rising, and it is not raining. The surface temperature shall be 50 degrees F or higher when the mixture is applied.

8.3 PROTECTION OF EXISTING SERVICES

The contractor shall take all necessary precautions to prevent microsurface or other material used from entering or adhering to gratings, hydrants, valve boxes, manhole covers, bridge or culvert decks, and other road fixtures. Immediately after resurfacing, the contractor shall clean off any such material and leave any grating, manholes, etc. in a satisfactory condition.

8.4 FOGGING PAVEMENT

The surface should be pre-wetted by fogging ahead of the spreader box. The rate should be adjusted as dictated by the pavement temperatures, surface texture, humidity, and dryness of existing pavement.

8.5 MIX STABILITY

The modified mix shall possess sufficient stability so that premature breaking of material in the spreader box does not occur. The mixture shall be homogeneous during mixing and spreading; it shall be free of excess water or emulsion, and free of segregation of the emulsion and aggregate fines from the coarser aggregate.

8.6 APPLICATION RATE

The application rate, square yards per cubic yard of mix specified, are average rates; the surface texture variation throughout the work will dictate the actual spreading rates. The strike-off squeegee shall be adjusted to provide a microsurface thickness which will completely fill the surface voids and provide an additional thickness not exceeding one and one-half times the largest top-size stone. This requirement of 1-1/2 stone depth does not apply to rut filling operations as these depths vary greatly according to the surface irregularities.

8.7 JOINTS

No excessive build-up or unsightly appearance shall be permitted on longitudinal or transverse joints. A maximum of 4.0" overlap will be permitted on longitudinal joints. The contractor shall provide suitable width spreading equipment to produce a minimum number of longitudinal joints throughout the work. Half passes and odd width passes will be used in minimal amounts. If half passes are used, they cannot be the last pass of any paved area. Care shall be taken to ensure straight lines along curbs and shoulders. No runoff on these areas will be permitted.

Construction joints shall be neat in appearance and shall be tapered or feathered to conform to the existing surfacing. All excess material shall be removed from the surface upon completion of each run.

8.8 HANDWORK

Approved squeegees and lutes shall be used to spread the mixture in areas inaccessible to the spreader box and other areas where hand spreading may be required.

8.9 PROTECTION OF MICROSURFACE

Adequate means shall be provided by the contractor to protect the uncured product. Any damage done to the produce shall be repaired at the contractors expense.

8.10 DAMAGE TO MICROSURFACE

The contractor's responsibility to replace microsurface damaged by unexpected rain after spreading shall be limited to the period within four (4) hours of placement of the microsurface.

9. PAYMENT

The micro-surfacing shall be paid for by the weight of the aggregate and weight of emulsified asphalt, as shown on certified weight tickets from the supplies delivered to the project less weigh backs. The price shall be full compensation for furnishing, mixing and applying all materials; and for all labor, equipment, tools, design tests, and incidentals necessary to complete the job as specified herein.

PART 400

RIGHT OF WAY AND TRAFFIC CONTROL

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SECTION 401

TRAFFIC CONTROL

Section 401 TRAFFIC CONTROL: delete this section in its entirety and substitute the following:

401.1 DESCRIPTION:

Traffic control shall consist of traffic control devices and flagmen or pilot cars. All traffic control devices, the application of traffic control measures, and traffic regulation in these specifications are to supplement and are not intended to delete any of the provisions of the Contracting Agency's Traffic Barricade Manual, the Uniform Manual on Traffic Control Devices or any agency's Supplements to these Uniform Standard Specifications.

401.2 TRAFFIC CONTROL DEVICES:

The Contractor shall provide and maintain all necessary traffic controls to protect and guide traffic for all work in the construction area.

Traffic control devices shall consist of providing, erecting, and maintaining necessary and adequate devices for the protection of the work, the workmen and the traveling public.

(A) Temporary traffic control devices shall be used to guide traffic through construction areas. They include, but are not limited to, traffic cones to channelize traffic, portable barricades for warning, vertical panel channelizing devices to divert traffic, and lighting devices between the hours of sunset and sunrise.

(B) Advance warning devices shall be used to alert the motorist of an obstruction in the roadway. They include diamond-shaped signs, flags, and flasher-type high level warning devices mounted 8 feet above the roadway.

(C) The contractor shall in all cases notify the Engineer at the same time as other required notices in this section are made. Notification shall be through Engineer when so required.

401.3 FLAGGERS AND PILOT CARS:

Flagging of traffic or pilot cars shall consist of providing sufficient flaggers (with proper signing), uniformed off-duty law enforcement officers or pilot cars to expedite the safe passage of traffic. Off-duty law enforcement officers shall be used when flagging two or more traffic lanes in each direction.

401.4 TRAFFIC CONTROL MEASURES:

The application of all traffic control measures shall be based primarily upon the conditions existing at the time that such measures are deemed necessary. Prior to the start of any work that would interrupt the normal flow of traffic, sufficient and adequate devices and measures shall be provided and erected required for compliance with the stipulations. The Engineer reserves the right to require additional traffic control measures in any specific instance. These devices shall be immediately removed when no longer needed.

401.5 GENERAL TRAFFIC REGULATION:

Arrangements for partial or complete street closure permits shall be handled through the Engineer on local projects or through the Arizona Department of Transportation Resident Engineer on Federal-aid

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projects or through the Permit Inspector on permit work to the Contracting Agency's Traffic Engineer. An advance notice of 48 hours for major streets and 24 hours for local streets and alleys is required from the contractor.

A traffic lane shall be a minimum of 10 feet of clear width with a safe motor vehicle operating speed of at least 25 miles per hour.

An intersection shall be all of the area within the right of way of intersecting streets plus 300 feet beyond the edge of the intersected right of way on all legs of the intersection.

The following are minimum traffic control requirements for all traffic restrictions, unless otherwise provided for in the "Special Traffic Regulations" listed in the Contracting Agency's project or permit, if applicable, by prior approval of the Traffic Engineering Division or during emergency conditions:

(A) During the PEAK TRAFFIC HOURS of 7:00 a.m. to 8:30 a.m. and 4:00 p.m. to 6:00 p.m., weekdays, TRAFFIC RESTRICTIONS ARE NOT PERMITTED on Major or Collector streets. Streets with reversible lanes shall not be restricted between 6:00 a.m. and 9:00 a.m. and between 4:00 p.m. and 6:00 p.m. weekdays.

(B) During OFF PEAK TRAFFIC hours when one traffic lane is restricted at multiple lane signalized intersections with left-turn channels, the left-turn channels with special channelization shall be used to provide a minimum of four thru traffic lanes (two lanes for each direction).

(C) Except as provided for in items A and B above, a minimum of two traffic lanes (one for each direction) shall be maintained open to traffic on all Major and Collector streets at all times. A minimum of two traffic lanes in the same direction shall be maintained open to traffic on "one way" streets at all times.

(D) A traffic lane shall not be considered as satisfactorily open to traffic unless it is paved with hot mix or cold mix asphalt paving if surrounded by existing pavement. Where all of the existing pavement has been removed, a traffic lane shall not be considered as satisfactorily open to traffic unless it is graded reasonably smooth and maintained dust-free.

(E) The contractor, utility or other agency, shall provide a uniformed off-duty police officer during OFF PEAK traffic hours to assist with traffic control at multiple lane signalized intersections whenever traffic in any one direction is restricted to one lane. This requirement may be waived by the Engineer when conditions, in his opinion, do not require it.

(F) Local streets may be closed except for local access, when construction or maintenance requires.

(G) Local access shall be maintained to all properties on all streets (Major, Collector and Local) at all possible times. When local access cannot be maintained, the contractor, utility or other agency shall notify the affected property owner, resident, or tenant, a minimum of 24 hours in advance and restore access as soon as possible. Unless specifically authorized by the Engineer, access to businesses will not be closed during business hours.

(H) All contractors doing work in the right of way shall promptly remove traffic control devices when the closure or lane restrictions are no longer in effect. All lead signs shall be turned so that they are not readable by drivers. Signs may be stored behind the sidewalk for short periods of time.

401.6 EXISTING TRAFFIC CONTROL DEVICES:

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During construction and maintenance operations it is important that all existing traffic control devices be kept compatible with the traffic restrictions imposed. This includes existing signs, parking meters, traffic signals and pavement markings. Some devices will remain applicable to traffic and must be maintained. Other devices must be covered, relocated or removed. Requirements for each group of devices are detailed in this section.

(A) Traffic Signs:

The contractor, utility or other agency shall maintain all existing STOP, YIELD and street name signs, verifying they are erect, clean and in full view of the intended traffic at all times. If these signs interfere with construction, the contractor, utility or other agency shall temporarily relocate the signs to permit construction, but the devices must be kept in full view of the intended traffic. Portable signs shall be used to supplement the relocated permanent signs.

Other signs still applicable shall also be maintained erect, clean and in full view of the intended traffic by the contractor, utility or other agency at all times. Existing signs, not applicable, shall be removed by the contractor, utility or other agency without damage, and salvaged on the adjacent property lines. The Traffic Engineering Division shall be notified of all removals.

(B) Traffic Signals:

The contractor, utility or other agency shall maintain all existing traffic signal equipment except vehicle detector sensing devices, fully operational in the existing locations and in full view of the intended traffic at all times unless otherwise specified in the Contracting Agency's Traffic Barricade Manual or in the Project or Permit Plans or specifications.

The contractor, utility or other agency shall notify the Contracting Agency's Electrical Facilities Section 48 hours prior to the start of construction in the vicinity of signalized intersections. The Electrical Facilities Section will, upon request, provide the approximate locations of all underground traffic signal equipment (conduits, junction boxes, vehicle detector sensing devices, etc.). The exact location of this underground equipment shall be determined by the contractor, utility or other agency prior to any excavating operations.

The contractor, utility or other agency shall exercise care to prevent damage to all existing traffic signal equipment. Should damage occur, The Electrical Facilities Section will make the necessary temporary repairs to immediately restore traffic signal operation.

Responsibility for permanent repair or replacement of damaged equipment shall be as follows:

At the contractor's, utilities', or other agency's expense, when the approximate location of the damaged equipment has been made known to them. They will also be charged by the Electrical Facilities Section for any temporary repair. Permanent repairs or replacements must be made by a qualified electrical contractor to the satisfaction of the Electrical Facilities Section.

At the Contracting Agency's expense when the approximate location of the damaged equipment has not been made known to the contractor, utility or other agency; provided they have complied with the notification requirements of this section and requested underground locations.

When the existing traffic signal equipment cannot be maintained as provided for in the Manual or in the Contracting Agency's Project or Permit Plans or specifications, the contractor, utility or other agency shall, at their expense, have a qualified electrical contractor relocate said equipment to a temporary location and/or provide additional temporary equipment, such that all functions and

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indications of the existing signal equipment, except vehicle detector sensing devices, are maintained and in full view of the intended traffic at all times. The location and type of all temporary signal equipment shall be approved by the Traffic Engineering Division. All signal equipment relocations and/or installations of temporary signal equipment shall be coordinated by the contractor, utility or other agency with the Electrical Facilities Section. 24 hours advance notice is required.

When temporary equipment or new equipment is installed to replace existing equipment, the temporary or new equipment shall be fully operational before the existing equipment is removed.

The contractor, utility or other agency shall restore all signal control equipment to the original locations or new locations, if so specified, as soon as possible after all work in the immediate area is completed.

(C) Pavement Markings:

Existing pavement markings that conflict with the vehicle path indicated by barricades and channelization and cause driver confusion shall be removed or obliterated by the contractor, utility or other agency as directed by the Traffic Engineering Division.

Generally, pavement marking removal or obliteration is only required on long term construction projects such as detours for bridge construction or similar fixed location projects. However, removal or obliteration of existing pavement markings may be required at any location when visual inspection and/or accident history shows driver confusion caused by existing pavement markings.

Proper pavement marking removal or obliteration leaves a minimum of pavement scars and completely removes or covers existing markings. slurry Seal (MAG Specification, Section 332) may be used to obliterate existing markings. When used, Slurry Seal shall be applied in strips at least 24 inches wide over existing markings. Markings that become exposed shall be recovered with Slurry Seal. Painting over existing markings with black paint or asphalt material is not satisfactory except in emergency conditions awaiting more permanent removal to follow immediately.

(D) Parking Meters:

The contractor, utility or other agency shall maintain all metered parking spaces open for parking at all possible times. When parking meters must be hooded or removed, the contractor, utility or other agency shall notify the traffic Engineering Division. 24 hour advance notice is required.

All parking meter post removals, relocations or installations shall be done by the contractor, utility or other agency as provided for in the plans, or as directed by the Parking Meter Supervisor. The Traffic Engineering Division will provide the parking meter posts.

401.7 HOLIDAY SEASON TRAFFIC:

During the holiday season from mid November through the 1st of January, it is imperative that construction and maintenance activities which interfere with traffic flow be reduced to the lowest possible level.

On all major streets, adjacent to, or serving as primary access to large regional shopping centers work that restricts traffic should be minimized. In addition, work within the entire Central Phoenix area should be curtailed (Maricopa Freeway to Bethany Home Road, 27th Avenue to 32nd Street).

Your careful planning of work schedules to avoid operations that restrict traffic flow can do much to benefit the traveling public, decrease traffic accidents and improve your own organization's public

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image. Obviously, emergency work will be exempt.

401.8 FAILURE TO PROVIDE ADEQUATE MAINTENANCE OF TRAFFIC:

If the contractor fails to provide adequate maintenance of traffic, the Contracting Agency will have the work accomplished by other sources. The cost of having this work accomplished by other sources will be computed in accordance with the City of Phoenix Supplement to Section 109. The total cost will be deducted from monies due or to become due to the contractor.

401.9 MEASUREMENT:

No measurement will be made for traffic control devices.

When a pay item is included in the Contract Documents, flagmen, off-duty law enforcement officers or pilot cars, with driver, will be measured by the hour for each individual, including vehicle and equipment, required to perform traffic control. Minimum payment shall be three hours on any separate call out.

401.10 PAYMENT:

Payment will be made at the contract bid price in the proposal for uniformed off-duty law enforcement officer. If the officer is utilized in excess of 8 hours in any calendar day or in excess of 40 hours in any calendar work week, payment shall be at the rate of 1-1/2 times the contract bid price for all hours worked in excess in either of the above time periods.

Off-duty police officers required by the permit or used but not required by the Contract shall be paid at their regular rate of pay established by their primary employer. This is a non-pay item.

SECTION 424

PARKWAY GRADING

Subsection 424.2 ROUGH GRADING: is modified to add:

(C) The parkway area shall be graded at a variable slope from 1 inch below the back of sidewalk to meet the existing surface at the right-of-way line in accordance with the typical section shown on the plans. Material displaced in the grading of parkways shall not be allowed to be placed on base and surfacing material already in place on the roadway. No measurement or direct payment will be made for this work.

Subsection 424.3 FINE GRADING: delete paragraph (B) in its entirety and substitute the following:

(B) Where existing parkways are planted in grass, flowers or shrubs and the level is somewhat above the top of the curb or sidewalk, the parkway shall be graded as per City of Phoenix Landscape Standards an Guideline Detail "Water Retention on Turf Installation" with the least possible damage to the planted area.

SECTION 430

LANDSCAPING AND PLANTING

Section 430 LANDSCAPING AND PLANTING: delete this section in its entirety and substitute the following:

430.1 DESCRIPTION:

This section shall govern the preparation and planting of landscape areas required in the Plans or Specifications. Materials shall be in accordance with Section 795.

Existing utilities and improvements not designated for removal shall be protected in place. Any damage will be repaired by the Contractor at no additional cost to the Contracting Agency.

Unless otherwise provided, wall, curbs, planter boxes, irrigation systems, and other improvements shall be constructed after rough grading has been completed and prior to finish grading.

430.2 GENERAL:

Furnish all labor, materials, equipment and incidental needs to install the landscape to the lines and details shown in the plans.

Applicable publications listed below form a part of this specification to the extent referenced:

Arizona Nursery Association Growers Committee Recommended Tree Specification (latest edition).

Subcontract landscaping and irrigation work to a single firm specializing in landscape and irrigation installation and maintenance.

Perform work in accordance with all applicable laws, codes and regulations required by authorities having jurisdiction over such work and provide for all inspections and permits required by Federal, State and local authorities in furnishing, transporting and installing materials as shown or for completing the work identified herein.

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430.2.1 Source Quality Control: Ship materials with Certificate of Inspection required by governing authorities.

Do not make substitutions. If specified material is not obtainable, submit proof of non-availability, together with proposal for use of equivalent material, similar in appearance, ultimate height, shape, habit of growth and general soil requirements. Substitution of a larger size of the same species may be made by the contractor with approval by the Engineer. However, any additional cost for these substitutions will be borne by the contractor.

Before delivery, Certificates of Compliance shall be submitted, certifying that materials meet the requirements specified. Certified copies of the reports for the following materials shall be submitted:

1. Transporting of Cacti and Landscape Plant Materials (from the Arizona Department of Agriculture).
2. Soil Amendments and Conditioners
3. Seed mix

Certification shall indicate: suppliers name, address, telephone number, date of purchase, name and technical description of item purchased, and quantity of each item purchased.

430.2.2 Samples and Tests: The Engineer reserves the right to take and analyze samples of materials and plants for conformity to specifications at any time. Contractor shall furnish samples upon request. Rejected materials and plants shall be immediately removed from the site at the contractor's expense. Cost of testing materials and plants not meeting specifications shall be paid by the contractor.

430.2.3 Herbicide/Pesticide Application: All herbicide/pesticide applicators shall be properly licensed for application of non-restricted use chemicals with and A-20 license or an A-21 license with Pesticide Endorsement from the State Registrar of Contractors and Structural Pest Control Commission. All Landscape Contractors are required to furnish a copy of their application from the Registrar of Contractors which shall list the names of those employees approved as applicators by the Registrar of Contractors. Application of non-restricted use pesticides shall not take place until the Engineer receives a copy of the application.

430.3 PLANT ESTABLISHMENT GUARANTEE AND MAINTENANCE:

Unless otherwise authorized, the contractor shall maintain all landscape areas on a continuous basis as they are completed during the course of work and until final Plant Establishment Guarantee and Maintenance Acceptance. The contractor shall provide adequate personnel to accomplish maintenance. Maintenance shall include keeping the landscape areas free of debris on a weekly basis, chemical control of weeds and fertilization as needed, cultivating the planting areas, and mowing of turf where lawns are part of the project.

Plants shall be kept in a healthy, growing condition by watering, pruning, spraying, weeding and any other necessary operation of maintenance. Plant saucers and beds shall be kept free of weeds, grass and other undesirable vegetation. Plants shall be inspected at least once per week and appropriate maintenance performed. Pruning and restaking is to include removal of any growth conflicting with vehicular or pedestrian movement.

Turf from seed shall be considered established when no bare ground exists within a reasonable area (approximately 2 feet in diameter) as determined by the Engineer. Disturbed areas or any areas greater than 2 feet in diameter which fail to show a good stand of grass shall be reworked and replanted until an acceptable stand is established.

The contractor shall maintain the irrigation system and make any necessary repairs regardless of cause to assure a complete and operational system as originally designed and constructed. Repairs shall be made within 48 hours of detection.

Chemical mixing and method of application for weed control shall be done in the presence of the Engineer. Chemical application for weed control shall not apply to areas that are hydroseeded when hydroseeding is part of the project.

The Contractor shall request an inspection by the Engineer whenever completion of the planting and related work has been accomplished. After this initial inspection, and subject to his approval of work, the Engineer will issue a written field notification to the Contractor setting the effective date for beginning of the Plant Establishment Guarantee and Maintenance Period. This Period shall last for 60 days or as specified, unless extended by the Engineer. If the landscape areas are improperly maintained; if appreciable plant replacement is required (for whatever reason); if corrective work is required for the operation of the irrigation system; if turf areas or hydroseeded areas need reseeded or are not established; or if other corrective work is necessary; the Plant Establishment Guarantee and Maintenance Period shall be extended and the Contractor shall continue to maintain the entire site until accepted at no increased cost to the Owner.

At the end of the Plant Establishment, Guarantee and Maintenance Period a final inspection will be performed. If, after inspection, the Engineer is of the opinion that all planting areas are weed free, plant materials and turf are in satisfactory growing condition, he will give the contractor written Notice of Acceptance of the landscape installation. Any plants which need to be replaced, regardless of the cause, shall be replaced prior to final acceptance.

There shall be no separate measurement and payment for the Plant Establishment and Maintenance Period. This cost shall be included in landscape bid items for: plant materials, irrigation, and inert materials, such as decomposed granite, river run and boulders. Ten percent of each landscape bid item amount in addition to retention will be held for distribution during the maintenance period. Equal monthly payments will be authorized, based on inspection and subject to extensions, where the contractor fails to comply with previously stated requirements. Payment may or may not be supplemental to final project payment.

430.4 JOB CONDITIONS:

Site Examination: The prospective contractors are encouraged to visit the job site prior to bidding on this project, and to satisfy their concerns as to the magnitude of the work involved.

Water costs are the contractors responsibility, until Final Acceptance or end of Plant Establishment, Guarantee, and Maintenance Period which ever is longer and the water meters are transferred to the City.

All planting areas shall be left free of construction debris and/or toxic material and subgraded to a level to permit landscape and irrigation construction. Trenches, foundation backfill or other filled excavations shall be compacted prior to the site being turned over to the landscape contractor. No soil preparation or planting shall begin before the site has been cleared and cleaned of debris. Commencement of work indicates acceptance of job site conditions.

Cooperate and coordinate with other contractors and trades working in and adjacent to landscape areas.

430.4.1 Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damages. Any damages will be repaired by the contractor at no additional costs to the

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Contracting Agency. Hand excavate, as required. Maintain stakes by others until removal is mutually agreed upon by parties concerned.

430.4.2 Obstructions: If rock or other obstructions are encountered in excavation for planting, notify the owners representative. Proceed with work only as directed.

430.4.3 Imported Topsoil: Shall be used for all landscape planting, unless the Engineer determines that the existing soil is acceptable. Imported topsoil shall be a minimum of 6 inches, unless otherwise specified.

430.5 DELIVERY, STORAGE AND HANDLING:

Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored on site.

Sod: Time delivery so that sod will be placed within 24 hours after stripping. Protect against drying and breaking of rolled strips.

Trees and Shrubs: Do not prune prior to delivery unless otherwise approved by owners representative. Do not bend or bind trees or shrubs in such a manner as to damage bark, break branches or destroy natural shape. Provide adequate protection for root systems. Protect root balls from drying wind and sun.

Deliver trees/shrubs just prior to planting. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage. Keep roots moist. Water as often as necessary.

Plant Inspection Prior to Delivery to the Project Site: Prior to delivery on any species to the project site, the Contractor shall make the necessary arrangements with the Engineer for an inspection of the plant material. Travel to non-local Nurseries, out of the metropolitan Phoenix area, when requested by the contractor, will be paid for by the contractor. Any plants found to be unsuitable in growth or condition, or plants which are not true to the specification shall be removed and replaced with acceptable plants.

The Contractor shall notify the Engineer at least 48 hours in advance for inspection of the plant material at the offsite location. Prior to notification of the Engineer, the Contractor shall physically verify that the plant material meet the size specified.

430.6 MATERIALS AND PRODUCTS:

Shall conform to the requirements of the City Supplement to MAG Specifications Section 795.

430.7 SEQUENCING AND SCHEDULING:

Proceed with and complete landscape work as rapidly as portions of the site become available, working with reasonable limitations for each kind of work required.

Plant or install lawns during normal planting seasons and as directed by the Engineer.

For Bermuda, seed from April to the end of September, provided the nighttime temperatures are averaging above 60 degrees.

For Perennial Rye Grass, when directed by the Engineer.

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Coordination with Lawns: Plant trees and shrubs after final grades are established and prior to planting lawns, unless otherwise acceptable. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from tree or shrub planting operations.

430.8 PREPARING THE SITE FOR LANDSCAPING:

All non-paved areas, as directed by the Engineer, shall be treated with a chemical control, such as Round-up or Equal, to control and kill weeds. After weed kill has been established to the satisfaction of the Engineer, these areas shall be cleared and grubbed.

Prior to landscape grading, areas designated shall be cleared and grubbed in accordance with Section 201, Clearing and Grubbing.

Remove or relocated trees, shrubs, grass, improvements or obstructions interfering with the installation of new construction. Removal includes digging out stumps and roots to a depth of 12 inches below existing or proposed grade which ever is lower.

Fill depressions caused by clearing and grubbing operations with satisfactory soil material. Place fill in 6-inch loose depths and compact to adjacent ground densities.

Soil Preparation: After clearing and grubbing has been completed, the existing surfaces shall be scarified and cultivated to a minimum depth of 8 inches, then brought to finish grade, incorporating soil conditioning operation, if specified. During this operation, debris, including all items over 1 inch in any dimension, shall be removed and disposed of offsite.

Finish grade for landscape areas shall not vary more than 1 inch from specified grade and cross section and shall be a smooth, uniform surface, free of abrupt grade changes or depressions. Finished soil grade, adjacent paving, curbs or headers shall be adjusted for surface materials. Unless otherwise specified, seeded lawn areas shall be 1-1/2 inches below adjacent pavements. Granite and sodded areas shall be 3 inches below adjacent pavement.

430.9 HEADER INSTALLATION:

Headers shall be installed at the location and grade as shown in the plans. the Engineer shall approve all form work prior to pouring of concrete. Wood headers when specified shall be staked at corners and at an interval not to exceed 5 feet and shall be driven to slightly below the top of the header. Wood headers shall be nailed to the stake with two nails, clinched 1/2 inch. Splice plates shall be used at butt joint; centered on the joint and nailed with four nails.

430.10 EXECUTION OF PLANTING:

Clearing and grading areas shall be free of construction debris and/or toxic materials and graded to permit landscape construction.

Landscape or planting areas shall not be cultivated when they are so wet as to cause excessive compaction or so dry as to cause excessive dust or the formation of large clods.

Layout individual trees and shrubs for owners representative to approve. Make adjustments as might be requested.

Protect existing vegetation from damage during planting operations.

Excavation: Plant pits shall be dug to produce vertical sides and flat, non-compacted bottoms. If pits

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are dug with an auger and sides of pits are glazed, scarify the glazed surface. The size of the pits shall be twice plant root ball or container size.

Drainage: Test drainage of plant pits by filling with water twice in succession. Plant pit retaining water for more than 24 hours shall be brought to the attention of the owners representative. Submit in writing a proposal for correction, for approval by the Engineer, before proceeding.

Backfill Mix: Prepared soil mix shall be delivered in unopened 5 pound bags as specified in COP Supplement to MAG Section 795.3 and individually mixed into the backfill as described below for each planting pit.

| <u>Plant Size</u> | <u>Amount of Fertilizer</u> |
|-------------------|------------------------------|
| 1 gallon | 1 pound (one tenth of a bag) |
| 5 gallon | 2.5 pounds (one third bag) |
| 15 gallon | 5 pounds (one bag) |
| 24" box | 10 pounds (two bags) |
| 36" box | 15 pounds (three bags) |

Submit certification of contents, quantity and source to the Engineer per Section 430.2.1 for approval.

Cacti Backfill Mix: Prepared soil mix shall consist of one part excavated soil, one part sand, one half pound of gypsum and four ounces of soil sulphur. Mix thoroughly.

Setting and Backfilling for Plants: Set plant material on layer of compacted backfill mixture, plumb and in center of pit or trench with top of ball at an elevation necessary to accomplish finished grade. Remove pallets or containers before backfilling. Do not handle container plants by foliage, branches or trunks. After removing plant from container, scarify side of root ball to eliminate root bound condition. Do not plant stock if root ball is cracked or broken. When set, place additional backfill mix around plant, brace and place fertilizer tablets, if specified on the drawings. Work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3 full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. water again after placing final layer of backfill. Fertilizer tablets when specified shall be added approximately 6 inches below grade at the following rate:

| | |
|-----------------------------------|--------------------------|
| For one-gallon container | 1 tablet |
| For five-gallon container | 2 tablets |
| For fifteen-gallon container | 4 tablets |
| For twenty-four inch box | 6 tablets |
| For thirty-six inch box or larger | 3 tablets per 1/2" trunk |

dia.

Provide plant saucer as detailed, or directed by the Engineer.

Stake All Trees Per Plans: Set stakes vertical and spaced to avoid penetrating balls or root masses. Place tree ties for maximum support with top tie above scaffold branches and second ties midway to the ground level. Avoid "rigid" restraint of tree and allow for some trunk movement. Stakes to be set into native soil.

430.11 PREPARATION FOR LAWN:

Excavate subgrade to accommodate depth of soil amendments. Till to a depth of not less than 4 inches. Remove high areas and fill depressions. Apply soil amendments as follows:

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Organic matter 1 inches deep (approx. 3 CY/1000 sf)
Sulfur 15 lbs/1000 sf
Iron Chelate 1 oz/1000 sf

Till soil and amendments to homogenous fine mixture, free of lumps clots, stones roots and other extraneous matter to a depth of 4 inches.

Fine grade lawn areas to a smooth, even surface with a loose uniformly fine texture. Roll, rake and drag lawn area, remove ridges. Apply fertilizer, reference City Supplement to MAG Section 795, at the rate recommended by the manufacturer (approx. 6lbs/1000 sf) for initial seeding operations.

Moisten prepared lawn areas if soil is dry.

430.11.1 Sod: Allow for sod thickness in areas to be sodded. Apply commercial fertilizer at rates specified by the manufacturer and thoroughly mix into upper 2 inches of soil. Delay applications of fertilizer if planting will not follow within a few days.

Lay sod within 24 hours of stripping, to form a solid mass with tightly fitted joints. Butt ends and sides of sod stripes, do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod. Tamp or roll lightly to ensure contact with subgrade.

430.11.2 Seeding New Lawns: Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

Sow seed using a spreader or seeding machine at a rate of 3-1/2 lbs. Bermuda/1000 sq. feet. Do not seed when wind velocity exceeds 5 MPH. Distribute seed evenly over the entire area by sowing equal quantities in 2 directions at right angles to each other.

If Bermuda seed has not been established during the normal planting season, April thru September, then the owner will determine when Perennial Rye grass will be planted. Apply Rye grass at the rate of 15 lbs/1000 sq. feet.

Rake lightly into top 1/8 inch of soil, roll and water with a fine spray.

430.11.3 Reconditioning Existing Lawns: Recondition existing lawn areas damaged by contractor's operations, including storage of materials and equipment and movement of vehicles. Also recondition existing lawn areas when minor regrading is required.

Prepare soil with amendments and fertilizer. Fill low spots. Rake surfaces, removing clumps and debris. Fine grade and seed, per Section 430.

430.11.4 Hydroseeding: A hydromulch seed mix shall be applied to the areas specified on the project plans. The seed mix list can be found in the Contract Documents and shall be certified by the supplier per section.

430.11.5 Certify quantity of seed for each type of seed in the mix and PLS (Pure Live Seed) rate per type. The following materials shall be combined to form a seed mulch mixture for application:

- (A) 300 lbs. of fertilizer (5-3-1), Gro Power 50% humic acid or equal.
- (B) 2000 lbs. of wood fiber mulch per acre, Silva or equal.
- (C) 40-80 lbs. per acre of active ingredient Plantage Mucilage. Higher rates for steeper slopes.

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- (D) 100 lbs. per acre Gro Safe or equal activated Charcoal.
- (E) The seed will be specified in the Contract Documents.
- (F) Sufficient water to form a homogenous mixture capable of being applied by commercial hydromulching equipment.

If lawn is to be established by hydroseeding cultivate and apply soil amendments per Section 430.11.

Till soil in native seed areas to create 6-8 inch deep furrows with tines set no further than 18 inches on center. Till in two perpendicular directions. Utilize a heavy drag to smooth furrows. Naturalize the area removing cliche and unnatural appearing rock and debris. The surface should emulate the natural desert.

Site preparation shall not disturb or destroy existing irrigation pipe, plants or other improvements. The Contractor shall be responsible to replace or repair any damage that occurs to the satisfaction of the Engineer.

The homogenous mixture shall be applied to the seeding area by means of hydroaulic-type equipment which shall provide continuous mixing and agitation action to the mix of water, fertilizer, seed, and wood fiber. The mixture shall be applied through a pressure spray distribution system providing a continuous non-fluctuating discharge and delivery of the mixture in the prescribed quantities on the specified areas.

The Contractor shall provide, on request of the Engineer, past performance data that indicates his equipment and procedure are suitable or shall demonstrate his performance. The Engineer has final approval as to equipment and procedure and his decision is final.

430.11.6 Temporary Irrigation: When noted or shown on the plans a temporary irrigation system with sprayheads will be installed to apply adequate irrigation to the hydroseeded areas. Temporary systems shall be left in place for the duration of the maintenance period or as specified in the special provisions.

Irrigation shall be provided so that moisture is constantly available to the seed mix until germination occurs. The hydromulch and seed mix shall not be allowed to dry out. Irrigation application shall not cause run-off or ponding. Irrigation frequency shall be applied to prevent wilting of the seedlings and to prevent over watering, chlorosis and rotting. The Contractor is responsible to closely inspect hydroseeded areas and monitor irrigation needs throughout the entire maintenance period.

The Contractor shall be responsible to re-apply hydromulch and seed until establishment is acceptable to the Engineer based on 80% of the Pure Live Seed germinating and 40% establishment.

430.12 DECOMPOSED GRANITE AND RIVER RUN AREAS:

The areas on which the granite mulch or river run is to be placed shall be graded according to the drawing, prior to the placement of any granite or river run. The ground shall be reasonably smooth and rocks larger than 1 inch in diameter, within the top 1 inch of soil, removed and disposed of off-site.

The Contractor shall stake out all areas to receive granite mulch or river run. These areas shall be treated with a pre-emergent control, such as Surflan, prior to and after placement of the cover material.

Decomposed Granite shall be evenly distributed on the designated areas to a depth as indicated on the plans and details. If depth is not indicated, the minimum depth shall be two inches.

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After placing and grading the granite mulch, the Contractor shall water settle the granite with a light spray to remove fine materials from the surface. Immediately after watering, the Contractor shall roll the granite mulch with an appropriate device to an extent satisfactory to the owner's representative.

River run rock used shall be as specified on the plans. The rock shall be evenly distributed on the designated areas to depth of 1 and 1/2 times the maximum gradation size.

430.13 CLEANUP AND PROTECTION:

During landscape work, keep pavements clean and work areas in an orderly condition. Sweep, scrub or hose affected areas as directed by the owners representative to maintain a clean and neat work area.

Protect landscape work and materials from damage due to landscape installation, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace contractor damaged work as directed by the owner's representative. Remove all debris, trash and excess materials generated by the landscape installation.

430.14 MEASUREMENT AND PAYMENT:

The lump sum or unit prices established on the proposal sheet shall be full compensation for furnishing all labor, materials, tools and equipment and for performing all work necessary to complete the landscaping operation to include planting of trees, shrubs and ground cover.

SECTION 431

PALM TREE TRANSPLANTING

431.1 DESCRIPTION:

This section shall govern the relocation (transplanting) and planting of palm trees required by the plans or specifications. The Contractor shall furnish all labor, materials and equipment required to complete the excavation, lifting, transporting and transplanting of palm trees.

431.2 GENERAL:

Unless otherwise provided by this section the work shall conform to City of Phoenix Supplement to MAG Specifications Section 430 and the following.

431.3 Palm Establishment Guarantee and Maintenance:

Palm establishment, guarantee and maintenance shall be per City of Phoenix Supplement to MAG Specifications, Section 430 with the following modifications or additions:

The palm establishment, guarantee and maintenance period shall be for 90 days, unless otherwise extended.

Guarantee palms against the vascular disease Penicillium (Gliocladium) vermoeseni, the fungus Fusarium oxysporum, and the root disease Phytophthora and similar vascular infections for a period of five (5) years.

Replace without additional cost to the City all dead palms and all palms not in a vigorous condition as determined by the Engineer. Replacement shall be when directed by the Engineer.

431.4 Job Conditions:

Prospective Contractors are encouraged to visit the job site prior to bidding on this project, and to satisfy their concerns as to the magnitude of the work involved.

It may be necessary to supplement the irrigation system and provide additional water to establish newly planted palm trees. Water from the existing irrigation system will be paid for by the City. The Contractor is responsible for delivery and payment of water from other sources.

Remove all debris, trash and excess materials found on site or generated by the Contractor's operations.

Prior to digging and transplanting of palm trees the Contractor shall notify the Engineer at least two (2) working days before starting any work.

431.5 Delivery, Storage and Handling:

Palms shall be free of dead or dying fronds with all fronds of a normal size and color.

The Landscape Architect will be available to review and tag palms at place of growth and will again review palms upon delivery for conformity to the specifications. Travel to non-local Nurseries, out of the metropolitan Phoenix area, when requested by the Contractor, will be paid for by the Contractor.

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In lieu of non-local nursery review, the Contractor may elect to provide photographs with a person adjacent to each palm for preliminary review. Such review shall not impair the right of review and rejection during progress of the work should the palms not meet the specifications. The selected palms shall not exceed the specified height by more than 1 foot. It is unacceptable to plant the rootball deeper than 1 foot above the soil line of the palm.

The Contractor must certify that the palms are free of disease prior to shipment.

After tagging of the palms, remove all thatch from older leaves and cut back all resulting stems to within 2 inches of the base of the trunk. The crown of the palm shall be reduced per standard nursery practice prior to shipping. Use soft rope (organic twine) to tie remaining fronds to protect crown bud. Do not permit fronds to become damaged by means of restraint.

Exercise extreme caution while pruning palms, to prevent spread of vascular diseases. Dip pruning tools in a sterilizing agent before beginning pruning and before moving from one palm to another. Do not use any chain type saws for pruning operations.

Lifting, Off-loading, and Transporting: A lattice type crane, a telescoping type crane or a specially designed tree crane is acceptable for lifting and off-loading palm trees. For transporting, the trailer used shall be long enough to avoid damage to the heart of the palm. Loading and unloading of palms must be accomplished with the aid of nylon or fabric sling/straps with a minimum width of 4 inches. Excessive scarring or trunk damage will not be permitted and will be cause for rejection of the palms at the project site.

If the palms are not planted the day they arrive at the project site, the crowns and root ball should be protected from the sun and from reflected heat from the ground. Avoid storing on an asphalt surface.

Covering material must allow air movement so that heat does not build up under the covering. Do not use plastic or rubberized tarpaulins. Trees may not be stored for more than 48 hours. Do not stack palms, but lay them in a single layer on a flat surface. Covered rootballs must be watered lightly every couple of hours.

431.6 Materials and Products:

All palms shall have been grown in accordance with good horticultural practices under climatic conditions similar to those for the project for at least two (2) years prior to shipment to the site.

All palms shall be well-grown, symmetrical, without curvature or leaning trunk from the perpendicular and so trained or favored in development and appearance as to be superior in form, compactness and symmetry of crown. All palms shall be within one foot above or below the height specified, measured from the bottom of the crown bud to finish grade after installation.

All palms shall be sound, healthy and vigorous, well foliated prior to pruning and showing no signs of disease. They shall be free of disease, insect pests, eggs or larvae. They shall also have well developed root systems. All palms shall be free from physical damage or adverse conditions which would prevent thriving growth.

Verify that all field dug palms contain an adequate root ball to guarantee transplantation. Do not wrap root ball in plastic. Do not install palms that have damaged root balls.

Accessories:

Clean washed river sand.

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FronD Tie: Minimum 1/2 inch diameter soft sisal rope capable of maintaining frond in tied condition for 1 year.

Fungicides: Soil Drench: "Subdue" by CIBA-GIEGY

431.7 Sequencing and Scheduling:

Coordinate delivery of palms with planting operations to avoid on site storage longer than 48 hours. Planting delays may result in rejection of the palm.

431.8 Preparing the Site for Landscaping:

Remove palms designated for replacement. Removal includes digging out stumps and roots to make room for replacement material. Remove all debris, trash and excess materials generated, and dispose of this material off-site.

Protect existing plant material, walls, pavements and other site amenities from damage.

431.9 Palm tree salvaging:

Prior to excavation, the palm tree shall be thoroughly watered.

Excavation: A trenching machine, a backhoe with a narrow bucket or a properly sized tree spade is acceptable as the excavation equipment. The exact equipment used must be approved by the Engineer.

Reduce the crown of palm trees per standard nursery practice. Use soft sisal rope to tie remaining fronds to protect crown bud.

The size of the root ball taken shall be a minimum of 18" to 24" deep and have a 2" to 3" wider radius than the base of the palm, unless otherwise directed by the Engineer. Certify that all field dug palms contain adequate root ball to guarantee successful transplanting.

Carefully lift and transport palm tree to the new location so as not to cause damage to the tree or site.

431.10 Execution of Planting:

Layout palms at locations shown on the plans. Use 3 foot lath, color coded for each palm. The Engineer will check location of palms in the field to exact position before planting begins.

Where palms are to be preplanted to permit site improvements to be installed around them, be responsible for the accurate layout of those palms, measured to their centerlines. Be responsible for the protection of those palms while work is taking place. Provide regular irrigation as necessary until final acceptance.

The palm tree excavation shall be a minimum of 1.5 times (x) larger than the root ball depth and 1 foot larger on all sides. It is acceptable for the final site grade around the palm to be 6 to 12 inches higher than the original soil line of the root ball. The depth of the pit shall be approved by the Engineer prior to planting the tree.

Water test each tree pit for drainage by filling the holes twice in succession with water. If when filled with water the second time the pit fails to drain within 24 hours, then additional excavation is necessary to break through the impermeable layer or to provide a thick under layer of sand below the

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root ball. The cost for over excavation and for the installation of a drainage chimney will be considered should the tree pit not drain.

Clean moist washed river sand should be added to the bottom of the hole and tamped or water jetted, prior to insertion of the tree.

Install drainage and viewing pipe(s) in each tree pit to assure wetting of the whole root ball and to enable monitoring and viewing of the tree pit chamber. The vents shall be 4" diameter perforated PVC, with sufficient length to extend to the bottom of the tree pit. Do not backfill drainage or viewing pipes.

Backfill should be clean washed river or concrete sand amended with 25% native soil. In areas where soils are heavy in cliche, 100% sand shall be used. After placement of the palm, moistened sand shall be thoroughly tamped as backfill is being added to assure stability of the tree.

A 6" deep swale shall be made around each palm tree to provide water holding capability.

Mulch: Apply a 2" layer of decomposed granite in all palm tree watering basins.

After planting, the crown buds of all the palms shall be within 1 foot of the designated palm height above finish grade.

After planting, drench the soil with the fungicide, "Subdue" per manufacturers recommendations by flooding the planting basin. Reapply as often as label permits throughout the maintenance period.

Irrigation: It is essential that irrigation be deep enough to assure wetting of the whole root ball. The Contractor shall maintain the irrigation system to the existing trees and supplement additional water to newly planted trees as necessary for establishment. Use a tensiometer weekly during the maintenance period to verify correct watering at the surface and at the bottom of the rootball, report moisture levels to the Engineer.

431.11 Measure and Payment:

Measurement will be made on the number of trees that survive the planting operations. Unless otherwise specified by the Engineer, the Contractor shall be responsible for the cost of replacement and planting of any palm tree, in kind, that does not survive. Palms that do not survive become the property of the Contractor for disposal. Payment will be made at the unit bid price for each surviving tree which will be full compensation for all labor, materials, tools, equipment required for excavating, transporting, transplanting, and watering of the tree(s).

SECTION 440

SPRINKLER IRRIGATION SYSTEM INSTALLATION

440.1 GENERAL:

The Contractor shall furnish all labor, materials, tools, equipment, and services necessary for the excavation and completion of the irrigation system work as indicated on the drawings and as described in these specifications and the General Conditions.

Due to the scale of the drawings, it is not possible to indicate all offsets, fittings and sleeves which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan his work accordingly, furnishing such offsets, fittings and sleeves as

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may be required to meet such conditions. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications.

The work of this Section generally includes provisions of an underground sprinkler system including the following:

Trenching, stockpiling excavation material, and refilling trenches.

Complete system including but not limited to piping, backflow preventer assemblies, valves, fittings, spray heads, bubblers, emitters, controllers and wiring, and final adjustments to insure complete coverage.

Replacement of unsatisfactory materials.

Clean-up, inspection, and approval.

Tests. The system shall efficiently and uniformly irrigate all areas and perform, as required, by the plans and specifications.

No irrigation work is to be performed until all areas are finished to proper grade and until soil preparation is completed, and has been approved by the Engineer.

440.1.1 Allowances for Work by the Water Services Department: An allowance is included as a bid item for work to be performed by the Water Services Department in providing a water tap and meter. The Contractor will contact the Water Services Department and make application to have the work performed at least four weeks before installation is required. He shall submit the paid invoice to the Engineering Department and shall be reimbursed the exact amount paid. The Contractor shall pay for all water used until the project is accepted, or until completion of the Landscape Maintenance Period, whichever is later, and the water meter accounts are transferred. The Contractor will remain responsible for water use and payment thereof, until transfer.

440.1.2 Allowance for Work by the Power Company: An allowance is included as a bid item for work to be performed by the utility company. The Contractor will be responsible for all other electrical installations. In addition, the Contractor will obtain an account with the utility company and will pay for all electrical power used until the project is accepted, or until completion of the Landscape Maintenance Period, whichever is later, and the utility accounts are transferred. The Contractor will submit electrical meter account numbers to the Engineer and request transfer of the meter to the City, or the Contractor will remain responsible for electrical use and payment thereof, until transfer.

440.2 REFERENCES:

Conform to the requirements of reference information listed below except where more stringent requirements are shown or specified in the Contract Documents.

American Society of Testing Materials (ASTM) - Specifications and Test Methods specifically referenced in this Section, and Underwriter Laboratories (UL) - UL wires and cables.

440.3 QUALITY ASSURANCES:

Work involving plumbing for installation of copper piping, backflow preventer(s), and related work shall be executed by licensed and bonded plumber(s). Secure a permit at least 48 hours prior to start of installation.

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Tolerances: Specified depths of mains and laterals and pitch of pipes are minimums. Settlement of trenches is cause for removal of finish grade treatment, refilling, recompaction, and repair of finish grade treatment.

Coordinate work with other trades.

For period of one year from Final Acceptance, guarantee/warranty irrigation materials, equipment, and workmanship against defects. The Contractor shall replace any pavement damage resulting from the installation of the irrigation system and repair damage to grading, soil preparation, seeding, sodding, or planting at no additional costs to the owner. Make repairs within 3 days following notification by the Engineer.

440.4 SUBMITTALS:

440.4.1 Shop Drawings and Product Information: Prepare and make submittals in accordance with conditions of the Contract, and as follows: A minimum of ten days prior to beginning work on the irrigation system the Contractor shall submit six (6) copies of manufacturers literature including name and numbers covering materials listed below and any other items requested by the Engineer. Do not order materials until products are approved by the Engineer.

Items to be submitted:

| | |
|-----------------------|----------------------------|
| Pipe | Automatic Controls |
| Fittings and Solvents | Wire and Connectors |
| Gate Valves | Air Relief Valves |
| Valve Boxes | Pressure Regulating Valves |
| Sprinklers | Quick Coupling Valves |
| Automatic Valves | Soil Moisture Sensor |
| Flow Sensor | |

All items shall be those specified and approved by the Engineer. Substitutions will not be allowed without approval.

440.4.2 Record Drawings: The Contractor shall maintain an accurate set of as-built plans on site. At the end of each day work accomplished shall be updated on the as-built plans. The Contractor shall dimension from two permanent points of reference, building corners, sidewalk, or road intersections, etc., the location of the following:

- a. Connection to existing water lines
- b. Connection to existing electrical power
- c. Gate valves
- d. Routing of sprinkler pressure lines (dimension at a minimum of 100 ft. along routing)
- e. Sprinkler control valves
- f. Routing of control wiring
- g. Quick-coupling valves
- h. Other related equipment as directed by the Engineer

The above mentioned equipment and stock shall be turned over to the Owner at the conclusion of the project. Before final inspection evidence that the Owner has received this material must be shown to the Engineer.

The Contractor shall also indicate any non-pressure pipe routing changes on the as-built drawings.

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Before the final inspection, the Contractor shall deliver the Engineer one copy of the as-built plans to review. Delivery of this set of plans does not relieve the Contractor of the responsibility of furnishing required information that may be requested by the Engineer. The Contractor shall make corrections noted and submit final as-built plans to the Engineer for approval and acceptance. The Engineer will not certify payment requests or make final payment if as-built plans are not current or complete.

440.4.3 Controller Charts: As-built drawings shall be approved by the Engineer before controller charts are prepared. The chart shall show the area controlled by the automatic controller and shall be the maximum size which will fit inside the controller door and still be legible. Identify the area of coverage of each remote control valve, using a distinctively different color, drawing over the entire area of coverage. Following review of the charts by the Engineer, they shall be thermetically sealed between two layers of 20 mm thick plastic sheets. These charts shall be completed and approved prior to final inspection of the irrigation system.

440.4.4 Operation and Maintenance Manuals: Submit 4 operation and maintenance manuals to the Engineer for review prior to final acceptance. The manuals should include the complete technical description of materials and products used, guarantee statement, complete operating and maintenance instructions on all major equipment. The Contractor shall provide a demonstration to maintenance personnel, with owners representative present, of how to adjust and maintain all sprinkler head types, controller functions, and recommended controller programs, as established by the Contractor. The Contractor shall also review recommended watering rates for new plant materials.

440.4.5 Equipment to be Furnished: All materials to be new and bear the appropriate National Association seal of approval for example, NSF, UL, etc. Similar units shall be procured from the same manufacturer and internal parts shall be common and interchangeable. Parts listing and source replacement will be furnished to the Engineer.

Equipment to be furnished:

- a. Two sets of special tools required for removing, disassembling and adjusting each type of sprinkler and valve supplied to the project.
- b. Two five foot valve keys for operation of gate valves.
- c. Four quick-coupler keys and matching hose swivels for each type of quick-coupling valve installed.
- d. Three valve box keys or wrenches.

Extra stock to be furnished:

- a. 2 sprinkler heads of each type.
- b. 2 nozzles for each type used.
- c. 2 bubblers of each type used.

440.5 PERMITS:

All permits for installation or construction of the work included under this section, which are required by legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. He shall also arrange for and pay all costs in connection with any inspections and examinations required by these authorities.

440.6 EXECUTION:

Examine areas and conditions under which work of this section is to be performed. Do not proceed

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with work until unsatisfactory conditions have been corrected.

440.6.1 Staking: Mark with powdered lime, routing of pressure supply line and stake locations of various components, sprinkler heads and bubblers. Unless otherwise specified, the automatic sprinkler system layout shall be considered schematic. Sprinkler head spacing shall not exceed the maximum shown on the drawings or recommendations by the Manufacturer. Preliminary adjustments to conform to actual site conditions shall be accomplished during staking. Should changes be required the contractor shall obtain approval of the Engineer prior to actual work being performed. Utility connections, both water and electrical, shall be as shown on the plans or as designated by the utility concerned.

440.6.2 Trench Excavation: Trenches and other excavations shall be sized to accommodate the irrigation system components, conduit, and other required facilities. Additional space shall be provided to assure proper installation and access for inspection. Unless otherwise specified, the minimum depth of cover over pipelines and conduits shall be as follows:

- a. Electrical conduit - 18 inches
- b. Waterlines continuously pressurized - 18 inches
- c. Lateral sprinkler lines - 12 inches
- d. Plastic lines under pavement - 24 inches

The bottom of the trenches shall be true to grade and free of protruding stones, roots or other matter which would prevent proper bedding of pipe or other facilities. Where ledge rock, hard pan, or boulders are encountered, the trench bottom shall be undercut and filled with sand or fine grained material approved by the Engineer.

Clearances:

- a. Piping 3" and larger, minimum trench width of 12 inches.
- b. Piping smaller than 3", minimum trench width of 7 inches.
- c. Provide not less than 6" of clearance between each line, and not less than 12" of clearance between lines of other trades, to permit services replacement without disturbing the other line.

Grading and Stockpiling of trenched materials shall comply with Section 601.2.8.

440.6.3 Sleeving: Piping located under asphalt, concrete, or other pavements shall be sleeved, size and schedule as noted on the plans. If not noted, sleeves shall be Schedule 40, sized to easily accommodate piping. Use separate sleeve for wiring.

Boring will be permitted only where pipe must pass under obstructions which cannot be removed or when approved by the Engineer. When any cutting or removal of asphalt and/or concrete work is necessary, it shall be saw cut in accordance with Section 601. Permission to cut asphalt or concrete shall be obtained from the Engineer. When piping on the drawings is shown in paved area, but running parallel and adjacent to planted areas, the intent of the drawings is to install the piping in the planted area.

440.6.4 Piping: Provide pipe, schedule and size as shown on the drawings and per Section 757.

PVC Pipe: Snake pipe in trench as much as possible to allow for expansion and contraction. Provide a firm, uniform bearing for the entire length of each pipe line to prevent uneven settlement. Installation of pipe shall be installed in accordance with ASAE Standard: ASAE 376. pipe shall be clean prior to

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installation and shall be maintained in that condition during installation. When pipe laying is not in progress, the open ends of the pipe shall be closed by approved means.

Sand bedding or fine grained material shall be provided where ledge rock, hard pan, or boulders are encountered. Compact bedding material to provide a minimum depth of bed between pipe and rock of 4 inches.

Solvent welded joints shall be made in accordance with ASTM D-2855, and the type of solvent and primer recommended by the pipe manufacturer shall be used. primer and solvent shall be applied to the pipe ends in such a manner that no material is deposited on the interior surface or forced into the interior of the pipe during insertion. Excess solvent on the exterior of the joint shall be wiped clean immediately after assembly. The pipeline will not be exposed to water for at least 12 hours after the last solvent welded joint has been made.

Schedule 80 pipe shall be used for threaded joints. Field threading shall be accomplished in the same manner as specified for steel pipe, except that a plug will be installed in the bore of the pipe prior to threading to prevent distortion. Solvent will not be used on threaded pipe. Threaded joints shall be hand tightened with final tightening as necessary to prevent leaks with a strap wrench.

The pipe shall be protected from damage during assembly. All vises shall have padded jaws and only strap wrenches will be used. Any plastic pipe which has been nicked, scarred, or otherwise damaged shall be removed and replaced. Care shall be exercised so that stress on a previously made joint is avoided.

When PVC to metal pipe connectors are required, these connections shall be accomplished first. A plastic adapter with external pipe threads should be used, screwing it into the metal internal pipe threads. Use a non-hardening pipe dope, such as Permatex #2, or equal, on all plastic to metal threaded joints. The joint shall be hand-tightened. Utilize a light wrench, as necessary, to prevent leaks.

When wrapped pipe is specified, joints and connectors shall not be wrapped until completion of the pressure test.

440.6.5 Wiring: All service wiring shall be installed in rigid conduit from the service point to the controller at the minimum depth specified. A separate disconnect switch or combination meter socket, as required, shall be installed between the source of power and the controller. The minimum service wire shall be No. 12 AWG copper 600 volt type, TWH or larger, as required by the contract documents or controller manufacturer. Wire splices shall be located only in specified pull boxes and shall be made with a packaged kit approved for underground use. Pull boxes shall be plastic with locking covers set to proper elevation on a 6 inch layer of crushed rock or washed gravel.

Low Voltage Control Wiring issuing from the controller shall be direct burial, type UF, NO. 12 AWG copper, unless otherwise required and installed in main or lateral waterline trenches wherever practical. Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted.

Install two (2) control wires along the entire length of the mainline. The wiring shall be bundled and secured to the lower quadrant of the irrigation pipeline at 10 foot intervals with plastic electrical tape. Sufficient slack shall be left in the wiring to provide for expansion and contraction. When control wiring cannot be installed in the pipe trench it shall be installed a minimum of 18 inches below finish grade. Attach wire markers to the ends of the control wires and label valve stations at controller locations.

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All pilot or "hot" wires are to be of a different color and all common wires are to be of another color. If multiple controllers are being utilized, and wire paths of different controllers cross, both common and control wires, from each controller, shall be of different color.

Splices in control wire shall be made in accordance with the requirements for Service Wire. Sufficient slack shall be left at each splice and point of connection in pull boxes so that in case of repair the valve bonnet or splice may be brought to the surface without disconnecting the wire. No splices shall be permitted under pavements.

All wiring shall be tested for continuity, open circuits, and unintentional grounds prior to connecting the equipment. All controllers shall be grounded independent of any other controller as recommended by the controller manufacturer and all valves shall be connected to the ground wire of their controller. Each valve shall be connected by a separate hot wire to its controller.

Two spare #12 AGW wires shall be installed from the controller pedestal of terminal along entirety of pressure lines to last electric control valve on each and every leg of mainline. Color of spare wire to be green in all controllers. Loop spare wire inside all valve boxes.

440.6.6 Valves, Valve Boxes, and Special Equipment:

Backflow Preventer Assembly: The Backflow Prevention Assembly shall be installed per the details shown on the drawings and associated governing code requirements. Provide pipe supports and the accessories to properly secure the assembly. The irrigation system shall not be operated until the assembly has been tested and certified to meet the requirements of the Water Services Department - Water Quality Section.

After the backflow assemblies have been properly installed by the Contractor and approved by Development Services Department - Building Safety Branch, the Contractor shall pay for testing and be responsible for having the assembl(ies) tested by a certified backflow prevention assembly tester, approved by the City. The tester shall prepare test report(s), showing the condition of the assemblies and confirming that the assemblies are properly functioning.

It is the Contractor's responsibility to submit the forms to the Engineer and to Water Quality Division, Backflow Prevention Unit. Final acceptance will not be given until the reports are approved by the Engineer.

Valves, Pressure Regulators, and Related Accessories shall be installed as shown on the plans, or as specified. They shall be installed in a normal upright position unless otherwise recommended by the manufacturer, and shall be readily accessible for operation, maintenance and replacement. The equipment shall be set at a sufficient depth to provide clearance between the valve box cover and the valve handle, cap, or key for operation of the system.

Gate Valves and Isolation Valves shall be installed below ground and shall be housed in a concrete or plastic pipe, with bolt down lacking cover, that will permit access for servicing. The pipe shall be centered on the valve stem. Isolation valves shall not be located within range of the sprinklers the control without approval of the Engineer.

Drain Valves shall be installed at all low points in pressure supply lines as detailed. Provide drainage sump for each drain valve based on the table below:

CUBIC FT. OF GRAVEL PER DRAIN VALVE
DISTANCE OF PIPING TO BE DRAINED

| PIPE SIZE | 0-250 LF | 251-500 LF | 501-750 LF | 751-1000 LF |
|-----------|----------|------------|------------|-------------|
| 1" | .75 | 1.50 | .25 | 3.00 |
| 1-1/4" | .75 | 1.50 | 2.25 | 3.00 |
| 1-1/2" | 1.50 | 3.00 | 4.50 | 6.00 |
| 2" | 2.50 | 5.00 | 7.50 | 10.00 |
| 2-1/2" | 4.00 | 8.00 | 12.00 | 16.00 |
| 3" | 6.00 | 12.00 | 18.00 | 24.00 |
| 4" | 11.00 | 22.00 | 33.00 | 44.00 |
| 6" | 25.00 | 50.00 | 50.00 | 50.00 |

Quick Coupling and Hose Bibcocks shall be installed as shown on the plans, or as specified. Their location shall be a minimum of 3 ft. from curbs, pavements and walks, unless approved otherwise by the Engineer. Quick-couplers shall be installed in a swing joint riser assembly and set at a sufficient depth below ground to provide clearance for the valve box cover in the closed position. Hose bibcocks shall be set 12 in. above finish grade and installed on a galvanized riser or as detailed.

Valve Boxes: Install one valve box for each type of valve installed as shown on the plans, or specified unless directed otherwise by the Engineer. Install gravel sump after compaction of all trenches. Place final portion of gravel inside valve box after valve box is backfilled and compacted.

Set valve boxes to the finish grade specified, or as follows:

- a. In non-irrigated areas set box 1/2 inch above finish grade.
- b. In areas irrigated by food bubblers set boxes adjacent to curbs, sidewalks, or pavements at or just above water level.
- c. In irrigated turf areas set box 1/2 inch above finish grade.

The valve boxes shall be branded with the controller letter and station number of the contained valve. The letter and number size shall be no smaller than 1 inch and no greater in size than 1-1/2 inches. Depth of branding shall not be more than 1/8 inch into the valve box lid. All labeling shall be neat and legible.

440.6.7 Sprinkler Heads: Install sprinkler heads where indicated on the drawings, staked and approved. Set to finish grade as detailed; spacing of the heads shall not exceed maximum recommended by the manufacturer without approval of the Engineer. They shall be installed with at least 4 inches clearance from vertical elements projecting above grade such as walls, planter boxes, curbs, and fences. All sprinkler heads shall be perpendicular to finish grade unless otherwise designated on the plans or details.

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440.6.8 Bubblers: Install bubblers where indicated on the drawings, staked and approved. Bubblers heads shall be installed as detailed, to the elevations shown on the plans, or as follows if not shown:

- a. Plant beds - 1" above finish grade.
- b. Turf areas - provide 4" diameter times 12" long PVC class 200 pipe filled with pea gravel. Install bubbler 3" below top of pipe. Set top of pipe flush with finish grade of turf.

440.6.9 Riser Assemblies: Bubbler outlet assemblies shall consist of 1/2" S.D.R. 13.5 PVC lateral extension with a horizontal connection to the lateral line, schedule 80 fittings, and 1/2" flex hose with schedule 80 male adapters.

Sprinkler heads, and Quick Couplers shall have double swing joint assemblies, as shown on the plans. The assembly shall consist of: horizontal nipple threaded into a single outlet ell or tee installed schedule 80 fittings, minimum 12" long threaded nipple. The Contractor may submit a pre-manufactured swing joint assembly, such as that manufactured by Lasco Inc., or approved equal.

440.6.10 Controller System: The Controller and accessories shall be installed at the locations designated and per the details shown on the contract documents. Submit shop drawing showing wall elevation with equipment, and sleeving for approval by the Engineer.

All distribution wire shall be as specified in section 440.6.5. Provide slack and tape controller wire in neat bundles. The foundation for the controller, unless wall mounted, shall be Class B concrete of the size shown on the plan or as recommended by the manufacturer. Stub out all conduit for control wiring 2 feet beyond concrete slab or walls and provide bushings for all conduit. All RGS conduit in contact with earth shall be taped with scotchwrap, or equal, #50 minimum thickness 40 mils.

440.6.11 Bedding, Backfilling and Compaction: Pipe shall be bedded in at least 4 inches of finely graded native soil or sand to provide a firm, uniform bearing. After laying, the pipe shall be surrounded with additional finely grained native soil or sand to at least 4 inches over the top of the pipe.

Bedding sand shall be required when site conditions dictate and clean backfill meeting the specifications is not available. It shall also be required under asphalt and concrete pavements such as roadways, parking surfaces and plazas.

Thrust blocking shall be formed against a solid trench wall that has been hand excavated. The size and type of the thrust blocking shall be as per the drawing. Control wire shall not be concealed within the thrust blocking.

Trench backfill, sufficient to anchor the pipes, may be deposited before pipeline pressure testing, except that joints shall remain exposed until satisfactory completion of testing.

Trenches and excavations shall be backfilled with clean material from excavations. Remove organic material as well as rocks larger than 1 inch in diameter. Place acceptable material in lifts, the height of which shall not exceed that which can be effectively compacted, depending on the type of equipment and methods used. Trenches and excavations shall be backfilled so that the specified thickness of topsoil is restored to the upper part of the trench. Compaction shall be in accordance with Section 301. Water settling of the trenches will not be permitted unless approved by the Engineer.

440.6.12 Cleaning: Maintain continuous cleaning operations throughout the duration of the work. Dispose of, off-site at no additional cost to the Owner, all trash or debris generated by installation of the irrigation system.

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440.7 FLUSHING AND TESTING:

After completion and prior to the installation of any terminal fittings, the entire pipeline system shall be thoroughly flushed to remove all foreign material. After flushing, the following tests shall be conducted in the sequence listed below. All equipment, material, and labor necessary to perform the tests shall be furnished by the Contractor and all tests shall be conducted in the presence of the Engineer.

Pipeline Pressure Test: A water test shall be performed on all pressure mains. Pressure mains shall be tested with all control valves installed and in the closed position. The constant test pressure and duration of the test shall be for 6 hours at 125 psi. Any leaks which occur during the test period will be repaired immediately following the test. The pressure mains will then be retested until accepted by the Engineer.

Sprinkler Coverage Test: The coverage test shall be performed after sprinkler heads have been installed and shall demonstrate that each section or zone in the irrigation system is balanced to provide uniform and adequate coverage of the areas serviced. The Contractor shall correct any deficiencies in the system.

Operational Tests: The Contractor shall adjust or replace any type of irrigation heads or equipment to ensure proper distribution of water throughout the course of the Plant Establishment Guarantee and Maintenance Period.

440.8 PRELIMINARY, SUBSTANTIAL AND FINAL WALK-THROUGH INSPECTIONS:

Arrange for a preliminary walk-through with the Engineer, when the entire system is operational. Operate each zone in its entirety, additionally, open all valve boxes and expose items covered, if directed. Generate a list of items to be corrected and make adjustments, "fine tuning" the entire system by regulating valves, adjusting patterns and break-up devices, and setting pressure regulators at proper and similar pressure to provide optimum and efficient coverage. Flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walks, roadways, and buildings as much as possible. Adjustments may include, at no additional cost to the City, changes in nozzle sizes, and degree of arcs.

Arrange for a Substantial Completion walk-through when all items generated from the preliminary walk-through have been corrected. Items deemed not acceptable by the Engineer shall be reworked to complete satisfaction. The maintenance period will not begin unless authorized by the Engineer. All accessories, charts, record drawings and equipment, as required, will be provided before scheduling the Final walk-through.

Following the Landscape Maintenance Period a Final walk-through inspection will be scheduled to review the system and make adjustments to the watering schedules.

440.9 MEASUREMENT AND PAYMENTS:

Measurement and payment shall be in accordance with Section 109. The lump sum or unit prices established in the proposal sheets shall be full compensation for furnishing all labor, materials, tools and equipment, and performing all work necessary for completion of the irrigation system described or specified in the contract documents.

When unit bid items are included in the proposal sheets, the unit prices quoted shall include the following items of work and material.

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(A) Water Service Tap and Meter: The work under this item will be performed by the City of Phoenix Water Department and consists of furnishing and installing a curb stop, concrete meter box with cover, tap to main and pipeline to the curb stop at the locations and in accordance with the details shown on the plans. The curb stop and water meter box will be paid for under this item. Payment will be made at the current price for this service as charged by the City of Phoenix. With some projects an allowance may be shown in the bid proposal for this item, reference Section

440.1.1.

(B) Backflow Prevention Unit: The unit price for this item shall include the backflow prevention unit, risers and concrete thrust blocks, complete and in place.

(C) Electrical Remote Control Valve and Assembly: The unit price for this item shall include the valve, the valve box with stainless steel hex bolt secured cover, pea gravel and specified pipe to the meter or backflow prevention unit.

(D) Sprinkler Controller: The unit price for this item shall include:

Cost of sprinkler controller (automatic).

All wiring for a complete underground control system, including trenching, wire, conduit, boring or jacking.

Steel security cabinet with concrete base, grounding system, metal hasp and padlocks, and all wiring within the cabinet unless controller is placed on a building or within a walled enclosure.

The junction box and any work and materials required from the stubout provided by the power company in order to complete the installation of the controller.

(E) Irrigation Pipe: The contract price for this item shall include the pipe and fittings, trenching, backfilling and any necessary boring or jacking to install the pipe. Sleeves shall be Schedule 40.

(F) Pull Box: The contract price for this item shall include the pull box (plastic irrigation valve box with stainless steel hex bolt secured cover.)

(G) Sprinkler Head: The contract price for this item shall include the head and all fittings, nipples, and risers from lateral to the head.

PART 500
STRUCTURES

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SECTION 520

STEEL AND ALUMINUM HANDRAILS

Subsection 520.2 FABRICATION: Add the following sentence to the fourth paragraph:

Aluminum railings or members shall be Aluminum Alloy 6063-T6 as per the Aluminum Alloy Association Standards for Handrails.

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PART 600
UNDERGROUND WORK FOR UTILITIES
AND
UNDERGROUND FACILITIES

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SECTION 601

TRENCH EXCAVATING, BACKFILLING AND COMPACTION

Section 601 TRENCH EXCAVATING, BACKFILLING AND COMPACTION is deleted in its entirety and the following section substituted:

601.1 DESCRIPTION:

The work covered by this specification consists of furnishing all plant, labor, equipment, appliances and materials, and performing all operations in connection with the excavation and backfilling of trenches in accordance with the plans and special provisions.

Excavation for appurtenant structures, such as manholes, inlets, transition structures, junctions, structures, vaults, valve boxes, catch basins, etc., shall be deemed to be in the category of trench excavation.

601.2 EXCAVATION:

601.2.1 General: The contractor shall perform all excavation of every description and of whatever substances encountered, to the depths indicated on the plans, and including excavation ordered by the Engineer of compacted backfill for the purpose of making density tests. All excavation shall be open cut unless otherwise shown on the plans or approved by the Engineer.

No extra monetary compensation or additional time will be authorized for claims that soil conditions differ from those anticipated or those indicated by soil logs and/or reports. It is the contractor's responsibility to make his own determination as to actual existing conditions.

601.2.2 Trench Widths: Trenches for other than cast-in-place concrete pipe shall conform to the following dimensions, unless otherwise specified in the special provisions, indicated on the plans, and/or approved by the Engineer.

Table 601-1

| Size of Pipe (I.D.) | Max. Width at Top of Pipe Greater Than O.D. of Barrel | Min. Width at Springline Each Side of Pipe |
|----------------------|---|--|
| Less than 18" | 16" | 6" |
| 18" to 24" inclusive | 19" | 7-1/2" |
| 27" to 39" inclusive | 22" | 12" |
| 42" to 60" inclusive | 1/2 O.D. | 12" |
| Over 60" | 36" | 12" |

The width of the trench shall not be greater than the maximum indicated above, at and below the level of the top of the pipe. If the maximum trench width as specified above is exceeded at the top of the pipe, the contractor shall provide, at no additional cost to the Contracting Agency, the necessary additional load bearing capacity by means of bedding, having a higher bedding factor than that specified, higher strength pipe, a concrete cradle, cap or encasement, or by other means approved in writing by the Engineer.

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The width of the trench above the top of the pipe may be made as wide as necessary for shoring, sheeting or other wall support measures necessary for a safe and proper installation. If the contractor elects to slope the trench walls in lieu of shoring, sheeting or other wall support measures, he shall be responsible for any and all problems encountered and costs incurred as a result of the increased trench width.

No increases in contract time will be allowed as a result of sloping trench walls. The MAG Trench Pay Width (Section 336) will be used for computing payment.

601.2.3 Trench Grade: Alignment and elevation stakes shall be furnished by the contractor at set intervals and agreed upon offsets. On water main projects, elevation stakes will be furnished only when deemed necessary by the Engineer. In all cases where elevation stakes are furnished, the Engineer will also furnish the contractor with cut sheets.

For all pipe 8 inches or greater in diameter, the contractor shall excavate for and provide an initial granular bedding at least four inches thick or 1/12 the O.D. of the pipe whichever is greater. This bedding material shall be placed at a uniform density with minimum compaction and fine graded as specified below.

Bell or coupling holes shall be dug after the trench bottom has been graded. Such holes shall be of sufficient width to provide ample room for caulking, banding or bolting. Holes shall be excavated only as necessary to permit accurate work in the making of the joints and to ensure that the pipe will rest upon the prepared bottom of the trench, and not be supported by any portion of the joint.

Depression for joints, other than bell-and-spigot, shall be made in accordance with the recommendations of the joint manufacturer for the particular joint used.

601.2.4 Fine Grading: Unless specified in the plans and/or special provisions, the bottom of the trench shall be accurately graded to provide uniform bearing and support for each section of the pipe at every point along its entire length, except for portions of the pipe where it is necessary to excavate for bells and for proper sealing of pipe joints.

601.2.5 Overexcavation: Except at locations where excavation of rock from the bottom of the trench is required, care shall be taken not to excavate below the depth indicated.

Unauthorized excavation below the specified grade line shall be refilled at the contractor's expense with ABC material compacted to a uniform density of not less than 95 percent of the maximum density as determined by AASHTO T-99 and T-191 or ASTM D-2922 and D-3017. When AASHTO T-99, method A or B, and T-191 are used for density determination, MAG Detail 190 will be used for rock correction.

Whenever rock is encountered in the trench bottom, it shall be overexcavated to a minimum depth of six inches below the O.D. of the pipe. This overexcavation shall be filled with granular material placed with the minimum possible compaction.

Whenever unsuitable soil, not capable of supporting the pipe is encountered, the contractor will notify the Engineer and a field investigation will be made.

If the Engineer determines that overexcavation and backfilling, below the normal foundation and bedding depth, are required as a result of unsuitable material, it will be considered extra work. Payment and construction time extension will be negotiated with the contractor. As a condition of the contractor receiving payment for the extra work, agreement on method of payment and construction time extensions shall be reached prior to start of work.

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601.2.6 Excavation for Manholes, Valves Inlets, Catch Basins and Other Accessories: When placing concrete for a poured-in-place structure, the contractor may place the poured concrete directly against the excavated surface, provided that the faces of the excavation are firm and unyielding and are at all points outside the structure lines shown on the plans. If the native material is such that it will not stand without sloughing or if precast structures are used, the contractor shall overexcavate to place the structure.

When the structure is within the open trench limit, backfilling shall be in accordance with the requirements specified for the adjoining pipe. If the item is being constructed outside of the open trench limits, the overexcavation shall be backfilled with ABC compacted to 100%.

Any excavation below the elevation indicated for the foundation of any structure shall be filled with ABC per MAG 702 and compacted to at least 95% at the expense of the contractor.

601.2.7 Pavement and Concrete Cutting and Removal: Where trenches lie within the portland cement concrete section of streets, alleys, driveways or sidewalks, etc., such concrete shall be sawcut to neat, vertical, true lines in such a manner that the adjoining surface will not be damaged. The minimum depth of cut shall be 1-1/2 inches or 1/4 of the thickness, whichever is greater.

Asphalt pavement shall be clean-cut, with approved equipment and by approved methods in accordance with the requirements of Section 336.

No ripping or rooting will be permitted outside limits of cuts. Surfacing materials removed shall be hauled from the job site immediately, and will not be permitted in the backfill.

601.2.8 Grading and Stockpiling: All grading in the vicinity of trench excavation shall be controlled to prevent surface water from flowing into the trenches. Any water, either surface or ground, accumulated in the trench(es) shall be removed by pumping or by other approved methods. There shall be no additional payment for this work.

During excavation, material suitable for backfilling shall be piled in an orderly manner, a sufficient distance back from the edges of trenches, to avoid overloading and to prevent slides or cave-ins. Excess material shall be hauled from the job site and disposed of by the contractor.

Excavated material, with excessive or inadequate moisture content, shall not be considered as unsuitable for proper compaction. The contractor shall, at his own expense remove or add moisture to the excavated material to bring it within the range of +2 to -4 percent of the optimum moisture content in order that proper compaction, as per Table 601.2, can be obtained.

In lieu of the above, the contractor may, at no cost to the Contracting Agency, haul-off and dispose of excessively wet or dry material and replace it with material conforming to the backfill specifications. Disposal shall be in accordance with the project specifications.

In either event, the proper compaction and stability shall be obtained.

There will be no additional payment or time extension for this work.

Where the plans and/or special provisions provide for segregation of topsoil from underlying material for purposes of backfill, the material shall not be mixed.

601.2.9 Shoring and Sheeting: The contractor shall do such trench bracing, sheathing or shoring necessary to perform and protect the excavation as required for safety and conformance to governing laws. The bracing, sheathing or shoring shall not be removed in one operation but shall be done in

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successive stages as determined by the Engineer to prevent overloading of the pipe during back-filling operations. The cost of the bracing, sheathing or shoring, and the removal of same, shall be included in the unit price bid per foot for the pipe.

All shoring and sheathing deemed necessary to protect the excavation and to safeguard the Engineer's representatives during inspection and testing procedures shall be installed. See Section 107.

601.2.10 Open Trench: Except where otherwise noted in the special provisions, or approved in writing by the Engineer, the maximum length of open trench, where the construction is in any stage of completion (excavation, pipe laying or backfilling), shall not exceed 1,320 feet in the aggregate at any one location.

Any excavated area shall be considered open trench until all ABC for pavement replacement has been placed and compacted. With the approval of the Engineer, pipe laying may be carried on at more than one separate location, the restrictions on open trench applying to each location.

Where a trenching operation undercrosses ACP waterlines (12 inches or smaller excluding service lines) and four feet or more of the existing pipe is exposed, the Water Distribution Division will isolate the conflicting waterline by either cutting in any necessary valves or by the use of existing valves. After the crossing section has been isolated, the contractor shall remove that part of the waterline and install the new mainline as per plan. The waterline shall then be replaced with the same size ductile iron pipe by the contractor. The replacement section shall extend at least five feet beyond the new mainline trench wall and into undisturbed ground. The contractor shall request a shut-down, at least one week in advance, from Water Distribution (262-4711 or 4712). City forces will perform the shutdown and/or valve cut-in. There will be no charges to the contractor for this work. On permit work, the contractor shall pay for any and all work required.

The contractor will be paid for the ductile iron pipe at the unit price bid per each crossing under the bid schedule item WATERLINE REPLACEMENT. If there is an unanticipated conflict at the crossing which can be resolved with "offset pipe joints", the Water Department will supply the offset joints to the contractor at no cost. Offset pipe joints will be picked up by the contractor at the City's Water Stores Warehouse at 2640 South 22nd Avenue. Requests to pick up such material must be conveyed to the Water Department at least 24 hours in advance by the City Inspector. The contractor shall install the offset joints at no additional cost. The WATERLINE REPLACEMENT item shall include costs for trench excavation, backfill, compaction, and surface restoration.

Trenches across streets shall be completely backfilled as soon as possible after pipe laying.

Substantial steel plates with adequate trench bracing shall be used to bridge across trenches at street crossings where trench backfill and temporary patches have not been completed during regular working hours. Traffic control and maintenance of traffic shall be in accordance with City of Phoenix Section 401 and MAG Section 104.

601.3 PROTECTION OF EXISTING UTILITIES:

601.3.1 Utilities: Unless otherwise shown on the plans or stated in the specification, all utilities, both underground and overhead, shall be maintained in continuous service throughout the entire contract period. The contractor shall be responsible and liable for any damages to or interruption of service caused by the construction.

If the contractor desires to simplify his operation by temporarily or permanently relocation or shutting down any utility or appurtenance, he shall make the necessary arrangements and agreements with the owner and shall be completely responsible for all costs concerned with the relocation or shutdown and

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reconstruction. All property shall be reconstructed in its original or new location as soon as possible and to a condition at least as good as its previous condition. This cycle of relocation or shutdown and reconstruction shall be subject to inspection and approval by both the Engineer and the owner of the utility.

The contractor shall be entirely responsible for safeguarding and maintaining all conflicting utilities that are shown on the plans (MAG Section 106 & 107 apply). This includes overhead wires and cables and their supporting poles whether they are inside or outside the open trench. If, in the course of work, a conflicting utility line that was not shown on the plans is discovered, the Contracting Agency will either negotiate with the owner for relocation, relocate the utility, change the alignment and grade of the trench or, as a last resort, declare the conflict as "extra work" to be accomplished by the contractor in accordance with Section 104.

601.3.2 Irrigation Ditches, Pipes and Structures: The contractor shall contact the owners of all irrigation facilities, and make arrangements for necessary construction clearances and/or dry-up periods.

All irrigation ditches, dikes, headgates, pipe valves, checks, etc., damaged or removed by the contractor, shall be restored to their original condition or better, by the contractor at no additional cost to the Contracting Agency.

601.3.3 Buildings, Foundations and Structures: Where trenches are located adjacent to buildings, foundations, bridges or any other structures, the contractor shall take all necessary precaution against damage to them. The contractor shall be liable for any damage caused by the construction.

Except where authorized in the special provisions or in writing by the Engineer, water settling of backfill material in trenches adjacent to structures will no be permitted.

601.3.4 Permanent Pipe Supports: Permanent pipe supports for the various types and sizes of sewer, water and utility lines shall conform to the Standard Details or the details shown on the plans. Such pipe supports shall be erected at the locations shown on the plans and/or at any other locations as necessary as determined by the Engineer.

601.3.5 Electronic, Telephonic, Telegraphic, Electrical, Oil and Gas Lines: These underground facilities shall be adequately supported by the contractor. Support for plastic pipes shall be continuous along the bottom of the pipe. Support for metal pipe and electrical conduit may be continuous or nylon webbing may be used for suspension at no greater than ten-foot intervals.

The contractor shall avoid damaging the plastic pipe, pipeways or conduits during a trench backfilling and during foundation and bedding placement.

There will be no measurement or payment for this work. The contractor will include all associated costs in the unit bid price for the pipe installation.

601.4 FOUNDATION, BEDDING, BACKFILLING AND COMPACTION:

601.4.1 Foundation: The material upon which the conduit or structure is to be placed shall be accurately finished to the grade or dimensions shown on the plans or as directed by the Engineer. The bottom portion of the trench shall be brought to grade so that the conduit or structure will be continuously in contact with the material on which it is being placed. If rocky or unsuitable soil in encountered, Subsection 601.2.5 applies.

601.4.2 Bedding: Bedding shall be Select Material Type B or Aggregate Base as per Table 702. Open

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graded rock will not be used without the written approval of the Engineer.

Where water consolidation is used, bedding for conduits, 24 inches or less in I.D., may be placed in one lift. For larger conduits, the first lift shall not exceed the springline of the pipe.

Where mechanical compaction is used, the moisture content shall be within a range of +2 to -4 percent of the optimum moisture content prior to placing the material in the trench. The first lift shall be eight inches or 2/3 of the distance to the springline whichever is greater. Succeeding lifts shall not exceed one foot. Loose and extreme care will be taken to prevent damage to or movement of the conduit by the compaction equipment.

601.4.3 Backfill: Backfill shall be sound material free from broken concrete, broken pavement, wood or other deleterious material. Unless otherwise specified, this may be native material with no piece larger than eight inches, select material or aggregate base course. Under pavement, parking lots, sidewalks, etc., pieces larger than three inches will not be used in the final 12 inches below the pavement subgrade.

Where water consolidation is used, backfill will be placed in lifts as required in the following table prior to settlement.

| TRENCH WIDTH | BACKFILL LIFTS |
|--------------|------------------|
| 18" TO 24" | NOT TO EXCEED 4' |
| 25" TO 36" | NOT TO EXCEED 6' |
| OVER 36" | NOT TO EXCEED 8' |

The above backfill lift limitations are not applicable when water consolidation is accomplished by the jetting method.

When mechanical compaction is to be used, the contractor will provide a test section demonstrating his proposed method and equipment to be used. Upon agreement with the Engineer as to the acceptability of the contractor's proposed method and equipment, they shall not be changed without the prior approval of the Engineer. Mechanical compacted lifts in excess of one foot will not be allowed without the written consent of the Engineer.

Backfill material shall be within the range of +2% to -4% of the optimum moisture content, prior to placing the material in the trench. The moisture content shall be uniform throughout the backfill material. Material not meeting these requirements may be required to be removed from the trench and moisture added or removed to correct the deficiencies prior to replacement, all at no increase in cost to the Contracting Agency.

It shall be the contractor's responsibility to **blend** excavated material, removing or adding moisture as may be necessary to meet the requirements of the specifications, all at no increase in cost to the Contracting Agency.

Excavated material, when used for backfill, shall meet the requirements of Subsection 601.2.8.

The moisture content requirements contained herein are waived when granular material is used and water settled.

The Engineer may require all or any part of the trench to be load tested for stability with contractor's

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equipment prior to placement of asphalt or Portland cement concrete pavement. Unstable areas as determined by the Engineer shall be corrected by the contractor at no increase in cost to the Contracting Agency.

Backfill, around utilities that are exposed during trench excavation, shall be placed in accordance with the bedding methods.

601.4.4 Compaction Densities: Unless otherwise provided in the plans and/or special provisions, the trench backfill shall be thoroughly compacted to not less than the following densities when tested and determined by AASHTO T-99 and T-191 or ASTM O-2922 and O-3017. When AASHTO T-99, method A or B, and T-191 are used for density determination, MAG Detail 190 will be used for rock correction.

The density required will depend on the type shown on the plans and/or called for in the special provisions. Density required for each type is as follows:

TABLE 601-2
MINIMUM DENSITY REQUIRED

| Compaction Type | Location | From Surface to 2' Below Surface | From 2' Below Surface to 1' Above Top of Pipe | From 1' Above Top of Pipe to Bottom of Trench |
|-----------------|--|--|---|---|
| I | 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% granular 95% for non-granular (2) | 95% | 95% |
| II | On any utility easement, street, road or alley right of way outside limits of (1) | 85% | 85% | 95% |
| III | Around any structure or exposed utilities. | 95% | in all cases | in all cases |

(1) Note: The type required will generally be shown on the plans and the plans will govern. Where no type is shown on the plans the type shall comply with the above.

(2) Note: **Where full-depth asphalt is placed on native material, the pavement subgrade shall be compacted to 100%.**

A consideration in determining the backfill types as shown on the plans, is based on the trench widths as shown in the Contract Documents. If these trench widths are increased beyond those widths referred to above and fall within the 2-foot limit of paved surfaces and other improvements due to constriction exigencies, the backfill designation for that portion within the 2-foot limit of such improvements shall be Type I even though Type II backfill is shown on the plans.

601.4.5 Compaction Methods: Water consolidation by jetting shall be accomplished with a 1-1/2"

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pipe of sufficient length to reach the bottom of the lift being settled with adequate hose attached and a water pressure of not less than 30 psi.

All jetting shall be accomplished transversely across the trench at intervals of not more than 6 feet with the jetting locations on one side of the trench offset to the jetting locations on the other side of the trench. The entire lift shall be leveled and completely saturated working from top to the bottom.

Jetting shall be used as the consolidation method for all conduit bedding. The contractor shall be entirely responsible for establishing each lift depth so as to avoid floating the conduit being placed and shall make any repair or replacement at no cost to the Contracting Agency. However, for conduit larger than 24 inches I.D. the first lift shall not exceed the sprintline of the conduit.

Flooding is not acceptable as a water consolidation method unless authorized in the specification or by a written change order. It will consist of the inundation of the entire lift with water and then puddled with poles and bars to ensure saturation of the entire lift.

Where jetting or flooding is utilized and the surrounding material is such that it does not permit proper drainage, the contractor shall provide, at his expense, a sump and a pump at the downstream end to remove the accumulated water.

The use of water consolidation does not relieve the contractor from the responsibility to make his own determination that such methods will not result in damage to existing improvements. The contractor shall be responsible for any damage incurred.

Where water consolidation is not permitted or does not result in adequate compaction, the backfill material shall be compacted with hand and/or mechanical work methods using equipment such as rollers, pneumatic tamps, hydro-hammers or other approved devices which secure uniform and required density without injury to the pipe or related structures.

Where Type I backfill is required, water consolidation will not be permitted for non-granular material.

601.4.5.1 New **Residential** Development Areas: In a new development area, prior to paving and prior to opening the area to public traffic, the following deviation to water consolidation, bedding and compaction shall apply:

- (A) Water consolidation of non-granular material will be permitted at the contractor's discretion and responsibility.
- (B) Bedding (select material Type B or aggregate base per Table 702) for conduits less than 12 inches in diameter shall be **compacted a minimum of 6 inches** over the top of the conduits instead of 12 inches.
- (C) The minimum density required for bedding shall be 90% instead of 95%.
- (D) The minimum density required for backfill from 2 feet below the surface to 6 inches above the conduit shall be 90%. The minimum density from the surface to 2 feet below the surface shall be as prescribed in Table 601-2.

601.4.6 Specifications for Granular Material: For purposes of this specification, granular material shall be defined as material for which the sum of the plasticity index and the percent of the material passing No.200 sieve shall not exceed 23. The plasticity index shall be tested in accordance with AASHTO T-90.

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601.4.7 Rights of way Belonging to Others: Backfill and compaction for irrigation lines of the Salt River Valley water User's Association and Roosevelt Irrigation Districts and for trenches on State of Arizona and Maricopa County rights of way, outside the limits of the Contracting Agency, shall be accomplished in accordance with their permit and/or their specification.

601.4.8 Test Holes: Boring logs shown on the plans or included in the specifications do not constitute a part of the contract and are included for the contractor's convenience only. It is not intended to imply that the character of the material is the same as that shown on the logs at any point other than that where the boring was made. The contractor shall satisfy himself regarding the soils moisture content and the amount of rock, gravel, sand, silt, clay and water to be encountered in the work to be performed.

601.4.9 Foundation and Bedding for Electronic, Telephonic, Telegraphic, Electrical, Oil and Gas Lines: Foundation and bedding for these underground facilities shall be native material or sand which conforms the grading requirement of ASTM C-33 for fine aggregate. When backfill material consists of aggregate base course, crushed stone, or other material containing stones, only sand will be used for foundation and bedding. The foundation depth shall be six inches and bedding depth shall be one foot above the top of the facility. Compaction will be in accordance with Section 601.

601.5 PAVEMENT REPLACEMENT AND SURFACE RESTORATION:

601.5.1 Grading: The contractor shall do such grading in the area adjacent to backfilled trenches and structures as may be necessary to leave the area in a neat and satisfactory condition approved by the Engineer.

601.5.2 Restoring Surface: All streets, alleys, driveways, sidewalks, curbs, or other surfaces in which the surface is broken into or damaged by the installation of the new work, shall be resurfaced in kind or as specified to the satisfaction of the Engineer in accordance with Section 336.

601.5.3 Clean-Up: The job site shall be left in a neat and acceptable condition. Excess soil, concrete, etc., shall be removed from the premises.

601.5.4 Temporary Pavement: The contractor shall install temporary asphalt pavement or the first course of permanent pavement replacement in accordance with Section 336 immediately following backfilling and compaction of trenches that have been cut through existing pavement. Except as otherwise provided in Section 336, this preliminary pavement shall be maintained in a safe and reasonably smooth condition until required backfill compaction is obtained and final pavement replacement is ordered by the Engineer. Temporary paving removed shall be hauled from the job site and disposed of by the contractor at no additional cost to the Contracting Agency.

601.6 PAYMENT:

No payment item will be included in the proposal, nor direct payment made for trench excavation, backfilling, compaction or placement of temporary pavement. The cost of these features of the work shall be included in the unit price bid per linear foot for furnishing and laying pipe.

SECTION 610

WATERLINE CONSTRUCTION

610.3 Materials: Subsection (B) is changed to read:

(B) Pipe eighteen (18) inches and larger may be either ductile iron, or concrete pressure pipe - steel

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cylinder type.

Subsection 610.4 CONSTRUCTION METHODS: is modified to add:

610.4.1 Construction Work by City Forces:

(A) City forces shall perform **all valve cut-ins, waterline shutdowns, and wet taps that are necessary for construction.**

The contractor shall contact the **inspector** to make the necessary arrangements to have the City forces perform the required work. **With the exception of permit work, there will be no charge for valve cut-ins, waterline shutdowns, and wet taps that are necessary for construction.**

For any valve cut-ins, waterline shutdowns, or wet taps requested by the Contractor, which are not necessary and are for the convenience of construction, the Contractor shall make application and pay the required charges to the Contracting Agency.

On permit work, the contractor shall pay all costs incurred.

(B) When an existing waterline, other than as noted on the plans, conflicts with any proposed new work in the contract and no provision has been made in the proposal for relocating such lines, the City has the option to make any necessary adjustments or relocations, alter the proposed new work or negotiate with the contractor for relocating the obstructing line.

610.4.2 Construction work by Other Utility Owners: Except as otherwise provided in the plans or project specification, all utilities in conflict with the new work will be relocated by the owner thereof. Mountain Bell and Arizona Public Service Company will adjust their manholes. 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. It will be necessary for the contractor to coordinate his work with the utility companies in the relocation of their facilities during construction.

610.4.3 Construction Work by the Contractor:

(A) The contractor shall adjust valve and meter boxes to final grade as described in Section 345 and the City of Phoenix Supplement. All valve boxes, manhole covers, etc., shall be adjusted after the asphalt concrete base is placed and prior to placing the 1-1/2 inch of asphalt concrete finishing course.

(B) Where the centerline of the new waterline parallels the existing curb and gutter and is approximately two feet from the lip of the gutter, the contractor shall remove and replace the pavement to the lip of the gutter. The contractor will be paid for the extra pavement replacement in addition to the normal pavement re-placement over the pipe trench in accordance with MAG Section 336.

(C) The contractor shall accomplish the cutting and plugging of City water mains, where required on the plans, **in accordance with City of Phoenix Detail P-1343.**

The cuts and plugs will remain exposed until line pressure is restored and they can be inspected for leakage. The contractor shall schedule the restoration of line pressure through the Engineer.

Payment shall be at the unit bid price or lump sum bid price for "CUTTING AND PLUGGING EXISTING WATER LINES." This payment shall be full compensation for ~~shut-down fees~~, material, labor, tools and equipment necessary to complete the work.

(D) Unless otherwise noted on the plans, the contractor shall relocate existing water service lines and meters and remove or relocate fire hydrants. Unless other adequate provisions are made for fire protection, a fire hydrant will not be out of service for a period exceeding 24 hours. When relocating water meters which utilize either galvanized or polyethylene service pipe (or any other non-standard service pipe) the entire service piping shall be replaced using the approved service pipe material for that particular meter size. The existing corporation stop can be used provided and approved copper pipe adapter is used. Approved adapters are the Ford C04-43 and C04-54 conversion assembly or qual.

610.4.4 Approved Water Service Components: Approvals shown are not necessarily exclusive. If approval of a similar device, believed to be comparable and equal, is desired, a request should be submitted supported by appropriate information and data.

If general approval is desired, request should be submitted directly to the Water Services Department.

CORPORATION STOPS

| Manufacturer | Copper Services | W/Dielectric Insulation |
|--------------|-----------------|-------------------------|
| FORD | P-1600 | F-1000 |
| HAYES | | |
| JONES | J-3401 | |
| McDONALD | 4701 T | |
| MUELLER | | H-15007 |

ADAPTERS

| Manufacturer | IPS Copper, Ell |
|--------------|--------------------|
| FORD | L-84-33 L-84-44 |
| HAYES | |
| JONES | J-2619 |
| MUELLER | |
| McDONALD | 4779 MT |

| Manufacturer | Curb Stops* | Metering Coupling |
|--------------|--|--------------------|
| FORD | B-11-333 B-11-666 B-11-444 B-11-777 | SPM-2R |
| JONES | J-1900 | J-130 J-134 |
| McDONALD | 6101 | 4622 or 4624 |
| MUELLER | H-10283 B-10291 | H-10890 H-10891 |
| HAYES | 4000 | 5680 or 5682 |

*Heads of all curb stops shall be drilled 1/4" diameter for locks.

610.4.5 Concrete Pressure Pipe - Steel Cylinder Type: Where concrete, steel cylinder, pressure pipe is installed the following shall apply:

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(A) General:

(1) The contractor shall mortar the inside and outside of all pipe joints. The mortar shall be applied in the field on the inside joints such that the mortared surface is flush with the adjacent pipe mortar lining. The outside of the joints shall be mortar coated by the diaper method. The mortar shall be a Type "M" mortar per MAG 776 using Type II, low alkali cement.

(2) All non-mortar coated steel, including flanges, shall be covered with a minimum of two (2) inches of hand-packed mortar. Wire mesh shall be used to hold the mortar in place. Mortar shall be the same as applied to the joints. Field-applied coal tar coatings will not be accepted in lieu of mortar. Except, coat tar enamel in accordance with AWWA C-203 shall be applied to the non-mortar coated steel and flanges on the 24" side outlets in access manholes.

(3) Joint restraints shall be provided by means of welded joints. The extent of welded joints shall be as shown on the pipeline and layout drawings, and shall in no case be less than that shown on the plan drawings. Where welded joints are required, the weld shall be continuous about the entire circumference of the pipe joint. Welds shall be made intermittently, in short sections of about six (6) inches, to avoid overheating the gaskets on joints where a gasket is used. Welds shall conform to that shown on the approved shop drawings and calculations.

610.4.6 For mains eighteen (18) inches and larger, the following shall apply:

(A) Backfill and compaction for the full distance encompassed by welded/restrained joints shall be completed prior to testing.

(B) All mainline valves shall be covered with a minimum of two (2) inches of hand-packed mortar. Wire mesh shall be used to hold the mortar in place. Field applied coal tar coatings will not be accepted in lieu of mortar. Portions of valve within manholes shall not be mortar coated. The mortar shall be a Type "M" mortar per MAG 776 using Type II, low alkali cement.

(C) Where plans call for welding joints and ductile iron pipe is furnished, the contractor shall restrain the joints by an approved joint restraint method.

610.4.7 Where restrained joints are specified on mains less than eighteen (18) inches in diameter, ductile iron pipe shall be used with an approved joint restraint method.

610.4.8 Joints in fire hydrant "run-out" piping to conform to 750.3. All joints in the fire hydrant "run-out" from the main through the shut-off valve shall be restrained by an approved joint restraint method.

610.4.9 Payment for Water Used During Construction: The contractor shall pay for all water used during the course of construction. This cost shall be included in the unit bid price for pipe. The final fill of the pipeline with replacement water shall not be included in the cost. Water rates shall be obtained from the Water Services Department - Accounting Division (262-6687).

Measurement will be through a fire hydrant meter or, if this is not possible, calculated by one of the procedures listed below:

(A) Unmetered water used for testing, flushing and chlorination shall be calculated on a cubic foot basis, using the volume per foot pipe multiplied by the number of times the pipe is filled and by the total length of pipe installed for each hydrostatic test, flushing and chlorination procedure. If any additional testing, flushing or chlorination is required, because of failure to meet any of the above conditions, the volume of water used for each procedure shall be calculated as on the above basis for first procedure.

FOR ONE FOOT LENGTH OF PIPE

| Diameter (Inches) | Cubic Feet | Gallons | Gallons Per Mile |
|-------------------|------------|---------|------------------|
| 3 | .0491 | .3673 | 1,939 |
| 4 | .073 | .6528 | 3,447 |
| 6 | .1963 | 1.469 | 7,756 |
| 8 | .3490 | 2.611 | 13,786 |
| 10 | .5455 | 4.081 | 21,547 |
| 12 | .7854 | 5.876 | 31,025 |
| 14 | 1.069 | 7.977 | 42,224 |
| 16 | 1.396 | 10.44 | 55,123 |
| 18 | 1.767 | 13.22 | 69,802 |
| 20 | 2.182 | 16.32 | 86,170 |
| 24 | 3.142 | 23.50 | 124,080 |
| 30 | 4.909 | 36.72 | 193,882 |
| 36 | 7.069 | 52.88 | 279,203 |
| 42 | 9.620 | 71.96 | 379,950 |
| 45 | 11.044 | 82.62 | 436,233 |
| 48 | 12.566 | 94.02 | 496,326 |
| 54 | 15.90 | 118.97 | 628,162 |
| 60 | 19.63 | 146.88 | 775,526 |
| 66 | 23.76 | 177.72 | 938,362 |
| 72 | 28.27 | 211.44 | 1,116,403 |

(B) Unmetered water used for settling trench backfill for small waterlines 12" and less in diameter shall be estimated at a volume of 2.66 cubic feet of water per linear foot of trench settled.

(C) Water used for settling trench backfill on waterlines 14" and larger, shall be metered by a fire hydrant meter, or other means approved by the Engineer.

Subsection 610.6 VALVES: For correction of a printing error the seventh paragraph should read:

Standard coupling or matching joints shall be used when more than one length of pipe is required, or when two or more pieces are joined, to form the valve box riser. Install extension stems on all valves where operation nut is 5 feet or more below grade.

Subsection 610.8 FIRE HYDRANTS: is modified to add:

Except where otherwise required on the plans, the City of Phoenix will furnish the contractor fire hydrants without cost for City of Phoenix projects. To secure the hydrants, the contractor shall obtain a permit at the Water Services Department Office then pick up the hydrants at to City of Phoenix Water Stores, 2640 South 22nd Avenue.

Whereas a new fire hydrant furnished by the City of Phoenix is found to be defective, the contractor shall remove the defective hydrant, return it to the pipe yard, pick up a new one and install as indicated on the plans. The second installation will be treated as a new fire hydrant installation and the contractor will be paid for both installations, each at the unit bid price in the proposal for fire hydrant installations (furnished by the City).

All connections from the main to the fire hydrant shall be cast iron or ductile iron pipe as shown on the detail drawings. Fire hydrants shall be the dry-barrel type. If plugs are present in the weep holes, they shall be removed before installation.

Extenders for hydrants or valves are not permitted on new fire hydrant installations unless approved by the Water Services Department.

Subsection 610.10 METERING SERVICE CONNECTIONS:

Delete the second paragraph which reads "When plans call . . . except as follows." in its entirety and substitute the following:

All water service connections shall be made using Type K copper tubing which conforms to MAG Section 754.1 and fittings which conform to City of Phoenix Supplement to MAG Section 160.4.4 Joints in the copper tubing shall be made by the use of approved compressing fittings such as flared joints or pack joints. Soldered joints are not acceptable.

Subsection (A) is changed to read:

When a meter is specified to be relocated, the Contractor shall replace and/or extend water service lines in accordance with Detail P1342. The Engineer will determine when the existing service lines are unsatisfactory and must be replaced. Existing copper services in good condition, with sufficient cover, may be extended. Where the existing service pipe material is other than copper, the entire service shall be replaced from main to meter.

Add the following paragraph:

(E) The use of direct taps on water mains for meter service connections will not be allowed. New service taps shall be installed using an all bronze double-strap tapping saddle or a tapped coupling.

MAG Section 610.14 TESTING: is deleted in its entirety and the following is substituted:

Section 610.14 TESTING:

The Contractor shall test waterlines for water tightness, including all fittings and connections to the waterlines. Each pipe shall be tested for leakage and pressure in accordance with applicable provisions of AWWA standards and/or Manuals, except as modified below.

The Contractor shall provide all vents, piping, plugs, bulkheads, valves, bracing, blocking, pump, including measuring device and all other equipment necessary for making the tests, except pressure gages.

The pipe shall be tested between each valve or between a valve and the closed end of the pipe. Pipe test section shall be limited to 1/2 linear mile, or less, unless otherwise approved in writing by the Engineer.

If mechanical compaction is used in the backfilling operations, the test shall be made after the backfilling is completed or compacted.

All connections, blowoffs, hydrants and valves shall be tested with the main, where practical.

The test section shall be slowly filled with potable water and all air shall be vented from the line. The rate of filling shall be as approved by the Superintendent of Water Distribution, with at least 24-hour notice required before filling is scheduled.

(A) Pressure Tests: Waterlines, including all fitting and connections shall be tested for water tightness by subjecting each test section to pressure test. The test pressure shall be measured at the lowest end of the test section. The test pressure shall be 188 psi unless otherwise specified. The duration of each pressure test shall be at least 2 hours.

The pressure test shall begin after the pipe has been filled with water for at least 24 hours to allow for absorption.

(B) Leakage Tests: Leakage tests shall be made after pressure test has been completed, pressure test results are satisfactory, and all backfilling and compaction is completed.

The duration of each leakage test shall be at least 2 hours. Leakage test pressure shall be at least 150 psi and not vary more than 5 psi during the test.

The maximum allowable leakage from the pipe line shall be determined by the applicable formula:

$$L = \frac{ND\sqrt{P}}{4500}$$

(Pipe Larger than 16")

$$L = \frac{ND\sqrt{P}}{7400}$$

(Pipe 16" and smaller)

in which:

L = allowable leakage in gallon per hour

N = number of joints in the pipe being tested, with no allowance for joints at branches, blowoff, fittings, and similar appurtenances. "N" is calculated using the standard length of pipe installed divided into the length being tested.

D = nominal inside diameter pipe in inches.

P = average test pressure, in psi gage, as measured at the lowest point in the test section.

Should the test on any section of the pipeline show leakage greater than specified above, the Contractor shall locate and correct until the leakage is within the specified allowance for a 2-hour uration. All repairs and retests shall be at the Contractor's expense.

Leakage is defined as the quantity of make-up water necessary for the test section to maintain the specified leakage test pressure after the pipeline has been filled with water and all air expelled.

Connections to existing pipelines or existing valves shall be made after new construction has satisfactorily passed both the pressure and leakage tests.

SECTION 611

DISINFECTING WATER MAINS

Subsection 611.15 shall be modified to read as follows:

611.15 FINAL FLUSHING, SAMPLING AND TESTING:

Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipeline at its extremities until the replacement water throughout its length shall, upon testing, be proved comparable in quality to the water served to the public from the existing water system. **Prior to sampling for laboratory testing, the residual chlorine shall be reduced to 1.0 ppm or less throughout the length of the pipeline. Once the required residual chlorine level in the pipeline is achieved, samples shall be taken as outlined below.** The quality of water in the new main shall be as determined by laboratory examination and analysis of the samples over a period of at least three full days (72 hours).

Water Services Department laboratory technicians will perform sampling for tests of new water mains upon receipt, from the inspector, of a written request by the Contractor. The written request should be made to the Water Services Department no less than 24 hours prior to the time when samples are to be taken, so that the Department can properly schedule laboratory work. Waterlines ~~up to, but~~ less than 150 feet in length require one sampling riser installed as near the end as possible; lines 150 feet to 300 feet in length, two sampling risers, one near each end of the line; lines 300 feet to 3,000 feet in length, a minimum of three sampling risers. In addition, dead ends on main lines should be represented with a sampling riser.

Samples shall be taken from a tap and riser located and installed in such a way as to prevent outside contamination. Samples shall never be taken from an unsterilized hose or fire hydrant, because such samples will seldom meet bacteriological standards. One sample shall be taken at each sampling riser.

Results of all tests shall be sent by the laboratory to the Water Services Department. Results of laboratory analysis will be interpreted by the Water Services Department, and reported to the Engineer. Under no circumstances shall the Contractor contact the laboratory. If there is need for test results before written reports are submitted, such information shall be obtained only from the Water Services Department.

SECTION 615

SEWER LINE CONSTRUCTION

Subsection 615.3 LAYING PIPE: is modified to add the following paragraphs:

Where called for on the plans, sanitary sewers shall be concrete encased in conformance with MAG Standard Detail No. 404

Measurement and payment for concrete sewer encasement shall be by the linear foot of sewer concrete encased, which price shall include trenching, backfill, compaction, materials, and any pavement and surface replacement in excess of the applicable pay widths assigned to the adjacent water pipe.

Subsection 615.6 SANITARY SEWER SERVICE TAPS: is modified to add:

When sewer taps are found to be in conflict with the new work and no provision has been made in the proposal for relocating such taps, they shall be relocated by the City or the City will negotiate with the contractor for their relocation. When a sewer tap or other sewer line is in conflict with the new work and it is impractical or impossible to raise or lower the tap or sewer to clear the new work, the City will negotiate with the contractor to relocate the sewer on a different alignment or grade to avoid the conflict.

Subsection 615.10 TESTING: is modified to add:

615.10 TESTING:

In addition, sewer lines eight inches and larger, shall be subject to closed circuit T.V. inspection in accordance with the following procedures.

615.10.1 Closed Circuit T.V. Inspection: After backfilling has been completed and prior to acceptance, sanitary sewer lines shall be subject to a closed circuit T.V. inspection. The contractor shall notify the Engineer at least 48 hours prior to completion of the backfilling so that the inspection may be scheduled. The inspection will be accomplished by the Water Services Department.

The Contracting Agency will pay for the initial T.V. inspection. Any additional inspections required, due to failure of the initial inspection, shall be paid for by the contractor.

615.14 MEASUREMENT AND PAYMENT: is modified to add:

(D) There will be no measurement and payment for testing. The contractor shall include all associated costs in the unit bid price for sewer pipe installation.

SECTION 618

STORM SEWER CONSTRUCTION WITH CONCRETE PIPE

Subsection 618.1 DESCRIPTION: is modified to add:

In general, the specified D loads for design of concrete and reinforced concrete pipe will be based upon the loads to which to pipe will be subjected upon completion of the project.

Should the contractor, as a result of his construction methods, or for any other reason, subject the pipe to loading which is greater than that for which the pipe was designed, it shall be the contractor's responsibility to take whatever steps are required to strengthen or otherwise protect the pipe from damage.

Pipe stronger than that specified may be furnished at the contractor's option and expense.

Subsection 618.2 (C) Change the sentence to read:

(C) Cement Mortar Joints for R.C.P. and N.R.C.P. will be in accordance with 736.3.1.

Subsection 618.3 CONSTRUCTION METHODS: Delete the third paragraph which reads "Where the cover over . . . by Section 601.11" in its entirety and substitute the following:

The structural design of the pipe for any depth of cover shall be based on an unlimited trench condition. The pay width for pavement replacement shall remain in accordance with MAG Section 336.

Subsection 618.3 CONSTRUCTION METHODS: Delete the second sentence in the fifth paragraph that reads "For closures and deflections . . . per standard details." and substitute the following:

Curves, bends and closures shall be made in accordance with MAG Section 735.

Subsection 618.3 CONSTRUCTION METHODS: is modified to add:

618.3.1 Pipe Joints for R.C.P. and N.R.C.P.: Pipe Joints for pipe 35 inches or greater in diameter may be either tongue in groove or O-ring gasket joints. For pipe smaller than 36 inches in diameter, only O-ring gasket joints will be used. The O-ring gasket joints will not required mortaring and grouting. Mortaring and grouting of the tongue in groove joints will be in accordance with the following paragraphs.

Tongue in groove joints will not require outside grouting except where the pipe is used on curves or angle points. All joints shall be butted together. The overlap of the tongue with the groove portion of the joint shall not be less than 50% of the overlay measured from the manufacturer's designed full seat position. The material and layout drawings shall specify the maximum inside annular space that satisfies this specification. The inside annular space between pipe sections shall be completely filled with mortar and finished smooth with the inside pipe surface. The entire depth of the finished inside joint shall be filled with mortar in such a manner as to ensure a strong, tight joint. Curves or angle points joints will require outside grouting or a concrete collar as determined by the Engineer. Joints will not be mortared until the next two joints are in place.

All cement mortar or grout joints will be in accordance with MAG Subsection 736.3.1.

618.3.2 Procedure for Connecting Pipes to New Storm Sewer and Temporary Pipe Closure:

(A) All inlet connecting pipes and lateral pipes shall remain temporarily plugged until all lines and facilities downstream have been completed to the satisfaction of the Engineer.

(B) Existing storm sewers shall be connected to the new storm sewer where indicated on the plans. However, existing storm sewer systems shall remain intact or a by-pass maintained until mainline ownstream has been completed to the satisfaction of the Engineer.

(C) All pipes shall have a temporary closure placed at the open end at the end of each work day.

618.3.3 Structures: Inlets, manholes and similar reinforced concrete structures generally built underground as part of the storm sewer are shown on the plans and shall conform to Section 505. Castings shall conform to Section 787. Miscellaneous steel shall conform to Sections 727 and/or 770.

Through manhole, lateral manhole or transition manhole, when specified on the plans, shall denote the construction and installation of a complete manhole including the base, shaft, reinforced concrete rings, frames and covers, concrete caps, frame adjustment to grade, etc., as shown on the plans and Standard Details. Note: Manhole steps shall no be installed. If installed they shall be removed and the holes filled with epoxy or Class 'B' concrete.

As an option, Standard Detail 522 is hereby modified to allow precast unreinforced manhole shaft pipe and cones which shall have a thickness of 6 inches and be manufactured of Class 'A' concrete per section 725. All other features of Standard Detail 522 shall remain unchanged, except that manhole steps will not be installed.

618.3.4 Leakage Tests: The Leakage test will be conducted in accordance with the procedure outlined in the project specifications.

618.3.5 Cleaning Conduits: All conduits shall be swabbed, flushed with water, or subjected to a combination of these or other methods in order to leave the pipeline clean and free from debris, garbage, rubbish, stones, and deposits, and like foreign materials.

SECTION 620

CAST-IN-PLACE CONCRETE PIPE

MAG Section 620 CAST-IN-PLACE CONCRETE PIPE: is deleted in its entirety and the following section substituted:

620.1 GENERAL:

This specification covers cast-in-place non-reinforced concrete pipe intended for use as storm sewers or irrigation lines. The abbreviated title is CIPP. CIPP is conduit made of portland cement concrete cast monolithically in a properly prepared trench, using equipment specifically designed for this purpose. The type of equipment to be used by the contractor must be approved by the Engineer and the contractor may be required to furnish evidence of the successful use of this equipment on prior work. CIPP will be placed only:

- (A) By experienced operators. The Engineer will be the sole judge as to experience level.
- (B) In the presence of the Engineer.
- (C) In ground capable of standing unsupported from the bottom of the trench to the top of the pipe without sloughing.
- (D) In fill when it can be demonstrated to the satisfaction of the Engineer that the fill will adequately support the pipe.
- (E) When designated as an allowable storm sewer pipe material in the project specifications, this designation is no warranty, expressed or implied, that conditions will be suitable for the use of CIPP. Any costs incurred and/or time required to provide suitable conditions or to substitute an alternate pipe acceptable to the Engineer, in whole or part, shall be the responsibility of the contractor.

620.2 MATERIALS:

620.2.1 Cement shall be ASTM C-150, Type II, low alkali as per Section 725.

620.2.2 Sand aggregate used for concrete and mortar shall conform to Section 701. Maximum size of the aggregate shall not be greater than 1/3 of the minimum wall thickness up to and including a wall thickness of 4-1/2 inches (114MM). The maximum aggregate size of 1-1/2 inches (38MM).

620.2.3 Water used for concrete and for curing to pipe shall be as per Section 725.

620.2.4 Concrete shall be Class 'A' in accordance with Section 725. Slump shall be the minimum required for satisfactory placement of the concrete by the equipment used by the contractor. The slump shall not exceed 3 inches (75MM).

620.2.5 Bonding mortar shall consist of two (2) or more parts of cement to three (3) parts of sand by volume.

620.3 CONSTRUCTION METHODS:

620.3.1 Excavation: The trench will be neatly excavated with vertical sides and semi-circular bottom. The trench shall be shaped to form the bottom outside of the pipe on the alignment and to the grades specified in the plans. Departure from and return to the established grade for the finished trench and the invert of the installed pipe shall not exceed 1 inch per 10 linear feet with a maximum allowable departure of 0.10 feet. Departure from and return to specified alignment for the trench and pipe shall not exceed the allowable tolerances specified for the grade. The bottom of the trench, hereinafter known as the trench form, will be shaped to provide full, form, and uniform support by undisturbed earth or compacted fill for at least the bottom 210 degrees of the pipe. Density of the fill shall be at least five percent (5%) greater than the natural in place soil, but in no case less than 85 percent (85%) when tested in accordance with AASHTO T-99, Method A and T-191 or ASTM D-2922 and D-3017.

When it is necessary to install the pipe in rocky areas, the rock will be removed and replaced with suitable fill material compacted to proper density. The rock will be over-excavated to leave a 6-inch (150MM) minimum compacted soil cushion between the rock and the pipe. For construction accuracy, areas left void by rock removal will be completely filled with compacted material, then trenched for the pipe as though natural ground. If the rock below the pipe subgrade is fractured or fragmented or if it consists of large cobblestones or boulders, the replacement fill material will be carefully selected to ensure that it is of such gradation that it will not be removed downward by fluctuation of the water table. In no case will expansive soils be used for fill. A similar procedure of over-excavation, backfill, compaction, and retrenching will be used where sloughing sand or where soft or spongy soil conditions are encountered. When expansive clays are encountered, they will be thoroughly moistened by ponding, to completely expand the soil, and the moisture maintained until the concrete is placed. The contractor may substitute non-reinforced or reinforced concrete pipe for CIPP in these unsuitable areas. There will be no additional payment for this substitution.

Excavated trench shall be checked for compliance with requirements for grade and alignment prior to placement of concrete. The contractor shall submit his proposed method of grade and alignment control and checking of same for conformance with specifications to the Engineer for his approval prior to start of work. The contractor shall supply manpower, equipment and materials, as are required, to provide and confirm compliance with grade and alignment requirements. This is a non-pay item and all costs incurred shall be included in the bid item(s) for the pipe installation.

620.3.2 Placement: At the time of concrete placement, all soil in the trench will be adequately moistened so that water is not drawn from the freshly placed concrete. However, the trench form will be completely free of water, mud, and debris. All forming devices, including the slopforms and hopper of the placement device, shall be thoroughly moistened.

Concrete shall not be placed when temperature of the concrete exceeds 90 degrees Fahrenheit (32 Celsius) or is less than 50 degrees Fahrenheit (10 Celsius). The soil adjacent to the trench shall be at a temperature above freezing.

The pipe shall be constructed in one placement, the entire cross-section being placed monolithically. Inside forms shall be sufficiently rigid to withstand consolidation of the fresh concrete. Placement shall be such as to produce a thoroughly consolidated homogeneous concrete mixture conforming to the test requirements of this specification. Effective consolidation means shall be applied to the fresh concrete over the entire circumference and from within the pipe shell. Consolidation means shall be capable of effectively placing and consolidating fresh concrete at production speeds. Methods of consolidating shall be capable of building up sufficient pressure to effectively bond the concrete to the surrounding earth and to keep loose sand, mud and water out of the pipe shell.

Under no circumstances will the contractor be allowed to continue the pipe installation if the vibrators

of the cast-in-place machine are inoperable. Portable vibrators or "stingers", shall only be used to supplement internal vibrators on the machine and not as a sole source to consolidate and distribute the concrete mix.

The contractor shall make provisions for removing sloughed material, debris and any foreign objects from trench before and during placement of concrete such that buildup of material does not occur ahead of the machine. In addition, small transverse trenches shall be dug across trench bottom, at distances not to exceed 25 linear feet, to receive soil built up and pushed ahead of the slipform.

(A) Construction Joints:

When pipe placement stops in excess on ninety (90) minutes, a construction joint shall be formed. The ends of the pipe that are to be butt contact shall be left in rough condition with a slope between 20 and 45 degrees. Number 4 reinforcing bars shall be embedded 12 inches in the previous pour and 12 inches into the next pour and shall be placed 12 inches on center for pipe 42 inches in diameter or less and shall be placed 18 inches on center for pipe diameters in excess of 42 inches. Immediately before resuming concrete placement the surface to be bonded shall be cleaned of all laitance, coatings, foreign materials, and loose or defective concrete thoroughly wetted and coated with a layer of bonding mortar (Section 620.2.5) approximately 1/4 inch (6MM) thick. In lieu of the bonding mortar, neat cement paste may be thoroughly scrubbed onto the wet surface of the previously placed concrete.

For a joint that may be used for connections to another pipe or structure, a joint shall be made by squaring off the end of the pipe. An excavation shall be made along the sides and bottom of the cast-in-place pipe, for any diameter, to permit casting of a concrete collar as described above.

(B) Pipe Dimensions and Tolerances:

(1) The internal diameter of the pipe at any point shall not be less than 95% of the nominal diameter, and the average of any four (4) measurements of the internal diameter made at 45 degree intervals shall not be less than the nominal diameter.

(2) For pipe less than 15 inches (381 MM) inside diameter, the minimum wall thickness shall be 2 inches (50 MM).

For pipe with an inside diameter of 15 inches (381 MM) to 24 inches (610 MM) the minimum wall thickness shall be 2-1/2 inches (63 MM). For pipe exceeding 24 inches (610 MM) inside diameter the minimum wall thickness shall be 1/12 of the inside diameter, plus 1" inch (25 MM).

(3) Offsets at form laps and horizontal edges shall not exceed 1/2 inch (13 MM) for pipe having inside diameter not greater than 42 inches (approx. 1 M); 3/4 inch (19 MM) for pipe having inside diameter greater than 42 inches, but not greater than 72 inches (approx. 2 M); and 1 inch (25 MM) for pipe having inside diameter greater than 72 inches (1.8 M).

(C) Pipes Placement:

(1) It is essential that concrete placement be done in a smooth and steady manner with as few starts and stops as is possible. The contractor shall schedule materials and operate the pipe machine at speeds and in a manner that will achieve this.

(2) The contractor shall provide an anchoring system for pull of the machine in a manner which will provide the least probability of causing deviations in grade and/or alignment. Adjustments to or modifications in anchoring system, when required in the opinion of the Engineer, shall be made at no additional cost to the project.

620.3.3 Curing and Backfilling: The contractor shall be responsible for proper curing of the concrete and backfilling the trench to an even grade. Final backfill and compaction shall not be started until concrete has developed a compressive strength of at least 3000 psi. The pipe shall be checked for grade, alignment and thickness prior to backfilling. Curing shall be performed in such a manner as to prevent the premature drying of the concrete. The contractor shall use the method described below.

(A) Polyethylene film complying with ASTM C-171, nominal thickness 0.0015 inches (0.038 MM), shall be placed on the exposed top surface of the pipe immediately after the pipe is cast. The film shall be anchored in place with loose soil to assure continuous, adequate curing.

A humid atmosphere within the pipe, as evidenced by condensation on the interior surface, shall be maintained for at least seven (7) days following placement, except for a maximum period of 24 hours allowed for removing forms and making repairs. To prevent air drafts which may dry the pipe and to maintain a humid atmosphere inside the pipe, all openings, ends, manholes, connector pipes shall be kept closed or securely covered, except when actual work is in progress on the inside of the pipe. The pipeline shall be partially filled with water during the curing period when work is not being performed on the inside of the pipe.

620.3.4 Repair: Immediately after removal of the forms, the inside of pipeline will be inspected for required repairs and conformance with all dimensional requirements including alignment and grade. The Engineer shall be the sole judge as to the repairability of deficiencies. He shall require removal and replacement of those sections of pipeline which he judges to be non-repairable or which are not within required dimensional tolerances, including alignment and grade.

When concrete placement is done by a method requiring the use of metal inner forms, the contractor shall schedule his work force, by extended, staggered or multiple shifts, as required, to provide for removal of forms within 4 to 6 hours of placement of concrete and start of repairing, patching and finishing of pipeline to conform with specification requirements.

When concrete placement is done by methods using pneumatically inflated inner liner, the contractor shall schedule his work force, by extended, staggered or multiple shifts, as required, to provide for removal of the pneumatic inner liner within 12 hours of placement of concrete and start of repairing, patching and finishing of pipeline to conform with specification requirements.

All rock pockets, non-longitudinal cracks or indentations shall be cleaned out, moistened and filled with 1:2 cement grout or approved epoxy material. Except where, in the opinion of the Engineer, the width and/or length of the crack may indicate a structural deficiency, repairs shall be made as required for longitudinal cracks.

At the discretion of the Engineer, longitudinal cracks exceeding 0.01 inches in width and 12 inches in length may be cause for rejection and removal and replacement of that portion of the pipe. Subject to the approval of the Engineer, cracks may be repaired using a pressure applied epoxy compound capable of providing structural correction to the area in addition to sealing the void. A longitudinal crack shall be defined as one which has the general direction of a 30 degree angle or less with the alignment of the pipe.

Irrespective of concrete placement method, all repairs, patches and finishing shall be completed within 24 hours of concrete placement.

The contractor, prior to start of concrete placement on project shall submit a written schedule of his proposed work activities and work time schedules for the Engineer's review and approval. No time schedule requiring overtime by the Engineer's staff is authorized without specific written approval of the Engineer.

Compliance with this section is a non-pay item and any costs incurred shall be included in the bid proposal item(s) for the pipe.

620.3.5 Finishing: Except for the form offsets, the interior surface of the pipe shall be equivalent to or better than a wood float finish. Form offsets shall be trimmed so as to provide a reasonably tapered slope from surface to surface. The bottom of the pipe below the metal forms shall be finished in a workmanlike manner and shall conform to the general circular circumference of the pipe without sags, dips and humps. All extraneous concrete shall be removed from the interior surface.

620.4 TESTS:

Random tests shall be made of the wall thickness at the top, bottom and sides, approximately every 100 feet, on a daily basis by probes through fresh concrete or small holes drilled through the concrete. Holes shall be properly and permanently closed and sealed, flush with the inside surface of the pipe, after measurements are made, in accordance with the requirements of the fifth paragraph of MAG Subsection 620.3.4, contained herein.

Test cylinders shall be prepared and tested as per Section 725. If the cylinder tests indicate that the concrete does not meet the specified strength requirements, cores shall be taken from the same section of concrete represented by the faulty test cylinder under the supervision of the Engineer. The concrete should be at least 14 days old before the core specimens are taken. The diameter of the core specimens for the determination of compressive strength should be at least three (3) times the maximum nominal size of the coarse aggregate used and must be at least twice the maximum nominal size of coarse aggregate.

The length of the specimen, when capped, should be twice to core diameter. A core having a maximum height of less than 95 percent of its diameter before capping or a height less than its diameter after capping shall not be tested.

If cores are taken, the contractor shall patch all core holes in such a manner that the patch will be permanent, will not leak, and will have a smooth interior finish flush with the interior surface of the pipe.

Procedures and payment for coring shall be in accordance with applicable portions of Section 725.

The Engineer will evaluate the test results and his decision as to required corrective action will be final.

620.5 MEASUREMENT:

Measurement of cast-in-place concrete pipe will be the number of linear feet of pipe measured horizontally along the pipe axis from end to end of pipe. At change in diameter, the measurement shall be to center of manhole or transition.

620.6 PAYMENT:

Payment will be made at the contract unit price bid per linear foot to the nearest foot for each size of pipe and shall be compensation in full for furnishing and installing the cast-in-place concrete pipe as specified including removal of obstructions, excavation, backfilling, compacting, testing, and all incidental costs not specifically covered in other items in the proposal.

SECTION 621

CORRUGATED METAL PIPE AND ARCHES

621.2 MATERIALS: Add the following paragraphs:

All prefabricated fittings for lateral pipes larger than 24 inches shall be welded fittings..

The rubber O-ring gasket shall conform to the requirements of ASTM C-361. The sleeve gasket shall be a closed cell rubber in accordance with ASTM D-1056, grade SCE 43.

621.3 INSTALLATION: Add the following paragraphs:

For the concrete lined pipe, cracks 1/16 inch or more in width and 36 inches or greater in length shall be repaired with and approved epoxy.

Where a curved alignment is indicated, curves shall be formed by straight pipe and fabricated specials. Pipe shall be of such length that no deflection angle of the pipeline exceeds 10 degrees. All deflection angles shall occur between the point of curvature and point of tangent of the curve as shown on the plans.

Transition manhole bases, for pipe larger than 48 inches, may be constructed with a prefabricated transition and a 48 inch stubbed manhole shaft casted as one structure. Dimensions of this structure shall be equivalent to those shown in to Standard Detail. A shop drawing of this option shall be submitted to the Engineer for review. Corrugated steel manhole shafts will not be permitted unless a detail of construction is included and reviewed with the shop drawing.

Pipe layout shall be such that for manholes not located at a joint, the outside edge of the manhole shaft shall be a minimum of 1.5 pipe diameters away from the nearest joint, on both sides of the manhole.

If the manhole cannot be so located, then the concrete encasement shall be extended to include the joint or joints no outside to minimum distance of 1.5 pipe diameters form the outside of the manhole shaft.

621.3.1 Joints: Delete this Subsection and substitute to following: For bituminous coated pipe, the thickness of the exterior pipe coating under the connecting band and that of the connecting band shall be a minimum of 0.050 inches with a smooth, neat appearance that will permit the connecting band to properly seat and lock in to angular corrugations and compress the gasket.

Pipe sections shall be joined together with annular corrugated type bands or hugger type bands locking in at least one annular corrugation and shall be designed to form a leak-resistant joint. The hugger type band shall use an O-ring gasket. The annular corrugated type band shall use a 1/4 inch thick rubber sleeve gasket the same width as the connecting band.

One-piece bands may be used on pipe with diameters up to and including 48 inches. O-ring gaskets or one-piece bands shall be a minimum of 3/4 inch diameter. Two or more piece bands shall be used on all pipe diameters exceeding 48 inches. For pipe with diameters exceeding 48 inches, O-ring gaskets shall be a minimum of 7/8 inches in diameter. The minimum connecting band width shall be 7 inches for pipe diameters of 12 inches through 30 inches, 10-1/2 inches for pipe diameters of 33 inches through 60 inches, and 13-1/2 inches for pipe diameters greater than 60 inches through 120 inches. The connecting bands may be two numerical gage thickness lighter than the gage specified for the pipe material, but not less than 0.064 inches (16 gage) nor more than 0.109 inches (12 gage).

The band shall be tightened evenly, keeping equal tension on the bolts. The joint shall remain uncovered over a period designated by the Engineer, and before covering the joint, the nuts shall be tested for tightness. If the nut has a tendency to loosen its grip on the bolt, it shall be tightened again and remain uncovered until a tight, permanent joint can be obtained. Prior to backfilling around the joint, the bolts, lugs, and nuts shall n be given a coating of bituminous mastic. For the bituminous lined pipe, the annular space between abutting pipe sections shall be filled with bituminous mastic after joining. For the concrete lined pipe, all internal joints shall be mortared to a smooth trowel finish around the entire pipe. The leakage test will not be performed until all internal joints have been filled or mortared.

SECTION 625

MANHOLE CONSTRUCTION AND DROP SEWER CONNECTION

Subsection 625.2 Materials: Add the following paragraph:

Plastic manhole steps that mechanically lock into precast holes in to manhole structure are accepted for use. Plastic shall conform to ASTM D-2146, TYPE II.

SECTION 630

TAPPING SLEEVES, VALVES AND VALVE BOXES ON WATER LINES

Subsection 63.4 (B) (2) Stainless Steel Type 304, Change the Subsection to read:

Stainless Steel, Type 304 - All integral metal parts of the sleeve shall be stainless steel, Type 304. All welds shall be chemically treated and the residue removed so as to return the welded stainless steel to its original corrosion resistant state. All gaskets shall be of virgin styrene butadiene rubber (SBR), or equal, compounded for water service. The complete circle gasket I shall be a minimum of 0.22 inch thick and permanently attached to sleeve. The sleeve shall be capable of withstanding 125 ft.-lbs. of bolting torque without deformation of any sleeve components. Actual bolting torque during installation shall be as specified by the manufacturer.

PART 700
MATERIALS

SECTION 702
BASE MATERIALS

Subsection 702.1 GENERAL: is modified to add:

For all City of Phoenix projects, aggregate base or ABC as used on the plans and Standard Details shall be crushed aggregate, with gradation as for aggregate base per Table 702, and shall be placed in conformance with Section 310 for Untreated Base.

SECTION 705
PORTLAND CEMENT TREATED BASE

Subsection 705.1 GENERAL: Change the second sentence that reads "The estimated cement requirement is 3-1/2 percent by weight of the dry aggregate." to read:

The estimated cement requirement is 5 percent by weight of the dry aggregate.

SECTION 710
ASPHALT CONCRETE

Subsection 710.2.3 Mineral Filler and Anti-Stripping Agent: paragraph (A): Add the following sentence:

Either dry hydrated lime or Portland cement, approximately 1.5 percent by weight of the mineral aggregate, shall be used as a mineral filler in all asphalt concrete pavement including Recycled Asphalt Concrete.

Subsection 710.2.5 Job-Mix Formula: Make the following changes:

(A) Reference the Job-Mix Tolerances, change the tolerance for "Aggregate Passing Sieves No. 8 and No. 30 from plus-minus 6 percent to plus-minus 5 percent.

(B) In the third paragraph after "AASHTO T-164 and T-16811", add the following: or City of Phoenix Methods SN-403 and SN-441.

Subsection 710.9 DRUM MIXES: Change this subsection title to read:

710.9 DRUM MIXING:

SECTION 735
REINFORCED CONCRETE PIPE

Subsection 735.4 MATERIALS: Paragraph (D) Steel Reinforcement. Change the last sentence that reads "The number of steel wraps . . . for any one pipe." to read:

The area of steel used shall be the same as that shown on the shop drawing for that pipe.

Section 735.4 MATERIALS: Paragraph (E). Delete this paragraph in its entirety and substitute the following:

(E) Rubber gaskets for pipe used for storm sewers, drainage or irrigation purposes shall be in accordance with MAG Section 618.2. Rubber gaskets for sanitary sewer pipe shall be in accordance with MAG Section 765.

SECTION 736

NON-REINFORCED CONCRETE PIPE

Subsection 736.3 PIPE JOINTS: Delete the first paragraph in its entirety. The specification for pipe joints is included in City of Phoenix Supplement to Section 618.

Subsection 736.3.2 Rubber Gaskets Joints: Delete this subsection in its entirety and substitute the following:

736.3.2 Rubber Gasket Joints: Rubber gaskets shall conform to MAG Subsection 618.2.

SECTION 741

LINING FOR REINFORCED CONCRETE SANITARY SEWER PIPE

Subsection 741.1 GENERAL:

In the first sentence delete any reference to Type 'B' lining. Type 'A' only will be used.

Subsection 741.2.2 Material Details and Dimensions: Change the first sentence to read:

The linear plate shall not be less than 0.060 inches in thickness.

SECTION 750

IRON WATER PIPE AND FITTINGS

Subsection 750.2 DUCTILE IRON WATER PIPE: is modified to add:

Ductile iron water pipe shall be of minimum pressure class as follows in accordance with AWWA C-150:

| | |
|-----------------|-----|
| 14" and smaller | 350 |
| 16" thru 24" | 250 |
| 30" and larger | 150 |

Ductile iron water pipe with a minimum wall thickness of Class 50 may be substituted in lieu of the above.

All ductile iron water pipe shall be cement-mortar lined and seal coated in accordance with AWWA C-104.

For ductile iron pipe eighteen (18) inches and larger, a manufacturer's pipeline layout shall be submitted showing the line layout with each fitting specified and detailed. Numbering of each standard joint is not required.

The following are approved joint restraint methods for use with ductile iron pipe: Flanged joint; Pacific States lock mechanical joint or restrained tyton joint; Ebba Iron, Inc. Series 1100 Megalug thru 24"; Clow Super-lock joint; U.S. Pipe TR Flex gripper ring; **U.S. Pipe TR Flex Joint**; American Lok-ring restrained joint.

Where tangential outlets are shown on plans, tangential outlets shall be furnished.

Weld-on boss outlets are not acceptable.

750.4 FITTINGS: Change the second paragraph to read:

Fittings for water pipe shall be cement mortar lined and seal coated in accordance with AWWA C-104.

SECTION 757

SPRINKLER IRRIGATION SYSTEM

757.1 GENERAL: Add the following paragraph:

The Manufacturer of component equipment shown on the drawings or specified in the Special Provisions form the basis of the irrigation design as well as the physical and operational standards for which the components were selected. Component equipment from other manufacturers may be submitted, by the Contractor, to the Engineer for approval. No equipment however is to be ordered without approved shop drawings.

757.2 PIPE AND FITTINGS: add the following subsections:

757.2.2 Plastic Pipe: Change this subsection to read:

757.2.2 Plastic Pipe: (A) Rigid Plastic Pipe shall be extruded from 100% virgin normal impact unplasticized polyvinyl chloride (PVC) Type I, Grade I or II resin 2000 psi (PVC 1120 or PVC 1220), design stress ASTM D1784, Department of Commerce PS-21-70, PS-22-70. Standard Dimension Ratio (SDR) 26 or less than 160 psi. Pipe shall conform to ASTM D-2241 and D-2672.

Testing of pipe: Provide written certification by supplier that polyvinyl chloride pipe has successfully passed the following tests:

Acetone test: Immerse a sample of pipe in 99% pure anhydrous acetone for 15 minutes; at the end of this time there should be no evidence of flaking or delamination on the inner or outer walls of pipe. Evidence of softening or swelling shall not constitute failure.

Flattening: Cut a specimen two inches long from each end of the pipe sample. Flatten each test specimen from parallel plates of a press until the distance between the plates, in inches, is equal to sixty (60) percent of the pipe O.D., and there shall be no evidence of cracking, splitting or breaking.

The pipe shall be homogeneous throughout, free from visible cracks, holes, or foreign materials. The pipe shall be free from blisters, dents, wrinkles or ripples, die and head marks.

Piping up to and including 2-1/2" size shall be SDR solvent welded.

Pressure mainline piping 3" size and larger shall be gasket pocket type, as manufactured by the Swanson Co. or approved equal, and shall conform to ASTM F-477.

Continuously and permanently mark pipe with manufacturer's name or trademark, kind and size (IPS) of pipe, material, manufacturer's lot number, schedule or type and NSF seal of approval.

(B) Plastic Pipe Fittings and Couplings: For pipe fittings up to and including 2-1/2" size, fittings and couplings shall be either threaded type or slip fitting tapered socket solvent weld type. Schedule 80

pipe will only be used for threaded joints. Tapered socket solvent weld fittings may be either Schedule 80 or Schedule 40, but in either case, will be equal to or greater than the schedule and Pressure Rating of the plastic pipe being joined. Tapered fittings shall be sized so that a dry, unsoftened taper cannot be inserted more than halfway into the socket. Plastic saddles and flange fittings are not permitted.

PVC fittings shall be marked with manufacturers name or trademark, type PVC, size and NSF seal of approval. Extruded couplings to be produced from NSF rated raw materials and meet ASTM standards.

For pipe 3" and greater, fittings shall be ductile iron, grade 80-55-06, in accordance with ASTM A-536. Fittings shall have mechanical joints with gaskets meeting ASTM F-477. Fittings shall have radii of curvature conforming to AWWA C110.

757.2.5 PVC Primer: The primer shall be specifically formulated for the pipe and type of connection, as recommended by the pipe manufacturer.

757.3.4 Electrical Remote Control Valves: change this section to read:

The electric remote control valve listed on the plans or specifications and described by the manufacturer's most recent literature (catalogue cut sheet), constitute the quality and performance standards for the specified valve.

757.3.7 Valve Boxes: change this section to read:

All valve boxes shall have stainless steel bolts and washers with lock down covers. Valve boxes and covers shall be molded, non-corrosive plastic, ASTM D638, D-356, except when located in paved surfaces. These shall be concrete boxes with lock down steel cover rated for traffic conditions to which it will be exposed.

757.4 BACKFLOW PREVENTER ASSEMBLY: change this section to read:

The Backflow Preventer Assembly shall consist of Pressure type, or Reduced Pressure type backflow preventer unit and associated components conforming to the governing code requirements and as shown on the plans or specifications. The backflow preventer unit shall be equal in quality and performance to the unit listed in the Contract Documents.

757.5 SPRINKLER EQUIPMENT: delete the last two paragraphs and substitute the following:

Spray heads, impact sprinkler heads, rotor pop-up sprinkler heads, bubblers, emitters, etc., as shown on the plans or specifications and as described in the Manufacturer's latest literature (Catalogue cut sheets) constitute the performance and quality standards for this equipment.

757.6.3 Electro-Mechanical Controller Unit: delete this subsection.

757.6.4 Controller Unit and Assembly: delete this section and substitute the following:

757.6.4 Controller Unit and Assembly: The Controller unit and assembly listed on the plans or specifications and as described in the Manufacturer's latest literature (Catalogue cut sheets) constitute the quality, performance and operational standards for the specified Controller.

SECTION 758

CONCRETE PRESSURE PIPE - STEEL CYLINDER TYPE

758.1 GENERAL: is modified to add:

Revised 1 July 1994
Revisions in bold print

All pipe shall be designed for 150 psi working pressure, test pressure 188 psi.

The pipe shall be designed to support the earth cover over the pipe as shown by the pipeline profiles on the plans. Where the earth cover over the pipe is less than eight (8) feet, the design shall be based on eight (8) feet minimum cover. When the plans show both existing and future surface profiles, the critical cover shall be used for design purposes.

Earth loads on pipe shall be calculated assuming the pipe is installed in a positive projecting embankment condition. The loading for positive projecting embankment condition shall be derived using a product of the projection ratio and the settlement ratio of 0.5. The Ku factor shall be 0.150. The soil unit weight shall be 140 pounds per cubic foot.

Pipe reinforced with ring stiffeners will not be permitted. Dimensions of fittings and specials shall conform to AWWA C-208.

Field joints for specials and fitting shall be as called for on the plans. Flanges shall be Class 'D' steel ring flanges in accordance with AWWA C-207.

758.1 (A) change second paragraph to read:

Reinforced concrete pressure pipe may be furnished in pipe diameters of eighteen (18) inches through forty-two (42) inches.

758.1 (A) is modified to add:

The pipe shall be designed for the maximum stress to be encountered in place as indicated on the plans, whether it be internal pressure, external backfill load, H-20 truck load on the backfill, or any combination of loading.

The pipe shall be designed to limit the deflection of the pipe, in inches, under the external loads specified to not more than the square of the diameter of the pipe in inches divided by 4,000. Deflection shall be calculated by "Spangler's" formula using a bedding constant (K) of 0.1 and a module of soil reaction (E') of 1,000.

The pipe shall be designed for external loading based on a H-20 truck loading and impact factors recommended by AASHTO for highway truck loads in "Standard Specifications for Highway Bridges."

Immediately after the cement-mortar coating has been placed, the ends of each section of pipe shall be tightly capped with waterproof covers to prevent the escape of moisture when water curing. When steam curing, waterproof covers may not be necessary until completion of cure, provided prompt application of steam is begun. The waterproof covers shall become a component part of the completed pipe section, to protect the interior of the pipes, and shall remain on the pipe until it is installed in the trench.

758.1 (B) Change the third paragraph to read: Pipe shall be designed by the methods described in AWWA C-304 to resist the internal pressures, and external loading conditions designated on the approved plans or in the project specifications.

758.1 (B) is modified to add: **at the end of the first paragraph "and AWWA C-304"**

Pipe may be either lined cylinder type or embedded cylinder type. Stress analysis of pipe shall be made using "Olander's" coefficients for a 120 degree bedding angle .

Except as otherwise provided in this Section, fabricated steel plate fittings and specials shall be

esigned for internal pressure only. The internal pressure design shall be based upon a design stress of 15,000 psi. The minimum steel plate thickness shall be 1/4 inch .

(1) Outlets, where specified on the plans, with an internal diameter of less than one-half the diameter of the mainline pipe shall be installed on prestressed concrete cylinder pipe. Outlets with an internal diameter greater than one-half the diameter of the mainline pipe or thirty-six (36) inches shall be designed and manufactured as a separate fabricated steel plate fitting.

(2) The exterior of fabricated steel plate fittings and specials shall **not be mortar coated, but shall be shop painted as provided in this section.**

(3) All fabricated steel plate fittings and specials shall be encased in reinforced concrete as shown on the details in the plans.

At mainline valves where a steel plate section is required to comply with plans and/or attach a companion flange for connection to the valve, the following shall apply to such plate sections:

(1) Design shall limit deflection to the square of the diameter in inches divided by 4,000 for pipe diameters less than sixty (60) inches. For pipe diameter sixty (60) inches and greater deflection is limited to one and one-half (1-1/2) percent of the diameter.

(2) Unless otherwise specified, plate sections shall not be longer than one (1) foot.

(3) Plate sections shall comply with all other applicable provisions, MAG Specifications, Phoenix supplement to Mag and AWWA Standards.

758.2 Manufacture: is modified to read:

An affidavit of compliance as specified in Section 1.11 of AWWA C-301 and Section 1.11 of C-303 shall be furnished to the Engineer.

Cement used in manufacture of pipe shall conform to ASTM C-150, Type II, low alkali.

No concrete admixture shall be used except as approved in writing by the Engineer.

Liquid membrane-forming compounds shall conform to ASTM C-309, Type I, and shall be of such composition that after drying they will not impart taste or odor to water flowing through the pipe, nor will they contain any toxic materials. The use of such compounds shall be subject to the approval of the Engineer.

Rust inhibitors used for preventing rust on steel surfaces at holdbacks of mortar lining and/or coating shall be quick-drying material with good bonding properties to the steel, and shall be tack-free and smooth within four (4) hours after applying.

All joints shall be the Carnegie Bell and Spigot type with rubber gaskets. The joint rings for spigot ends for rubber gasket joints shall be Carnegie Shape M-3516, M-3818 or M-3836.

Openings, connections and outlets shall be cement mortar lined and concrete coated as detailed on the plans.

758.3 Material Drawings: New Subsection:

The contractor shall furnish the Engineer with six (6) copies of shop drawings, pipe layout diagrams, manufacturer's catalog data, and detailed information, in sufficient detail to show complete compliance

with all specified requirements, covering but not limited to the following items:

Fabricated pipe and specials; design calculations; field closures; reinforcing steel and concrete mix designs.

The manufacturer's complete design calculations shall be submitted to the Engineer for review prior to or with the Joint Detail submittal.

The procedure outlined in American Water Works Association Manual M-9 will be used in determining the length of pipe requiring welded joints. Joint restraints design shall be based on test pressures. Shop drawing submittal shall include calculations showing the length of welded joints, tensile stress to be resisted by, and design of joint welds and pipe longitudinal reinforcement. Minimum design parameters shall be as follows: Soil unit weight is 110 pounds per cubic foot; soil friction coefficient 0.3; height of backfill over pipe - maximum four (4) feet or as shown on plans (if less than four (4) feet). Throat thickness of welds shall be based on an allowable stress of 8,800 pounds per inch per inch of throat thickness using an E60 low-hydrogen electrode. The allowable stress in the steel cylinder shall not exceed 15,000 psi.

Shop Drawings and Line Layout:

(A) The manufacturer's pipeline layout shall be furnished together with standard details for review. The line layout shall show each standard pipe joint and each special joint or fitting by number. Manufacturer's standard details shall be furnished in sufficient details to assure that the detail design of the pipe and specials will comply with the design concept and structural requirements of the project as presented in the Contract Documents. Full details of reinforcement, concrete, cement, mortar, joint dimensions, etc., for the straight pipe, specials and connections shall be furnished. Layout drawings shall show stations and the invert elevations of the pipeline.

(B) Manufacturer's shop drawings shall be furnished for fabrication, inspection and record purposes in accordance with the "General Conditions". The manufactured pipe and specials shall conform to the approved standard details and shall meet all specified requirements unless otherwise approved in writing.

(C) Valves and fittings to be incorporated in the pipeline shall be considered when preparing the pipeline layout.

758.4 Shop Inspection and Tests: New Subsection:

(A) Inspection:

(1) The City and its representatives shall have access to the work wherever it is in preparation or progress, and the contractor shall provide proper facilities for access and for inspection during the manufacturing process.

(2) Inspection by the City or its representatives, or failure of the City or its representatives to provide inspection, shall not relieve the contractor of his responsibility to furnish materials and to perform work in accordance with this specification.

(3) Material, fabricated parts, and pipe which are discovered to be defective or which do not conform to the requirements of this specification, will be subject to rejection at any time prior to final acceptance. Rejected material and pipe shall promptly be removed from the site of the work.

(B) Test and Materials:

(1) In advance of manufacture of the pipe, the contractor shall furnish to Engineer three (3) copies of the mill test certificate for all steel products incorporated in the pipe. Three (3) copies shall be furnished of mill test reports on each heat from which the steel is rolled.

(2) Methods of Tests for Cement, Mortars and Concrete:

(a) Mortar Lining: The mortar for all mortar lined pipe shall be sampled and molded by the following procedure:

The mortar sample shall be taken directly from the transfer bucket between the mixer and the charging trough which injects the mixed mortar into the spinning pipe. A sufficient amount shall be extracted to make four (4) 6" x 12" cylinders, and shall be placed in a wheelbarrow or other suitable container. The mortar sample material shall then be transported to the location at which the cylinder cans are to remain without moving for the next 24 hours. The mortar shall be thoroughly mixed immediately prior to pouring into the cylinders in order to prevent segregation. After the mortar has been thoroughly mixed, it shall be poured in a continuous stream into the cylinder cans. The cans shall immediately be capped and allowed to remain without disturbing for twenty-four (24) hours.

(b) Mortar Coating: Mortar for all mortar coated pipe shall be sampled by molding four (4) cylinders for compressive tests of the representative material being used to seat the pipe. The mortar sample shall be molded in 6" diameter cylinder in accordance with applicable provisions of ASTM D-558.

(c) Curing of Test Cylinders: The curing of concrete, lining and coating cylinders for the first twenty-four (24) hours shall be the same as that for the pipe, except that the mortar for coating cylinders shall be covered with a piece of damp burlap to retard the drying out or the low moisture content of the mortar coating. At the end of twenty-four (24) hours, the cylinders shall be transported to a moist curing cabinet and cured in accordance with ASTM C-192.

(3) Strength of Cement Mortar Lining, Coating, Concrete and Steel:

(a) Mortar Lining: The average compressive strength, as per Section C below, of cylinders for mortar lining for the several types of pipe shall be as follows:

(1) Semi-Rigid Pipe

Steel pipe and steel cylinder pipe, single wrap, pretensioned, the average compression strength of cylinders shall not be less than 1700 psi at seven days, and 2300 psi at 28 days.

(2) Rigid Pipe

Steel cylinder pipe prestressed, the average compressive strength of cylinders shall not be less than 3000 psi at seven days, and 4500 psi at 28 days. Steel cylinder pipe, double wrapped shall not be less than 3000 psi at seven days, and 4500 psi at 28 days.

(b) Mortar Coating and Concrete for Prestressed Pipe

(1) Semi-Rigid Pipe

Steel pipe and steel cylinder pipe, single wrap, pretensioned, the average compression strength of cylinders shall not be less than 3000 psi at seven days, and 4500 psi at 28 days.

(2) Rigid Pipe

Steel cylinder pipe prestressed, and steel cylinder pipe, double wrap pretensioned, the average compressive strength of cylinders shall not be less than 3000 psi at seven days, and 4500 psi at 28 days.

(c) To conform to these requirements ('a' and 'b' above), the average of any five (5) consecutive strength tests of the laboratory cured specimens shall be equal to or greater than the specified strength, and no more than 20% of the strength test shall have values less than the specified strength. If any one cylinder falls below 80% of the specified strength at seven days, an extra cylinder from the same batch shall then be broken, and if the strength of this cylinder also falls below 80% of the specified strength, then the entire production represented by these cylinders will not be accepted for use until the results of the twenty-eight day test is known, and if it also falls below 80% of the specified strength, the above non-acceptance will become final. The expense of the required tests of cylinders and mortar shall be the responsibility of the contractor.

(d) Testing of Steel Pipe Cylinders (Hydrostatic Pressure Test): Each steel pipe cylinder, prior to embedment in cement mortar, or concrete, shall be hydrostatically tested under a water pressure which stressed the steel to a unit stress of at least 22,000 psi after the bell and spigot ends have been welded in place, utilizing companion bell and spigot test heads. While under this stress, the welded seams shall be hammered vigorously at one foot intervals with a one pound sledge hammer, and shall be thoroughly inspected.

All parts of the cylinder showing leakage shall be marked for rewelding. After rewelding, such cylinders shall be subjected to another hydrostatic test as stipulated above. The costs of hydrostatic pressure test shall be at the contractor's expense.

(e) Testing of Fittings and Specials: The seams in angle pipe, short-radius bends and special fittings shall be welded in two or more passes, and each weld tested for tightness by the air-soap method or by the dye-penetrant method. However, if the fitting is fabricated from cylinders which have been previously tested hydrostatically, no further test is required for seams so tested. Hydrostatic testing of fittings to 150% of the design operating pressure may replace the tests described above. Any defect revealed under any of the alternate test methods shall be rewelded, and the weld tested again. The cost of these tests shall be at the contractor's expense.

758.5 Marking, Handling and Delivery: New Subsection:

(A) Marking: Identification markings, for each type of water pipe as specified herein, shall be placed on the pipes. These markings shall show the proper location of the pipe or special in the line by reference to layer drawings. All bends shall be marked on the ends with the angle of deflection and the plane through the axis of the pipe. All beveled pipe shall be marked with the amount of the bevel, and the point of maximum bevel shall be marked at the end of the spigot.

(B) Handling and Delivery: All pipe shall be manufactured, handled, loaded, shipped, unloaded and stored at the job site in such a manner as to prevent any damage to the pipe. Any pipe section that becomes damaged shall be repaired as directed by the Engineer if, in his opinion, a satisfactory repair can be made. Otherwise, it shall be replaced with an undamaged section, at the contractor's expense. Lifting from the inside of the pipe will not be permitted.

SECTION 760

COATING CORRUGATED METAL PIPE AND ARCHES

760.2 MATERIALS: all the following paragraphs:

The type of bituminous coated pipe shall be as specified by the standard details or special provisions. In addition to the types listed in AASHTO M-190, there will be a Type F.

Type F Pipe - Coated and Concrete Lined Pipe: The pipe shall be uniformly coated on the outside as required for Type A pipe. IN lieu of a bituminous coating, the entire inside shall be lined with Portland cement concrete. The lining shall be plant applied, in a manner approved by the Engineer, such that a homogeneous, non-segregated concrete lining with mechanical trowel finish is produced. The lining shall have a minimum thickness of 1/8 inch above the crest of the corrugation.

Portland cement used shall be in accordance with MAG Section 725 and, in no case, be less than 564 pounds per cubic yard of cement. Sand shall be as per Section 701 and the size and gradation shall be as specified for Portland cement concrete.

SECTION 765

RUBBER GASKETS FOR CONCRETE PIPE

~~Subsection 765.1 GENERAL: In the second paragraph, third sentence, change the word 'neoprene' to read:~~

~~'Chloroprene (ASTM SAE Designation Type SC)'~~

~~Table 765 RUBBER GASKETS: Make the following changes to the values in the table:~~

~~(A) Tensile strength, Min. psi change 1121001 to 115001.~~

~~(B) Shore durometer hardness, Type A, (1) change 150-601 to 140-601.~~

~~Subsection 765.1 GENERAL: delete the first sentence of the last paragraph that reads:~~

~~"The contractor shall submit, for approval, details of the shape and size of the gaskets he proposes to use."~~

SECTION 787

GRAY IRON CASTING

Subsection 787.3 Manhole Frame and Cover Sets: add the following paragraphs:

ASTM A-48 Class 35, gray cast iron manhole frames and covers are approved for use on City projects. The weights of the 30-inch frame and cover castings shall be a minimum of 219 pounds for the frame and 207 pounds for the cover. The weights of the 24-inch frame and cover castings shall be a minimum of 170 pounds for the frame and 180 pounds for the cover. The contractor shall provide manufacturer's certification that the product meets the required H-20 traffic loading.

MAG Standard Detail 424 (2411 and 3011 Manhole Frame and Cover) shall be modified to include a 3/4 inch diameter hole near the center of both the 24-inch and the 30-inch sanitary manhole covers.

SECTION 792

DUST PALLIATIVE

Subsection 792.2 TYPE AND APPLICATION OF MATERIAL: Paragraph (A) Asphalt Base Type: Delete this paragraph in its entirety. These asphalt base dust palliatives are not available or are restricted from use as dust palliatives.

SECTION 795

LANDSCAPE MATERIAL

Subsection 795.1 GENERAL: add the following paragraph:

The contractor shall submit written certification that plants are the species and varieties and size specified.

MAG Subsection 795.2 TOPSOIL: delete this entire subsection and substitute the following:

795.2 TOPSOIL:

Topsoil shall be a fertile, friable soil, obtained from well-drained arable land, and shall be free from nut grass, refuse, roots, heavy clay, clods, noxious weeds or any other material toxic to plant growth. At least 10 days prior to delivery of topsoil to the site, the contractor shall furnish the Engineer, at no additional cost, with a soil sample from each source for analysis and tests.

Soil tests will be accomplished by an approved independent soil testing laboratory capable of doing the appropriate horticultural soil test. The results of the test will determine the acceptability of the soil. The testing laboratory may suggest ways to amend the soil to make it suitable to grow plants. The contractor may be directed by the Engineer to provide the amendments at no additional cost.

To be acceptable, the ph factor shall not exceed 8.0 or be lower than 5.5, soluble salts shall not exceed 1500 PPM, the plasticity index shall be in the range of 3 and 10 inclusive, and it shall contain approximately 1-1/2%, by dry weight, organic matter either natural or added.

795.3 SOIL FERTILIZING MATERIAL: delete this subsection and substitute the following:

795.3 Soil Amendments and Conditioners: Fertilizing material shall comply with the applicable requirements of the State Agricultural Code. Fertilizing material shall be packaged, first grade, commercial quality products identified as to source, type of material, weight and manufacturer's analysis. It shall not contain toxic ingredients or fillers in quantities harmful to human life, animals, or plants. Material which has become caked or otherwise damaged shall not be used.

Plant Material: Fertilizing material for plants shall be similar to the product Milorganite (processed sewage sledge pellets), or approved equal, with the following additive ingredients (% by weight): 3% Nitrogen, 10% Sulfur, 4% Iron, 1% Zinc, 0.08% Manganese, and 0.13% Viterra. All fertilizing material shall be in 5 pound packages with additive ingredient 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.

Turf: Soil fertilizer for turf shall be a commercially approved brand designated for turf grass. Unless otherwise specified lawn fertilizer shall be a general purpose homogeneous blend no less than 12% analysis on a 1:1:1 ratio.

Slow Release Fertilizer Tablets: Shall be Agriform 21 gram tablets or equal with 20-10-5 analysis.

Organic Mulch: Shall consist of a ground or processed wood product derived from redwood, ground or shredded fir, redwood or ponderosa bark. It shall have a nitrogen content of 1%, a ph not exceeding 7.5% and organic matter not less than 85%. Mulch gradation shall be treated with a non-toxic agent so as to be hydroscopic.

When manure is used as a soil conditioner, it shall be the product of yard fed cattle, free of weed seeds, straw or any other inert material and aged at least 3 months. This manure shall have been processed by grinding and screening and shall be treated with a non-toxic agent so as to be hydroscopic.

Bone Meal: Commercial grade product uniform in composition.

Sand: Shall be brown washed natural mortar sand passing at least a #7 screen, free of weeds, organic material, stones, deleterious materials, non-toxic to plant and human life and usable for backfill mixtures.

795.4 ORGANIC SOIL CONDITIONERS: delete this subsection.

795.6 SEEDS: add the following subsection:

795.6.1 Native Seeds: Shall be certified to scientific name, lot number or other identification, origin of the seed, purity of the seeds as a percentage of pure live seed by weight, germination percentage and percentage of firm ungerminated seeds, name and address of person who labeled or offers seed for sale.

Pure Live Seed (PLS) percentage = (% germination + % ungerminated firm seed) x (% purity). The seed rate specified is pounds of Pure Live Seed.

795.7 PLANTS, TREES, AND SHRUBS: delete this section and substitute the following:

795.7 Plants: Plants shall be nursery grown or plantation grown stock conforming to ANSI 260-1 and shall be of the varieties specified in the plant list bearing botanical name listed. Plants shall meet the standards established by the Arizona Nursery Association Grower's Committee recommended specifications.

Planting stock shall be well broached and well formed, sound, vigorous, healthy and free from disease, sun-scald, windburn, abrasion and harmful insects or insect eggs and shall have healthy, normal and unbroken root system which is neither root or pot-bound and are free of kinked or girdling roots. Plants shall have been grown under climate conditions similar to those at the project site.

795.7.1 Sod: Shall be Midiron Bermuda if not specified and meet State standards to insure high quality and freedom from noxious weeds.

Sod shall be machine cut at a uniform soil thickness of 1/2 inch (plus or minus 1/4 inch), at time of cutting. Measurement excludes top growth and thatch.

Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically from a firm grasp on the upper 30% of the section.

Sod shall be free from disease, nematodes, and soil born insects.

795.8 MISCELLANEOUS MATERIAL: modify the following subsections to read:

795.8.1 Headers and Stakes: change this paragraph to read as follows:

Lumber for landscaping shall be redwood heartwood, rough sawn and sized according to the drawing. When unit bid items are included in the proposal sheets, the unit prices quoted shall be per linear foot.

795.8.2 Tree Stakes: change this paragraph to read as follows:

Tree Stakes shall be 2" x 2" redwood, douglas fir or lodge pole stakes which do not exceed 2" and of sufficient length to properly support the tree.

795.8.3 Tie Wires: Tie Wires shall be No. 12 AWG zinc coated wire and the cover for this wire shall be 1/2 inch garden hose.

795.8.4 Decomposed Granite: change this section to read as follows:

Decomposed Granite shall conform to the requirements of MAG Specifications Section 702.4. A 5 pound sample shall be submitted to the Engineer's office for approval prior to use on the project. The decomposed granite shall not contain lumps or balls of clay, cliche, organic matter or calcareous coating and shall be consistent in color with approved sample. The Contractor shall verify that sufficient material is available from a single source to complete the project. The gradation shall be as noted on the plans or if not specified as follows:

| TYPE "A" | TYPE "B" | TYPE "C" | TYPE "D" |
|----------------------|----------------------|------------------------|----------------------|
| General Landscape | General Landscape | Tree and Shrub saucers | Multi Purpose Trails |
| 3/4" minus | 1/4" minus | 3/4" sized granite | 1/4" minus |
| sieve % size pass | sieve % size pass | sieve % size pass | sieve % size pass |
| 1" 100 | 1/2" 100 | 1" 100 | No.4 100 |
| 3/4" 95-100 | No.4 65-80 | 3/4" 90-100 | No.8 40-50 |
| 1/2" 85-100 | No.8 40-50 | 3/8" 0-20 | No.30 15-25 |
| No.4 60-80 | No.30 15-25 | No.4 0-5 | No.200 0-15 |
| No.40 10-20 | No.200 0-7 | | |
| No.200 0-5 | | | |

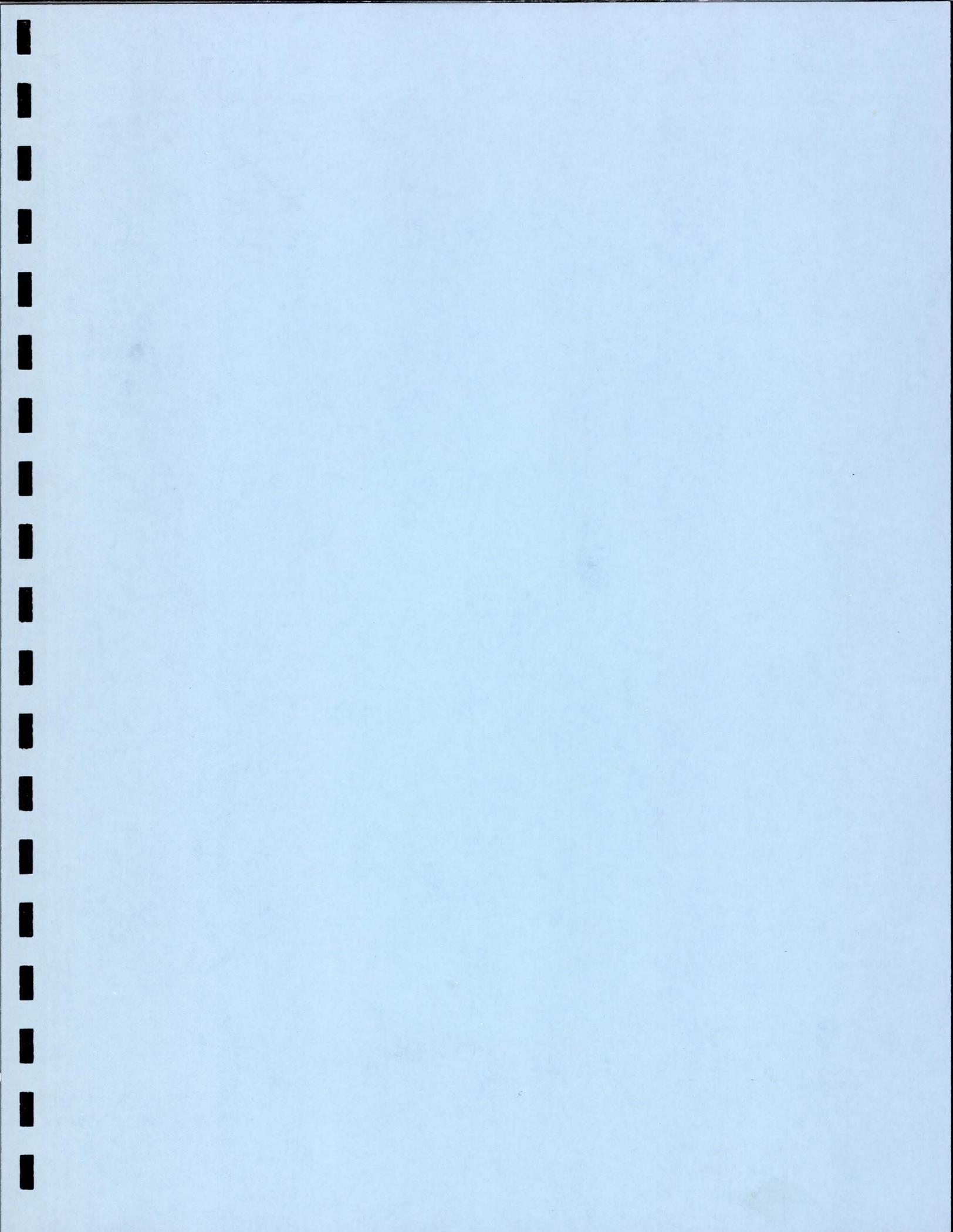
795.8 Miscellaneous Materials: add the following subsection:

795.8 River Run Rock: Rock shall be clean, hard, durable, uniform in quality, free from seams and coatings, rounded and water-worn. The gradation shall be as specified and approved by the Engineer.

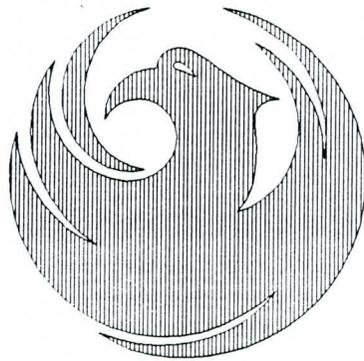
795.8.5 Clean Fill: Clean fill shall be soil free of weeds, boulders, clods, heavy clay, aggregate base, asphalt or concrete pavement or other deleterious material. Any such material, placed in planters or

planting areas, shall be removed by the contractor and replaced with clean fill at his own expense.

Measurement & payment shall be made at the unit price bid per cubic yard for the item "CLEAN FILL DIRT".



PHOENIX SUPPLEMENTAL
STANDARD DETAILS
FOR
PUBLIC WORKS
CONSTRUCTION



City of Phoenix

ENGINEERING AND ARCHITECTURAL
SERVICES DEPARTMENT
1994

1000 SERIES
TRAFFIC ENGINEERING

| | |
|--|--------|
| P1010 - MINIMUM MAJOR STREET, CROSS SECTION | - (82) |
| P1011 - MINIMUM PARKWAY STREET, CROSS SECTION | - (82) |
| P1012 - INTERIM PARKWAY STREET, CROSS SECTION | - (82) |
| P1013 - MINIMUM COLLECTOR STREET, CROSS SECTION | (82) |
| P1014 - MINIMUM LOCAL STREET, CROSS SECTION | - (82) |
| P1015 - MAJOR STREET, INTERSECTION FLARES | - (82) |
| P1016 - RIGHT-TURN LANE DESIGN | - (82) |
| P1017 - ACCESS ROAD OPENING | - (82) |
| P1018 - ACCESS ROAD TERMINATION AT ALLEYS | - (82) |
| P1019 - ACCESS RD. TERMINATION AT INTERSECTION | - (82) |
| P1020-1 PLANNED AREA DEVELOPMENT | - (82) |
| P1020-2 PRIVATE ACCESS WAY | - (88) |
| P1021 - PRIVATE DRIVEWAY (STREET) | - (88) |
| P1022 - TEMPORARY TURN-AROUND EASEMENT | - (80) |
| P1023 - STREET SIGN BASE, OBJECT MARKER & DELINEATOR | - (82) |
| P1024 - STEEL PIPE BARRICADES | - (84) |

1100 SERIES
GENERAL INFORMATION

| | |
|---|-----------|
| P1100 - STANDARD TRACING SIZES | - (80) |
| P1102 - DEPTH OF BASE COURSE, RESIDENTIAL STREETS | - (80) |
| P1103 - DEPTH OF BASE COURSE, LOCAL COMMERCIAL & LIGHT INDUSTRIAL STREETS | - (80) |
| P1104 - DEPTH OF BASE COURSE, MAJOR STREETS & HEAVY INDUSTRIAL STREETS | (REV. 82) |
| P1105 - STEEL COVERS FOR OPEN TRENCHES | - (80) |
| P1106 - BARRICADES | (REV. 82) |
| P1120 - V.C.P. TRENCH LOADING | (REV. 84) |
| P1121 - 8" & 10" V.C.P. TRENCH LOADING | (REV. 84) |
| P1122 - 12" & 15" V.C.P. TRENCH LOADING | (REV. 84) |
| P1123 - 18" & 21" V.C.P. TRENCH LOADING | (REV. 84) |
| P1124 - 24" & 27" V.C.P. TRENCH LOADING | (REV. 84) |
| P1125 - 30" & 33" V.C.P. TRENCH LOADING | (REV. 84) |
| P1126 - 36" & 39" V.C.P. TRENCH LOADING | (REV. 84) |
| P1127 - 42" V.C.P. TRENCH LOADING | (REV. 84) |
| P1164 - MAXIMUM DRIVEWAYS & ALLEY SLOPE | - (82) |
| P1165 - DEBRIS CAP INSTALLATION | - (94) |

1200 SERIES
STREET INFORMATION

| | |
|---|-----------|
| P1230 - SIDEWALKS | (REV. 84) |
| P1233 - SIDEWALK RAMP DETAIL TYPE A | (REV. 82) |
| P1234 - SIDEWALK RAMP DETAIL TYPE B | (REV. 82) |
| P1235 - SIDEWALK RAMP DETAIL TYPE C | (REV. 82) |
| P1236 - SIDEWALK RAMP DETAIL TYPE D | (REV. 82) |
| P1237 - APRON JOINTS | - (86) |
| P1255 - DRIVEWAY ENTRANCE | (REV. 94) |
| P1256-1 MID-BLOCK BUS BAY TYPE 1 | (REV. 94) |
| P1256-2 MID-BLOCK BUS BAY TYPE 2 | (REV. 94) |
| P1257 - FAR SIDE BUS BAY | - (86) |
| P1258 - BUS SHELTER PAD LOCATION | (REV. 94) |
| P1260 - BUS SHELTER/ACCESSORY PAD (BUS STOP) | - (92) |
| P1261 - BUS SHELTER/ACCESSORY PAD (BUS BAY) | - (92) |
| P1262 - PARKWAY BUS SHELTER/ACCESSORY PAD | - (92) |
| P1263-1 FRONTAGE ROAD MID-BLOCK BUS SHELTER/ACCESSORY PAD | - (92) |
| P1263-2 FRONTAGE ROAD TERMINATION BUS SHELTER/ACCESSORY PAD | - (92) |
| P1270 - FRAME AND COVER AND GRADE ADJUSTMENT | - (94) |

1300 SERIES
WATER INFORMATION

| | |
|---|-----------|
| P1315 - STEEL WATER METER BOX COVER | (REV. 84) |
| P1342 - WATER SERVICES CONNECTIONS | (REV. 88) |
| P1343 - WATERLINE - CUT & PLUG | - (84) |
| P1344 - WATERLINE CUT OUT | - (84) |
| P1351 - REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY INSTALLATION - 3" AND OVER | - (92) |
| P1352 - DOUBLE-CHECK VALVE BACKFLOW PREVENTION ASSEMBLY INSTALLATION - 3" AND OVER | - (92) |
| P1353 - DOUBLE-CHECK VALVE BACKFLOW PREVENTION ASSEMBLY INSTALLATION - 2-1/2" AND UNDER | - (92) |
| P1354 - REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY INSTALLATION - 2-1/2" AND UNDER | - (92) |
| P1355 - PRESSURE VACUUM BREAKER ASSEMBLY INSTALLATION - 2" AND UNDER | - (92) |
| P1359 - HYDRANT GUARDS | - (84) |

| | |
|---|-----------|
| P1361 - FIRE HYDRANTS THREADS | - (81) |
| P1363 - WATER METERING LOCATION | (REV. 88) |
| P1391-1 VALVE BOX INSTALLATION AND GRADE ADJUSTMENT | - (94) |
| P1391-2 VALVE BOX INSTALLATION | - (94) |
| P1394 - PRESSURE REDUCING & SUSTAINING VALVE | - (81) |
| P1395 - WATERLINE SUSPENSIONS | - (81) |
| P1396 - DOUBLE CHECK VALVE ASSEMBLY 1400 SERIES | - (81) |

SANITARY SEWER INFORMATION

| | |
|---|--------|
| P1404 - WATER AND SANITARY SEWER CROSSING | - (92) |
| P1430 - CONCRETE SANITARY SEWER MANHOLE CAST-IN-PLACE & PRECAST | - (80) |

1500 SERIES
IRRIGATION & STORM INFORMATION

| | |
|--|-----------|
| P1520 - STORM SEWER MANHOLE BASE (48" AND SMALLER) | - (87) |
| P1560 - STORM SEWER MANHOLE BASE TRANSITION (51" AND LARGER) | - (81) |
| P1561 - CATCH BASIN ACCESS FRAME & COVER | - (81) |
| P1562 - BARRIER SPECIFICATIONS SCHEDULE | (REV. 94) |
| P1563 - STORM SEWER OUTFALL ACCESS BARRIER | - (81) |
| P1564 - CATCH BASIN GRATE FRAMES | - (81) |
| P1565 - CATCH BASIN GRATES | - (81) |
| P1566 - COMBINATION CATCH BASIN TYPE J WITH CONCRETE APRON | (REV. 82) |
| P1567 - COMBINATION CATCH BASIN TYPE K | (REV. 84) |
| P1568 - CATCH BASIN TYPE L, CURB & PARKWAY OPENING INLET DETAILS | - (81) |
| P1569-1 CATCH BASIN TYPE M | - (92) |
| P1569-2 "M" BASIN TOP MODIFICATION & CENTER LANDSCAPE PARKWAY | - (92) |
| P1570 - CATCH BASIN TYPE N | - (81) |
| P1571 - CATCH BASIN TYPE P, DOUBLE CURB OPENING FOR FRONTAGE ROAD ISLAND | - (81) |
| P1572 - CATCH BASIN TYPE Q | - (81) |
| P1573 - CATCH BASIN TYPE R | - (81) |
| P1574 - INLET CURB OPENING & PIPE ENTRY | - (81) |
| P1575 - CONSTRUCTION SUBGRADE DRAIN | - (81) |
| P1576 - C.I.P.P. LATERAL PIPE CONNECTION | - (84) |
| P1577 - CATCH BASIN ACCESS FRAME & COVER | - (86) |

DETAIL NO.



City of Phoenix

STANDARD DETAIL

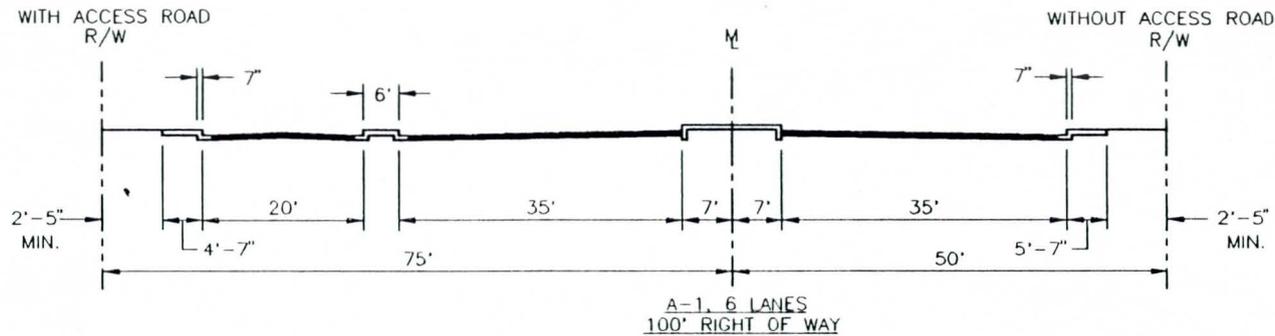
INDEX

APPROVED

Kenny Whelan
CITY ENGINEER

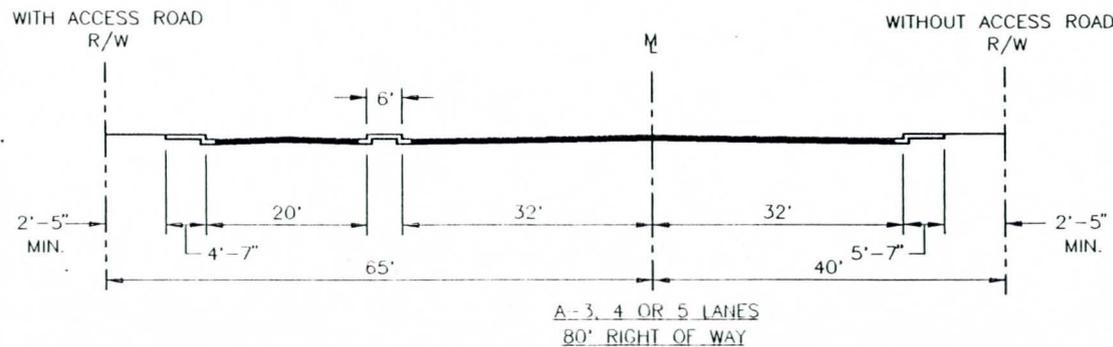
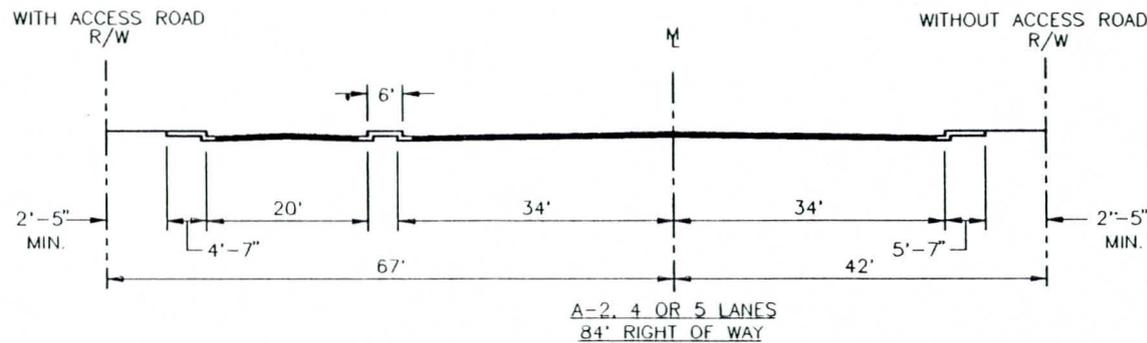
5-31-94
DATE

DETAIL NO.



NOTES:

1. IN NEW RESIDENTIAL DEVELOPMENTS ACCESS ROADS ARE NORMALLY REQUIRED WHERE LOTS FRONT ON TO MAJOR STREETS.
2. ADDITIONAL RIGHT OF WAY MAY BE REQUIRED FOR DRAINAGE, UTILITIES, SLOPE RIGHTS, OR IRRIGATION FACILITIES.
3. ALL DIMENSIONS TO FACE OF CURB.



DETAIL NO.
P1010



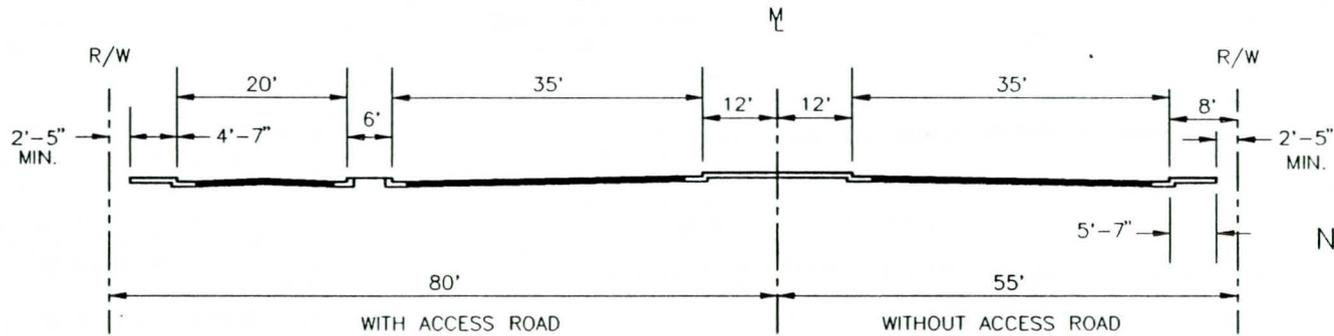
City of Phoenix
STANDARD DETAIL

MINIMUM MAJOR STREET
CROSS SECTIONS

APPROVED
Kenny Whelan
CITY ENGINEER

7-7-92
DATE

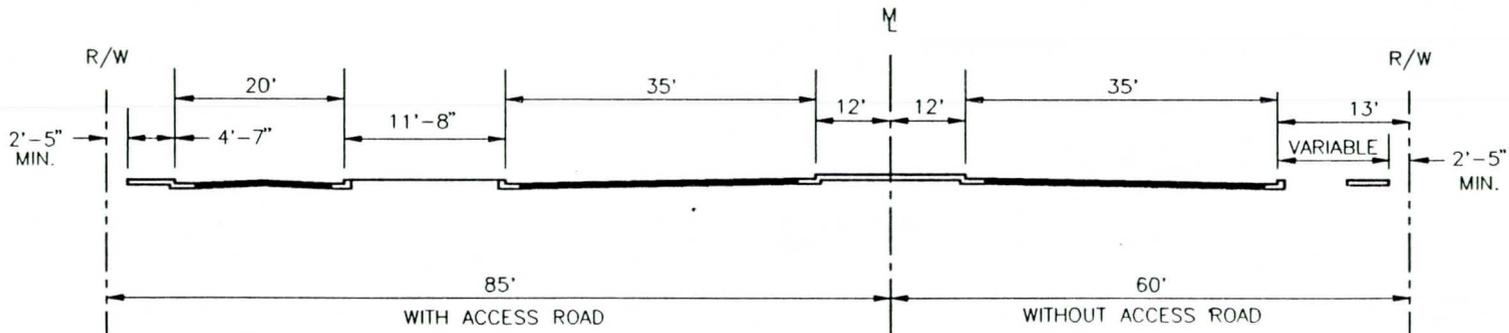
DETAIL NO.
P1010



P-1, (6 LANES)
110' RIGHT OF WAY

NOTES:

1. IN NEW RESIDENTIAL DEVELOPMENTS ACCESS ROADS ARE NORMALLY REQUIRED WHERE LOTS FRONT ON TO MAJOR STREETS.
2. ADDITIONAL RIGHT OF WAY MAY BE REQUIRED FOR DRAINAGE, UTILITIES, SLOPE RIGHTS, OR IRRIGATION FACILITIES.
3. ALL DIMENSIONS TO FACE OF CURB.



P-3, (6 LANES)
120' RIGHT OF WAY

DETAIL NO.
P1011



City of Phoenix
STANDARD DETAIL

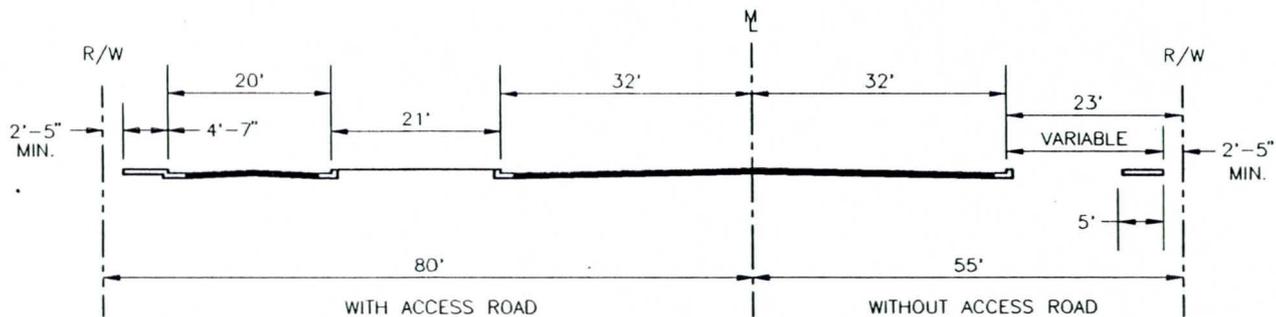
MINIMUM PARKWAY STREET
CROSS SECTION

APPROVED

Kenny W. Hain
CITY ENGINEER

7-8-92
DATE

DETAIL NO.
P1011



P-2, (5 LANES)
110' RIGHT OF WAY

NOTES:

1. IN NEW RESIDENTIAL DEVELOPMENTS ACCESS ROADS ARE NORMALLY REQUIRED WHERE LOTS FRONT ON TO MAJOR STREETS.
2. ADDITIONAL RIGHT OF WAY MAY BE REQUIRED FOR DRAINAGE, UTILITIES, SLOPE RIGHTS, OR IRRIGATION FACILITIES.
3. ALL DIMENSIONS TO FACE OF CURB.

DETAIL NO.
P1012



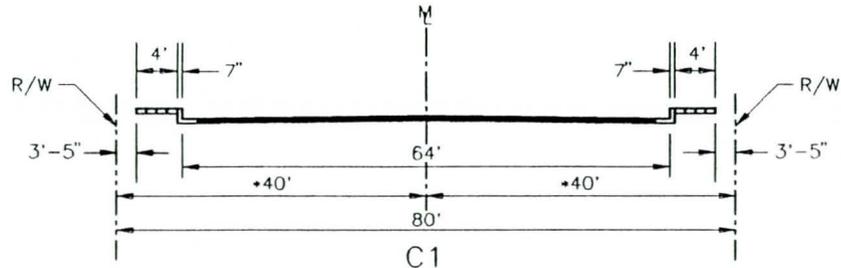
City of Phoenix
STANDARD DETAIL

INTERIM PARKWAY STREET
CROSS SECTION

APPROVED
Kenny W. Hain
CITY ENGINEER

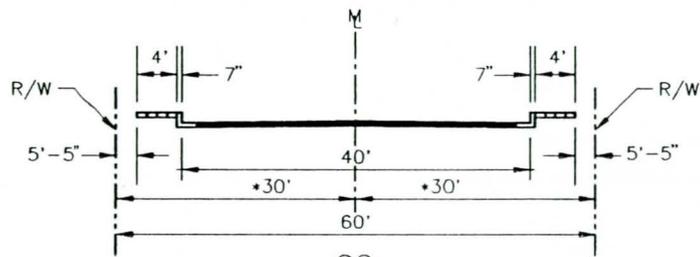
7-8-92
DATE

DETAIL NO.
P1012

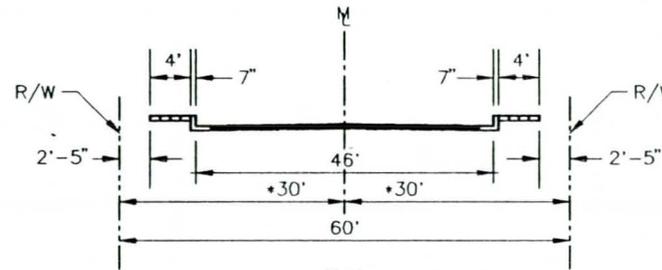


C1
COLLECTOR STREET—INTENSE TRAFFIC
GENERATION—DEVELOPED OR
UNDEVELOPED AREAS.

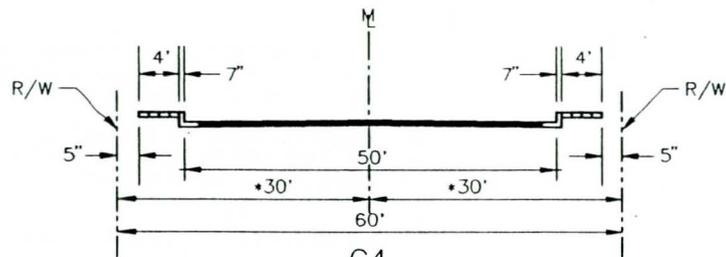
• THIS FOOTAGE IS REQ. IN ORDER TO
CONSTRUCT A HALF STREET AS SHOWN.



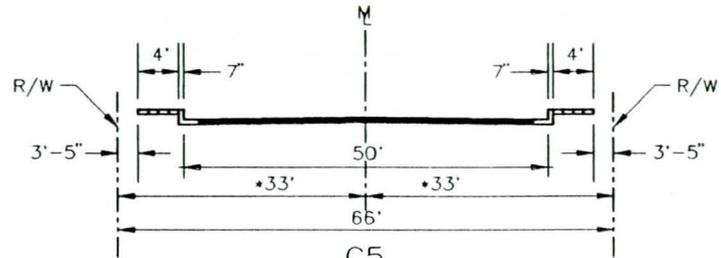
C2
COLLECTOR STREETS
RESIDENTIAL AREAS.



C3
COLLECTOR STREETS
SPECIAL CASE ONLY.



C4
COLLECTOR STREETS
COMM. OR HIGH DENSITY



C5
COLLECTOR STREETS
INDUSTRIAL AREAS

DETAIL NO.
P1013



City of Phoenix
STANDARD DETAIL

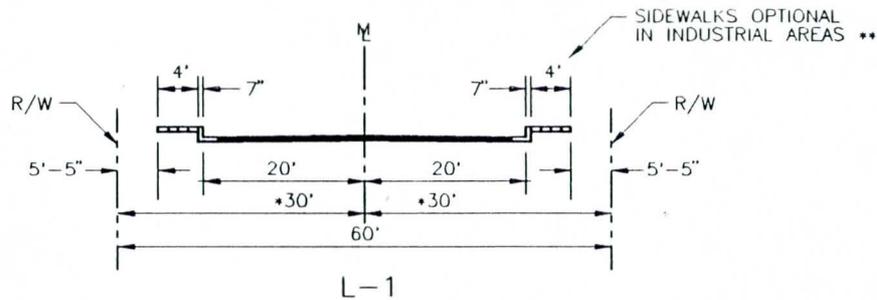
MINIMUM COLLECTOR STREET
CROSS SECTIONS

APPROVED

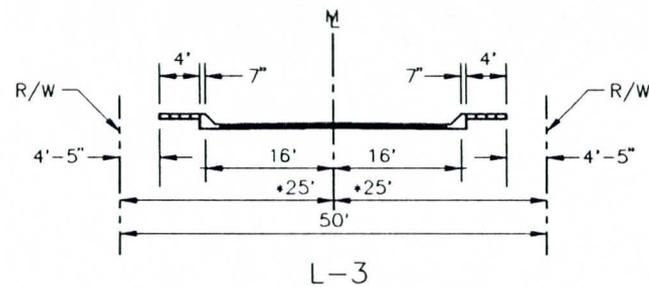
Kenny W. Han
CITY ENGINEER

7-8-92
DATE

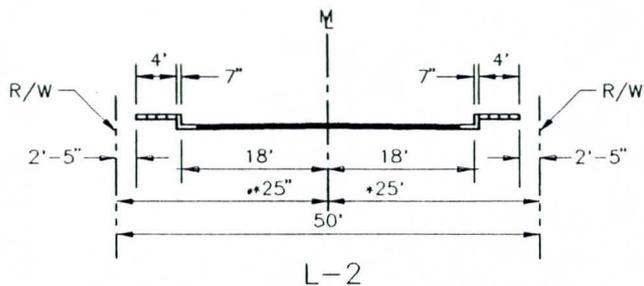
DETAIL NO.
P1013



L-1
LOCAL STREET W/ VERTICAL CURB
COMMERCIAL OR INDUSTRIAL AREAS



L-3
LOCAL STREET
RESIDENTIAL SINGLE FAMILY
WITH ROLLED CURB & GUTTER



L-2
LOCAL STREET W/ VERTICAL CURB
MULTI-FAMILY AREAS, COMMERCIAL
AREAS OR ABUTTING SCHOOL OR PARK

L-4
CENTRAL CORRIDOR
LOCAL ACCESS ROAD
(SEE C-3)

- ** A 6 FT. GRADED SHOULDER WILL BE REQUIRED WHERE SIDEWALKS ARE DELETED.
- * THIS FOOTAGE IS REQUIRED IN ORDER TO CONSTRUCT A HALF STREET AS SHOWN.

DETAIL NO.
P1014



City of Phoenix
STANDARD DETAIL

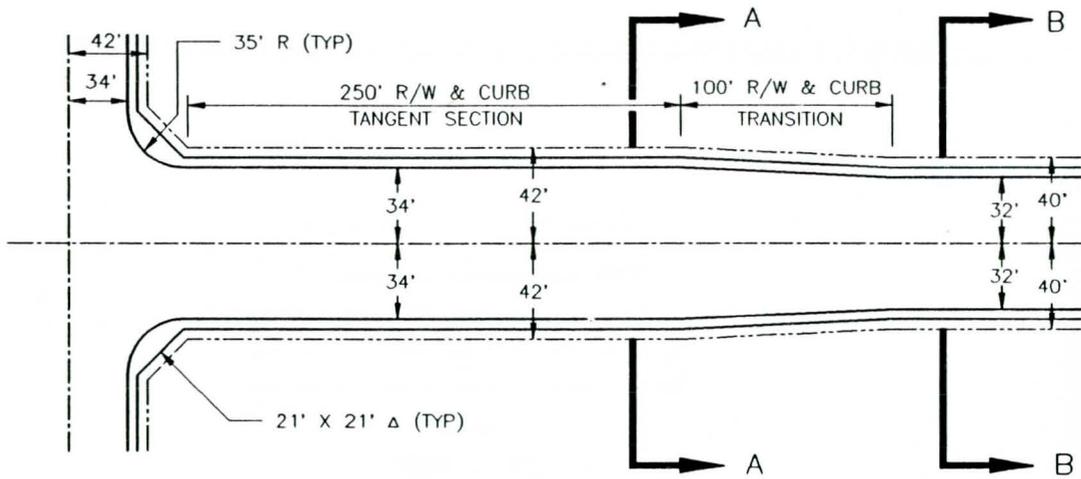
MINIMUM LOCAL STREET
CROSS SECTIONS

APPROVED

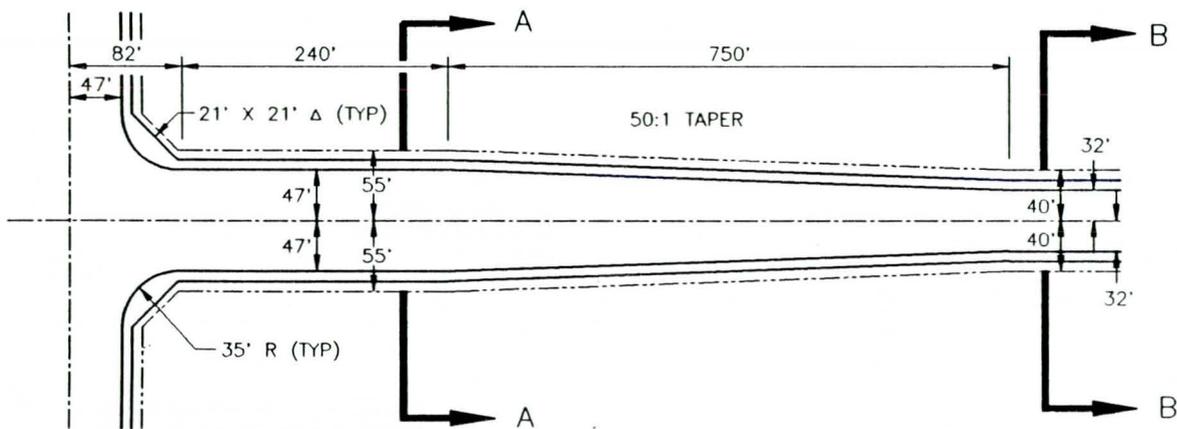
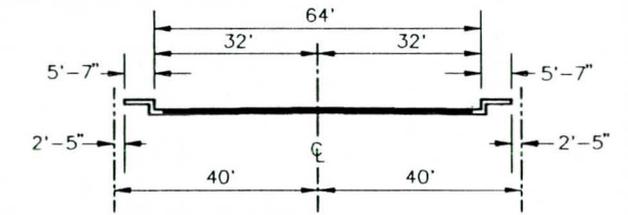
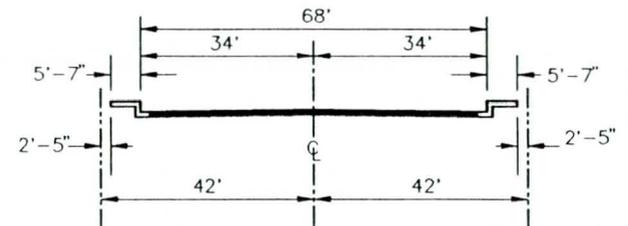
Kenny W. Han
CITY ENGINEER

7-8-92
DATE

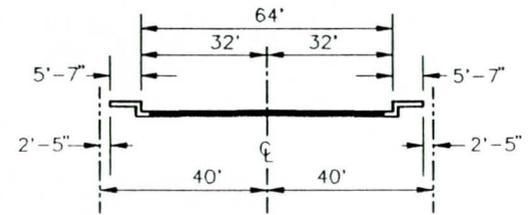
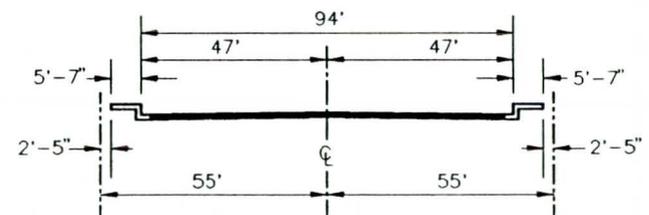
DETAIL NO.
P1014



INTERSECTION FLARE-TYPE I (68' PAVEMENT ON 84' R/W)



INTERSECTION FLARE-TYPE II (94' PAVEMENT ON 110' R/W)



DETAIL NO.
P1015



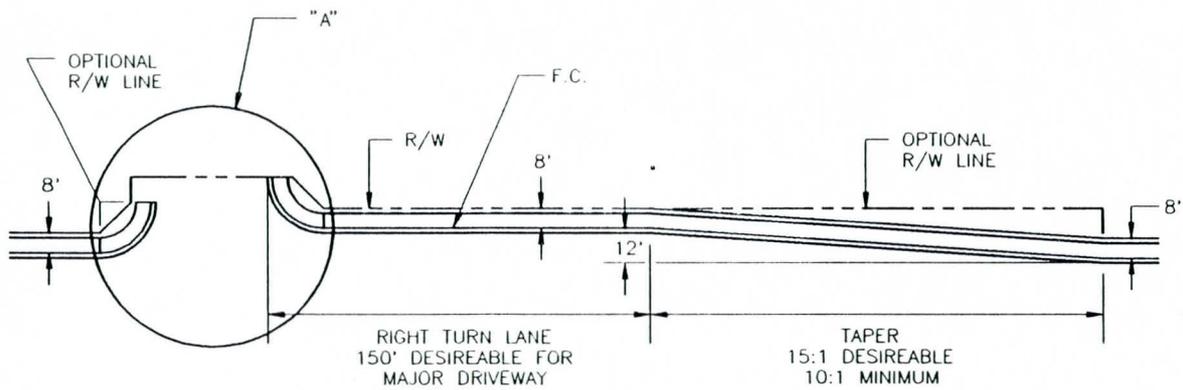
City of Phoenix
STANDARD DETAIL

MAJOR STREET
INTERSECTION FLARES

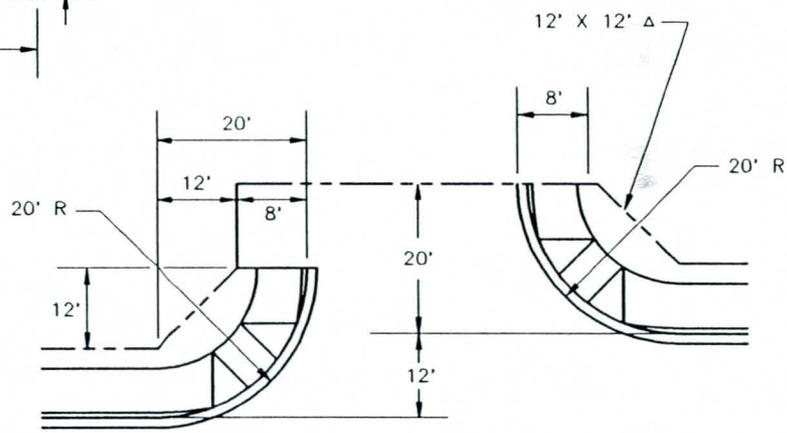
APPROVED
Kenny Whelan
CITY ENGINEER

7-8-92
DATE

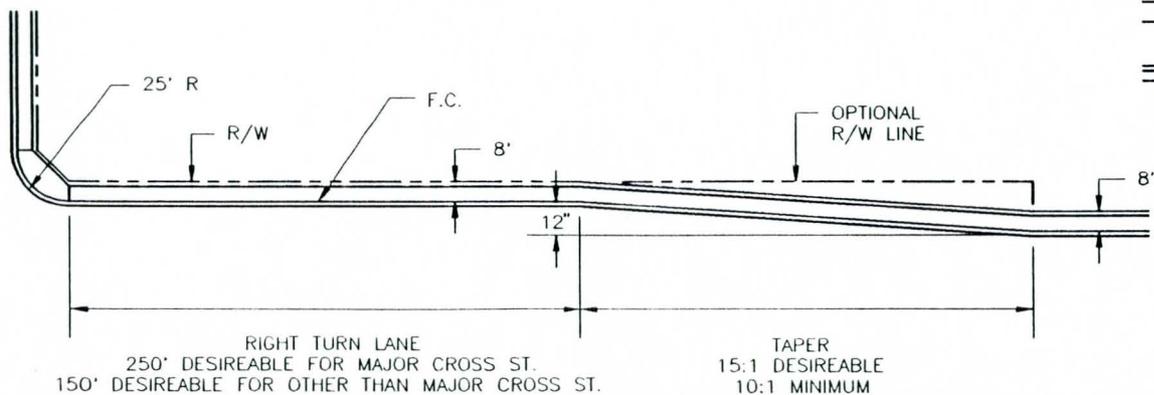
DETAIL NO.
P1015



FOR MAJOR DRIVEWAY



DETAIL "A"



FOR CROSS STREET

DETAIL NO.
P1016



City of Phoenix
STANDARD DETAIL

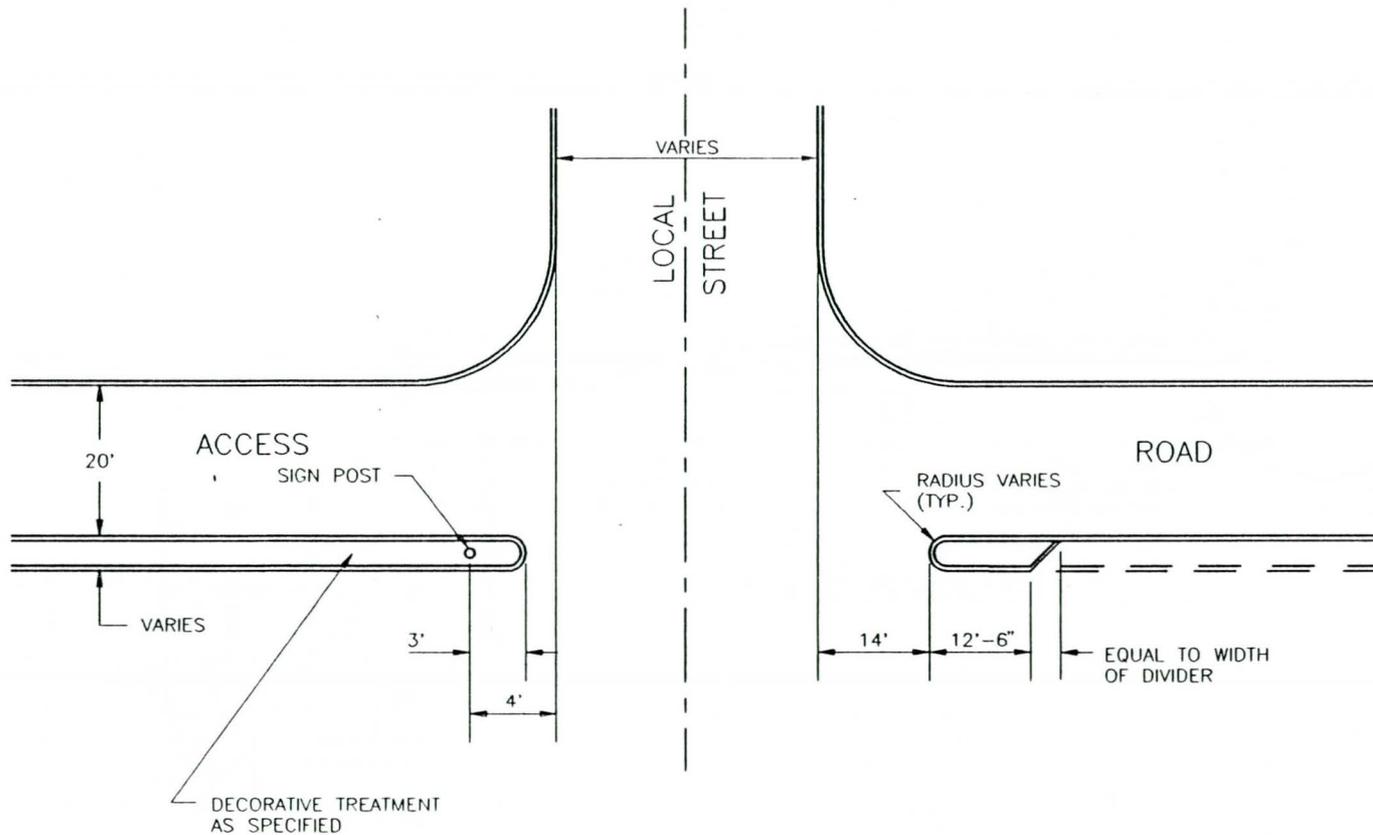
RIGHT TURN LANE DESIGN

APPROVED

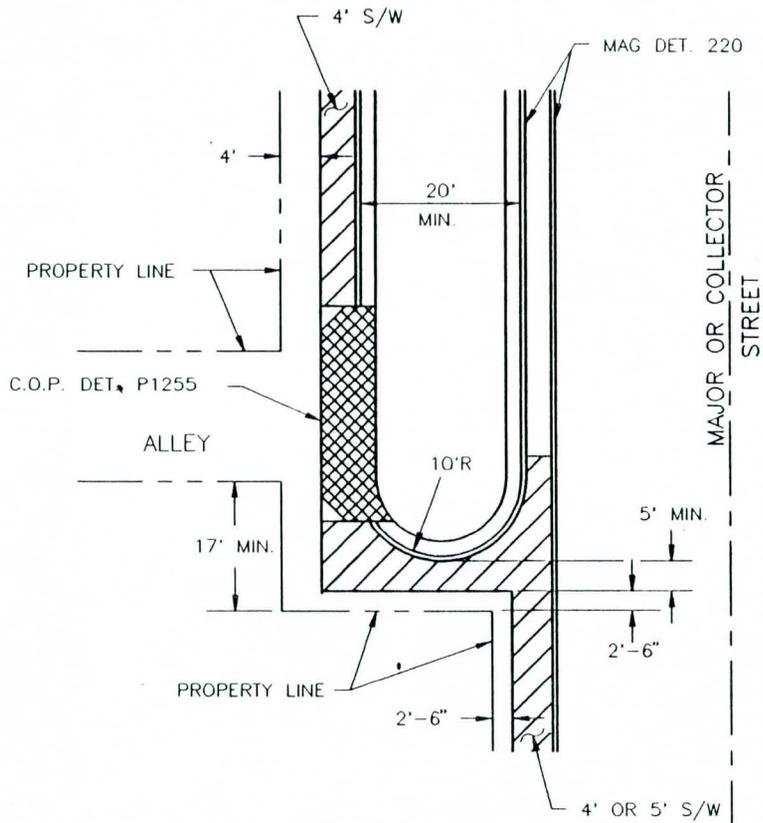
Kenny W. Hain
CITY ENGINEER

7-8-92
DATE

DETAIL NO.
P1016



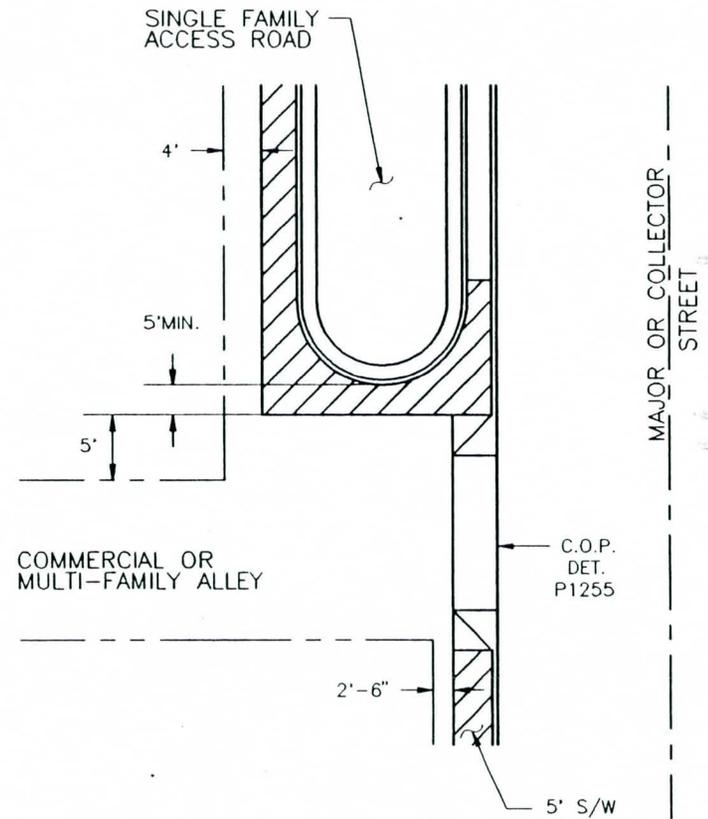
NOTE:
DIMENSIONS SHOWN ARE TO THE FACE OF CURB



NOTE:

SUFFICIENT RIGHT-OF-WAY MUST BE AVAILABLE TO CONSTRUCT ACCESS ROAD TERMINATION

SINGLE FAMILY ALLEY



NOTE:

COMMERCIAL AND MULTI-FAMILY ALLEYS MAY NOT ACCESS TO SINGLE FAMILY ACCESS ROADS.

COMMERCIAL OR MULTI-FAMILY ALLEY

DETAIL NO.
P1018



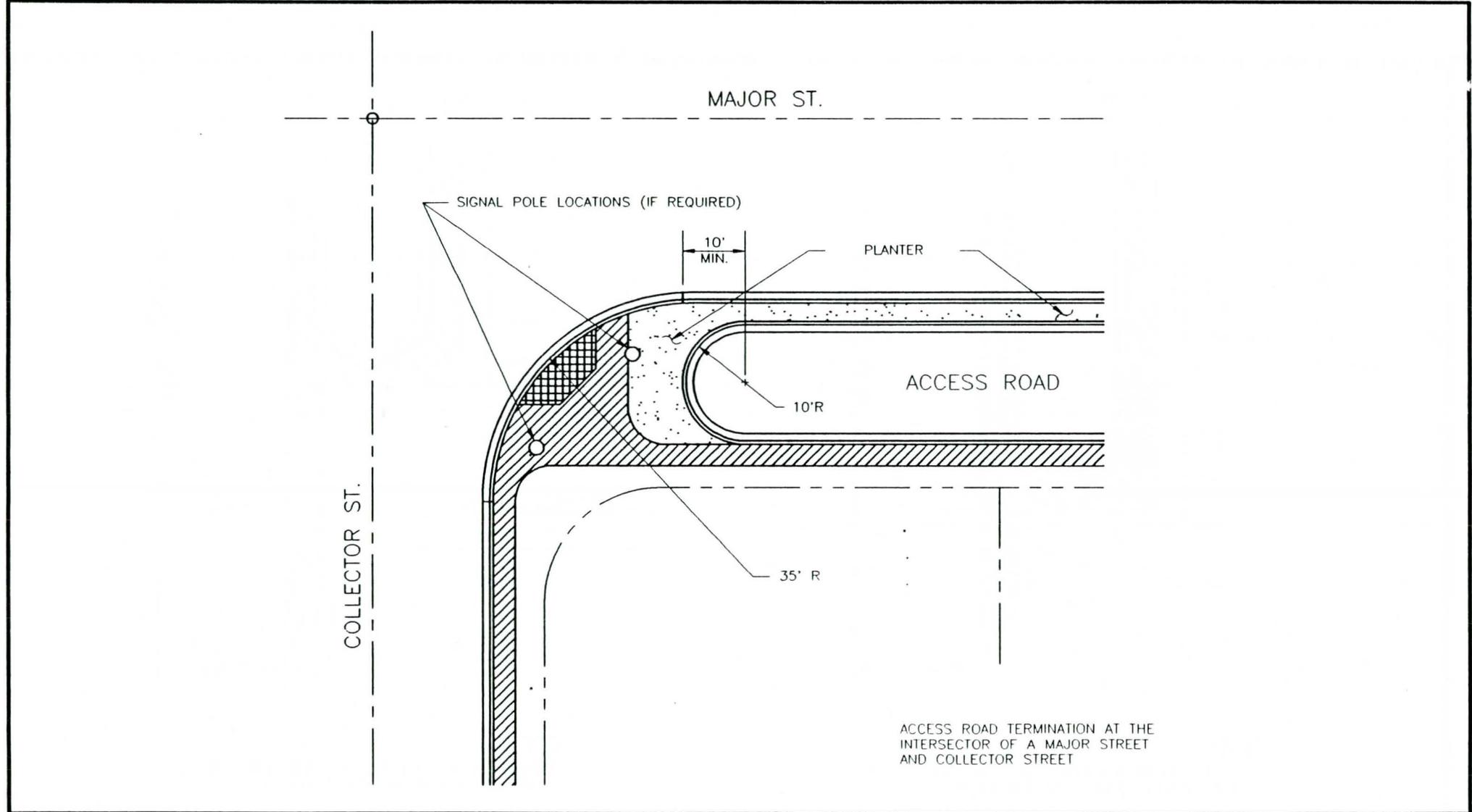
City of Phoenix
STANDARD DETAIL

ACCESS ROAD TERMINATION
AT ALLEYS

APPROVED
Kenny W. Hain
CITY ENGINEER

7-8-92
DATE

DETAIL NO.
P1018



DETAIL NO.
P1019



City of Phoenix
STANDARD DETAIL

ACCESS ROAD TERMINATION
AT INTERSECTION

APPROVED

Kenny Williams
CITY ENGINEER

7-8-92
DATE

DETAIL NO.
P1019

A PRIVATE ACCESS WAY IS INTENDED TO APPLY TO PRIVATE STREETS WITHIN DEVELOPMENTS SUCH AS PAD'S, MOBILE-HOME PARKS, AND SUB-LOTS.

1. PRIVATE ACCESS WAYS WILL BE ALLOWED IN NEW DEVELOPMENTS WHERE THEIR USE IS LOGICALLY CONSISTENT WITH A DESIRE FOR NEIGHBORHOOD IDENTIFICATION AND CONTROL OF ACCESS, AND WHERE SPECIAL OVERALL DESIGN CONCEPTS MAY BE INVOLVED.
2. PRIVATE ACCESS WAYS WILL BE PERMITTED ONLY WHERE A SATISFACTORY MEANS OF PROVIDING FOR THEIR MAINTENANCE AND OPERATION IS DEMONSTRATED.
3. THE USE OF PRIVATE ACCESS WAYS AS A DEVICE FOR PERMITTING INADEQUATE DESIGN WILL NOT BE ALLOWED.
4. THE USE OF PRIVATE ACCESS WAYS IS ORDINARILY LIMITED TO CUL-DE-SACS AND TO LOCAL STREETS NOT CARRYING THROUGH TRAFFIC. NORMALLY COLLECTOR STREETS WILL BE PUBLIC. FURTHER, THERE WILL BE AN ADEQUATE INTERNAL CIRCULATION SYSTEM AND NO PROPERTY WILL BE LANDLOCKED BY A PRIVATE ROAD SYSTEM.
5. THE DESIGN OF ALL PRIVATE ACCESS WAYS SHALL BE REVIEWED AND APPROVED BY THE CITY ENGINEER AND THE CITY TRAFFIC ENGINEER. THE CONSTRUCTION SHALL BE INSPECTED BY THE CITY ENGINEER, WITH A STANDARD INSPECTION FEE TO BE PAID.
6. NOTE TO BE PLACED ON PLAT "PRIVATE ACCESS WAY, NOT DEDICATED FOR PUBLIC USE".
7. THE HOMEOWNER'S ASSOCIATION CONSTITUTION AND BY-LAWS SHALL INCLUDE ACKNOWLEDGEMENT OF THE OWNERSHIP AND MAINTENANCE RESPONSIBILITY OF THESE PRIVATE FACILITIES, INCLUDING RESPONSIBILITY FOR ENFORCEMENT OF TRAFFIC CONTROL.

I GENERAL

1. PRIVATE ACCESS WAYS, AND/OR REFUSE COLLECTION EASEMENTS MAY BE USED IN PAD'S, MOBILE-HOME DEVELOPMENTS AND SUBLOTS AND SHALL BE KNOWN AS "PRIVATE ACCESS WAYS". UTILITIES MAY BE PLACED IN A PRIVATE ACCESS WAY.
2. MAJOR DRAINAGE WAYS SHALL BE DEDICATED.
3. SIDEWALKS SHALL BE REQUIRED ADJACENT TO ALL COLLECTOR STREETS AND IN ALL DEVELOPMENTS IN PAD 4 THROUGH PAD 15 OR IN THE SAID EASEMENT RIGHT OF WAY UNLESS OTHER MEANS OF ACCOMMODATING PEDESTRIAN TRAFFIC ARE PROVIDED IN THE DEVELOPMENT.
4. PRIVATE ACCESS WAYS SHALL BE ADEQUATELY DESIGNED TO CITY SPECIFICATIONS TO PROVIDE FOR LANE DELINEATION, STREET SWEEPING, AND DRAINAGE CONTROL. NORMALLY, A CROWN SECTION WITH CONCRETE CURB OR CONCRETE CURB AND GUTTER ON BOTH SIDES WILL BE REQUIRED; HOWEVER, OTHER MEANS OF PROVIDING SIMILAR FUNCTIONAL CHARACTERISTICS MAY BE CONSIDERED IF APPROVED BY THE CITY ENGINEER.
5. RETURN-TYPE DRIVEWAY ENTRANCE SHALL BE USED ON PRIVATE ACCESS WAYS. DEPRESSED DRIVEWAY APPROACHES SHALL BE USED WHERE THERE IS ONLY DIRECT ACCESS TO A PARKING AREA.

II MINIMUM PAVEMENT WIDTHS

THE ENTIRE WIDTH OF THE PRIVATE ACCESS WAY SHALL BE DESIGNATED BY PLAT AS A "PRIVATE ACCESS WAY".

| STREET CLASSIFICATION | CURB TO CURB | CURB RETURNS |
|---------------------------------------|--------------|--------------|
| COLLECTOR | 40' | 35' |
| LOCAL STREETS | | |
| WITH PARKING PLANNED ON BOTH SIDES | 36' | 20' |
| WITH PARKING PLANNED ON ONE SIDE ONLY | 32' | 20' |
| WITHOUT PLANNED PARKING | 24' | 25' |
| ONE-WAY, PLANNED PARKING ONE SIDE | 24' | 25' |

III GRADES

1. DESIRABLE MAXIMUM - 10%
2. MAXIMUM - 15%
3. MINIMUM - 0.30% - GRADES LESS THAN 0.30% SHALL REQUIRE CONCRETE VALLEY GUTTERS, ABSOLUTE MINIMUM GRADE 0.15%.

IV ALIGNMENT

1. STREET SHALL NORMALLY INTERSECT AT RIGHT ANGLES AND NO GREATER DEFLECTION THAN 15' FROM A RIGHT ANGLE WILL BE ALLOWED AND SHALL HAVE AT LEAST 20' TANGENT ADJACENT TO INTERSECTIONS. THE TANGENT LENGTH SHALL BE INCREASED WHERE SHORT RADIUS CURVES ARE USED NEAR THE INTERSECTIONS.
2. CUL-DE-SACS SHALL NOT ORDINARILY EXCEED 400' IN LENGTH. CURB RADIUS TO FACE OF CURB AT THE TURNAROUND SHALL BE 40' RADIUS MINIMUM.
3. IN SPECIAL SITUATIONS WHERE CITY REFUSE COLLECTION AND/OR CITY MAINTENANCE IS NOT REQUIRED, DEAD-ENDED PRIVATE ACCESS WAYS MAY BE USED AND SHOULD NOT EXCEED 300 LINEAL FEET. ADEQUATE TURNAROUND FACILITIES MAY BE REQUIRED AT THE END OF EACH DEAD-ENDED PRIVATE ACCESS WAY.
4. CENTERLINE RADIUS SHALL BE 100' MINIMUM FOR LOOP STREETS AND LOCAL STREETS OVER 800' IN LENGTH. WHERE RIGHT-ANGLED BENDS ARE USED IN THE STREET PATTERN IN LIEU OF THE MINIMUM RADII REQUIRED ABOVE, WIDENING SUFFICIENT TO ACCOMMODATE TRUCK-TURNING MOVEMENTS SHALL BE PROVIDED BY USE OF KNUCKLES OR OTHE APPROPRIATE MEANS.

V STRUCTURAL SECTION

THE MINIMUM STRUCTURAL DESIGN OF PAVING, CURB, GUTTER, AND SIDEWALK SHALL BE IN ACCORDANCE WITH CITY STANDARDS AND SPECIFICATIONS.

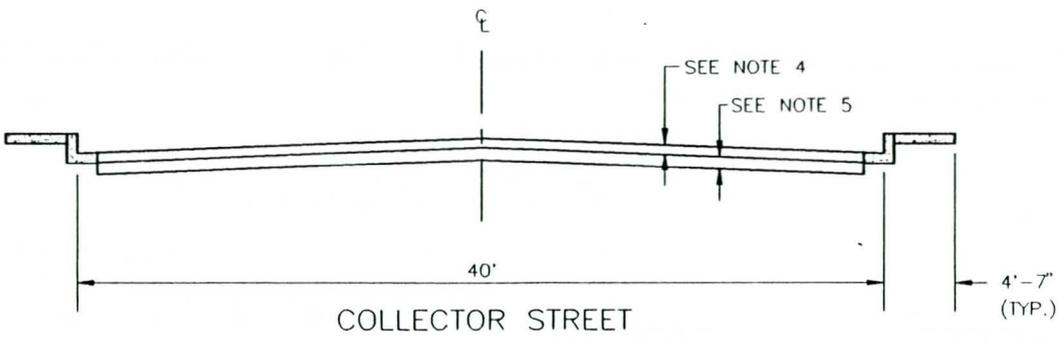
VI UTILITIES

1. ADEQUATE PROVISIONS FOR PUBLIC UTILITIES SHALL BE MADE.
2. FIRE HYDRANTS SHALL BE LOCATED ON THE PUBLIC STREET AT THE ENTRANCE TO THE PRIVATE ACCESS WAYS AND ALONG PRIVATE ACCESS WAYS AS REQUIRED BY THE CITY OF PHOENIX WATER AND WATER SERVICES DEPARTMENT STANDARDS.
3. STANDARDS OF CONSTRUCTION AND INSPECTIONS ON PRIVATE ACCESS WAYS SHALL BE TO CITY OF PHOENIX STANDARDS AND SPECIFICATIONS.
4. COSTS OF MAINTENANCE AND REPAIRS OF PRIVATE ACCESS WAYS, LIGHTS, AND NON-PUBLICLY-OWNED UTILITIES ARE TO BE THE RESPONSIBILITY OF THE HOMEOWNER'S ASSOCIATION.

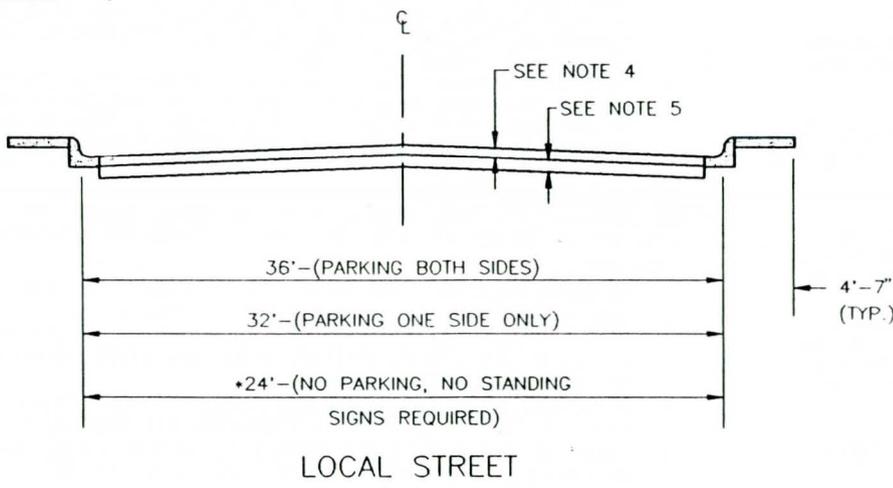
VII SIGNS

1. A SIGN SHALL BE PLACED AT THE ENTRANCE TO EACH PRIVATE ACCESS WAY GIVING NOTICE THAT THE PRIVATE ACCESS WAY IS "PRIVATE PROPERTY" NOT DEDICATED FOR PUBLIC USE OR MAINTAINED BY THE CITY OF PHOENIX.
2. A STOP SIGN SHALL BE POSTED AT ALL INTERSECTIONS OF PRIVATE ACCESS WAYS WITH PUBLIC STREETS. SIGNS SHALL BE IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICED AND SHALL BE MAINTAINED BY THE HOMEOWNER'S ASSOCIATION.





NOT TO SCALE



NOTES:

1. DRIVEWAY ENTRANCE RETURNS--VERTICAL CURB FACE
 - A. COLLECTOR STREET - 35' RADIUS TO FACE OF CURB
 - B. LOCAL STREET (36' OR 32' W) - 20' RADIUS TO FACE OF CURB
 - C. LOCAL STREET (24' WIDE) - 25' RADIUS TO FACE OF CURB
2. SIDEWALK--STD. DET. P1230. THE PLANNING DIRECTOR MAY WAIVE THE REQUIREMENT FOR SIDEWALKS, IF SIDEWALKS PROVIDED ELSEWHERE IN THE DEVELOPMENT WILL SATISFACTORILY SERVE THE SAME PURPOSE.
3. CURBS
 - A. COLLECTOR STREET--STD. DET. 220 TYPE "A" (VERTICAL CURB AND GUTTER)
 - B. LOCAL STREET--STD. DET. 220 TYPE "C" (ROLL CURB AND GUTTER) OR STD. DET. 221 WHEN SIDEWALK IS ADJACENT, RIBBON CURBS WILL BE PERMITTED WHERE DRAINAGE WILL BE RETAINED OR ADEQUATE DRAINAGE CHANNELS ARE PROVIDED THROUGH ADJACENT PROPERTY. RIBBON CURB MAY NOT BE USED ADJACENT TO SIDEWALK.
4. ASPHALT CONCRETE--2" THICKNESS, CONFORM TO M.A.G. SECT. 321. OTHER TYPES OF SURFACE TREATMENT MAY BE PERMITTED BY WRITTEN AUTHORITY OF THE CITY ENGINEER AFTER DEMONSTRATION THAT STRUCTURAL STRENGTH IS EQUAL TO OR GREATER THAN THAT OF THE EXISTING CITY STANDARDS.
5. AGGREGATE BASE COURSE--THICKNESS TO CONFORM WITH P1103. INSTALL TO CONFORM WITH M.A.G. SECT. 310.
6. STREET FURNITURE, FIRE HYDRANTS AND MAJOR PLANTINGS SHALL BE SET BACK A MINIMUM OF 5' FROM THE BACK OF CURB AND BUILDINGS SHALL BE SET BACK A MINIMUM OF 8' FROM THE BACK OF CURB.

SEE PHOENIX SUPPLEMENTS FOR ADDITIONAL DESIGN STANDARDS.

*REV. 12-88

DETAIL NO.
P1020-2



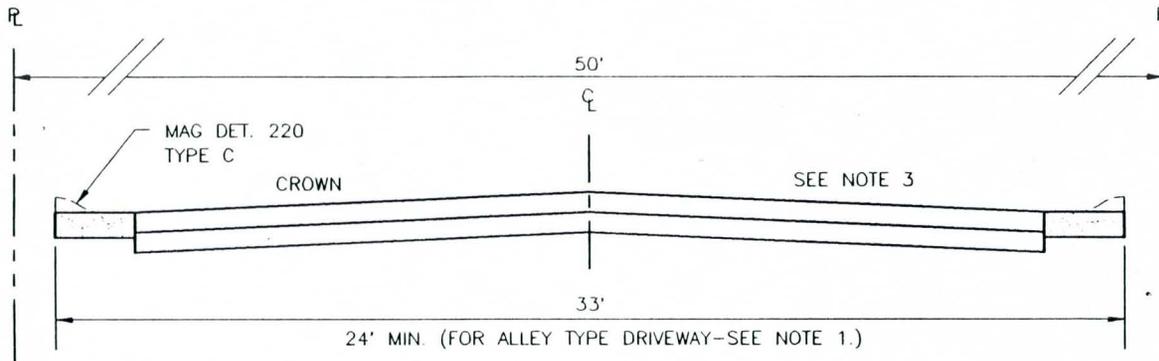
City of Phoenix
STANDARD DETAIL

PRIVATE ACCESS WAY

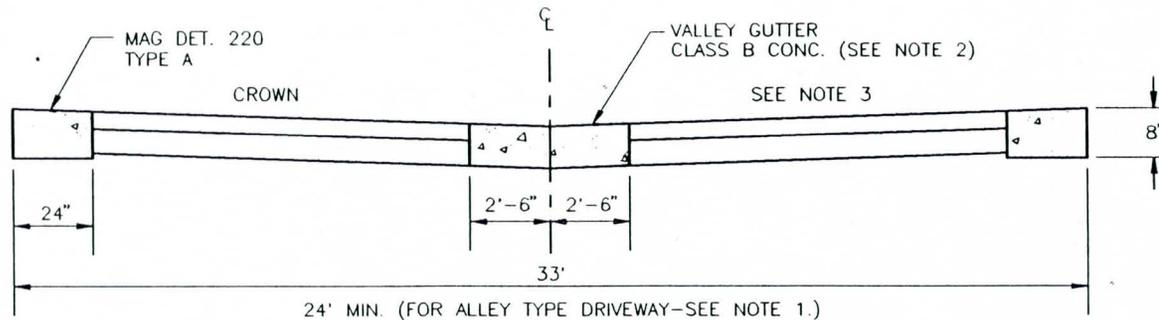
APPROVED
Kenny W. Hain
CITY ENGINEER

7-8-92
DATE

DETAIL NO.
P1020-2



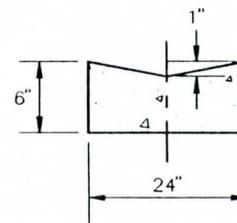
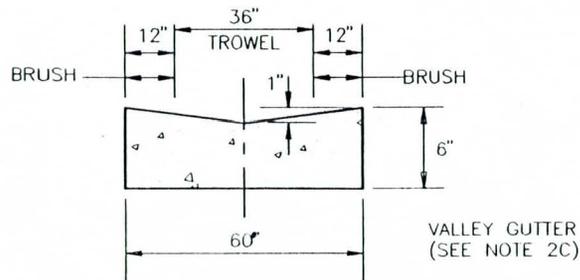
NORMAL CROWN

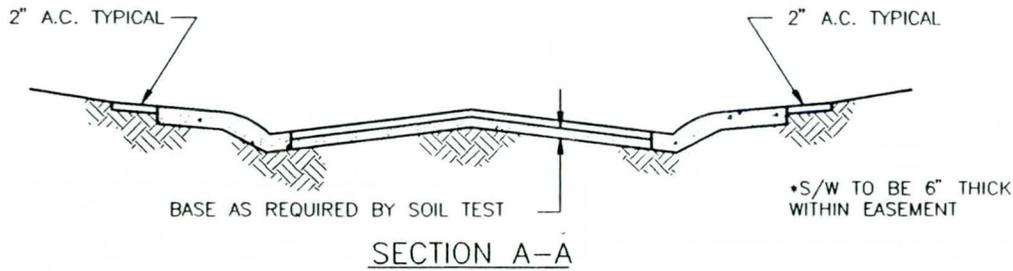


INVERTED CROWN

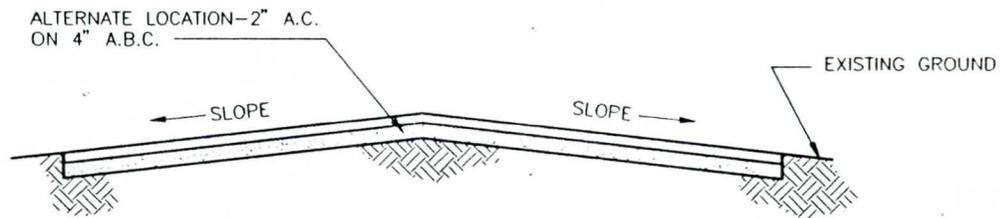
NOTES:

1. 24' MIN. WIDTH MAY BE APPROVED FOR SHORT DEAD-END OR CUL-DE-SAC DRIVEWAYS OR DRIVEWAYS IN APARTMENT TYPE DEVELOPMENT. A 3' UTILITY EASEMENT TO BE DEDICATED ADJACENT.
2. GRADES
 - (A) MAX. -15%. STREET GRADES EXCEEDING 12% SHOULD HAVE MAX. LENGTH OF 600'.
 - (B) DESIRABLE MIN. GRADE -0.25%.
 - (C) WHEN THE LONGITUDINAL GRADE OF INVERTED CROWN IS LESS THAN 0.30%, CONC. VALLEY GUTTER SHALL BE INSTALLED.
3. CROWN
 - (A) 5" TO 6" WHERE STREET GRADE IS LESS THAN 0.25%.
 - (B) 4" TO 5" WHERE STREET GRADE EXCEEDS 0.25%.
 - (C) INVERTED CROWN 4" TO 6".
NOTE: FOR 24' WIDTH DRIVEWAYS DEDUCT 1" FROM ABOVE CROWNS.
4. WITH INVERTED CROWN STREETS, ROLL CURB, WITH DEPRESSED LIP, MAY BE SUBSTITUTED FOR RIBBON TYPE CURB.
5. RIBBON TYPE CURB IS NOT TO BE INSTALLED IF S/W ARE PROPOSED.
6. CONCRETE PER MAG SEC. 725 & 505.

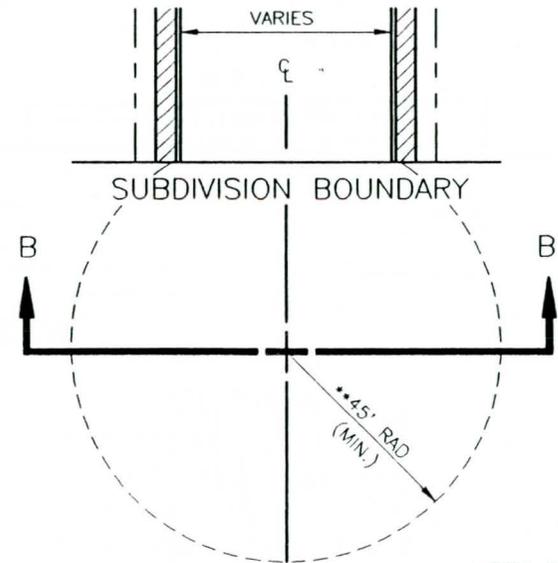
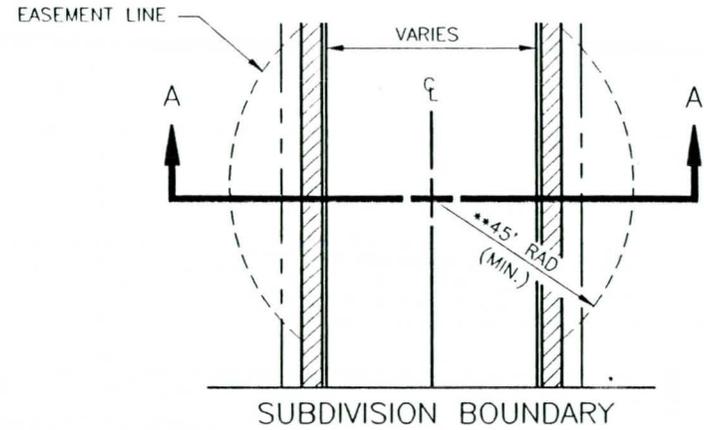




SECTION A-A



SECTION B-B



••REV. 12-88

DETAIL NO.
P1022



City of Phoenix
STANDARD DETAIL

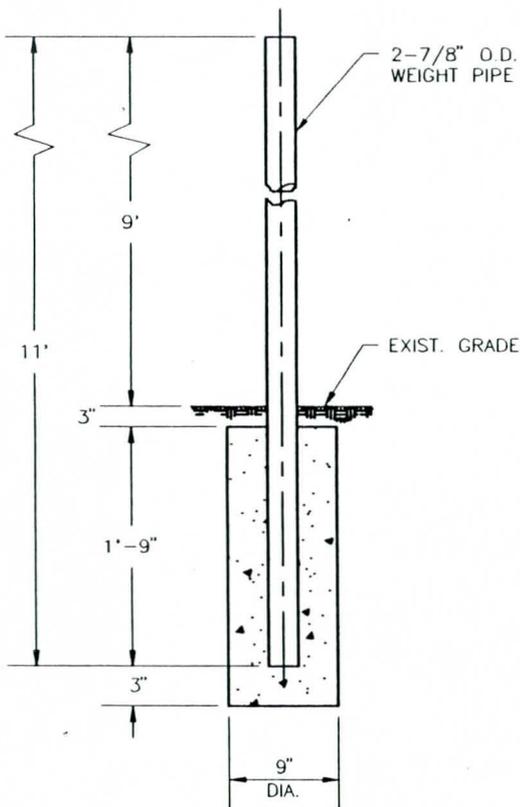
TEMPORARY TURN-AROUND EASEMENT

APPROVED

Kenny W. Hain
CITY ENGINEER

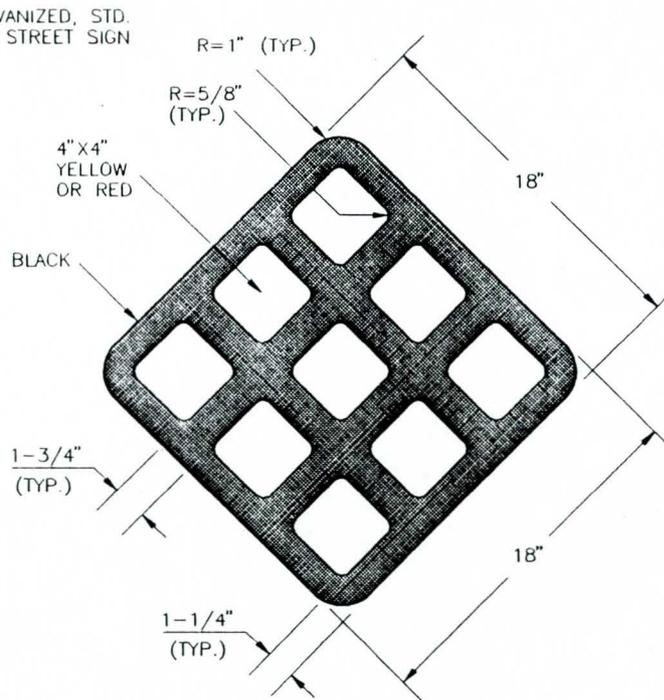
7-8-92
DATE

DETAIL NO.
P1022



STREET SIGN BASE

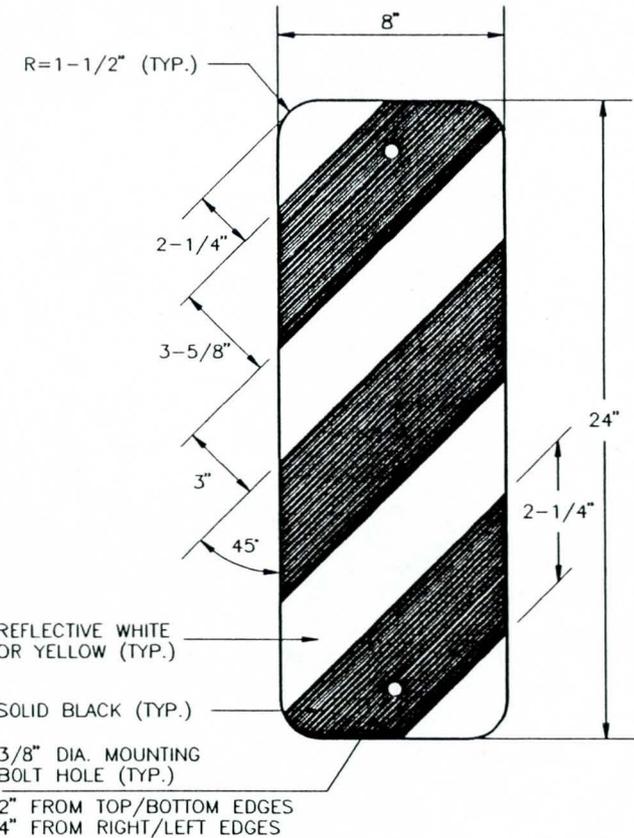
NOTE:
CONCRETE BASE FOUNDATIONS SHALL BE CLASS "C" CONCRETE AS PER MAG SECT. 505 & 725.



OBJECT MARKER

NOTES:

1. RED USED TO INDICATE A TOTAL CLOSURE CONDITION WHEREBY TRAFFIC CAN PROCEED NO FURTHER. (RED BALL)
2. YELLOW USED TO INDICATE OBJECTS WITHIN OR IMMEDIATELY ADJACENT TO THE ROADWAY CAUSING A PARTIAL CLOSURE OR SERIOUS INTERFERENCE WITH TRAFFIC. (YELLOW BALL)



DELINEATOR

NOTES:

1. STRIPES TO SLOPE DOWNWARD TO THE SIDE ON WHICH TRAFFIC IS TO PASS.
2. DELINEATOR TO BE BLACK AND WHITE WHEN USED ON THE RIGHT SIDE OF THE ROADWAY - AND BLACK AND YELLOW WHEN USED ON THE LEFT SIDE.

DETAIL NO.
P1023



City of Phoenix
STANDARD DETAIL

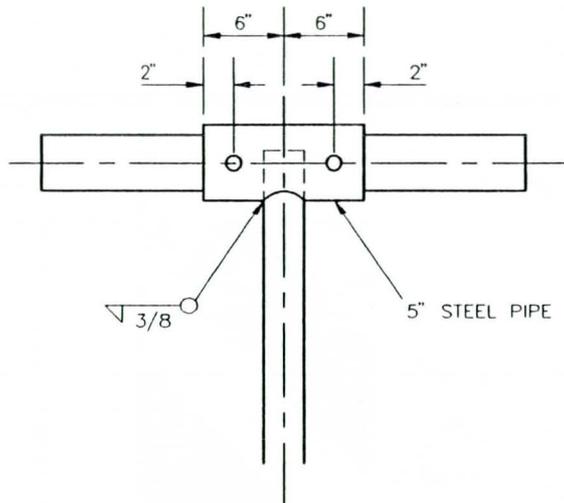
STREET SIGN BASE, OBJECT MARKER,
AND DELINEATOR

APPROVED

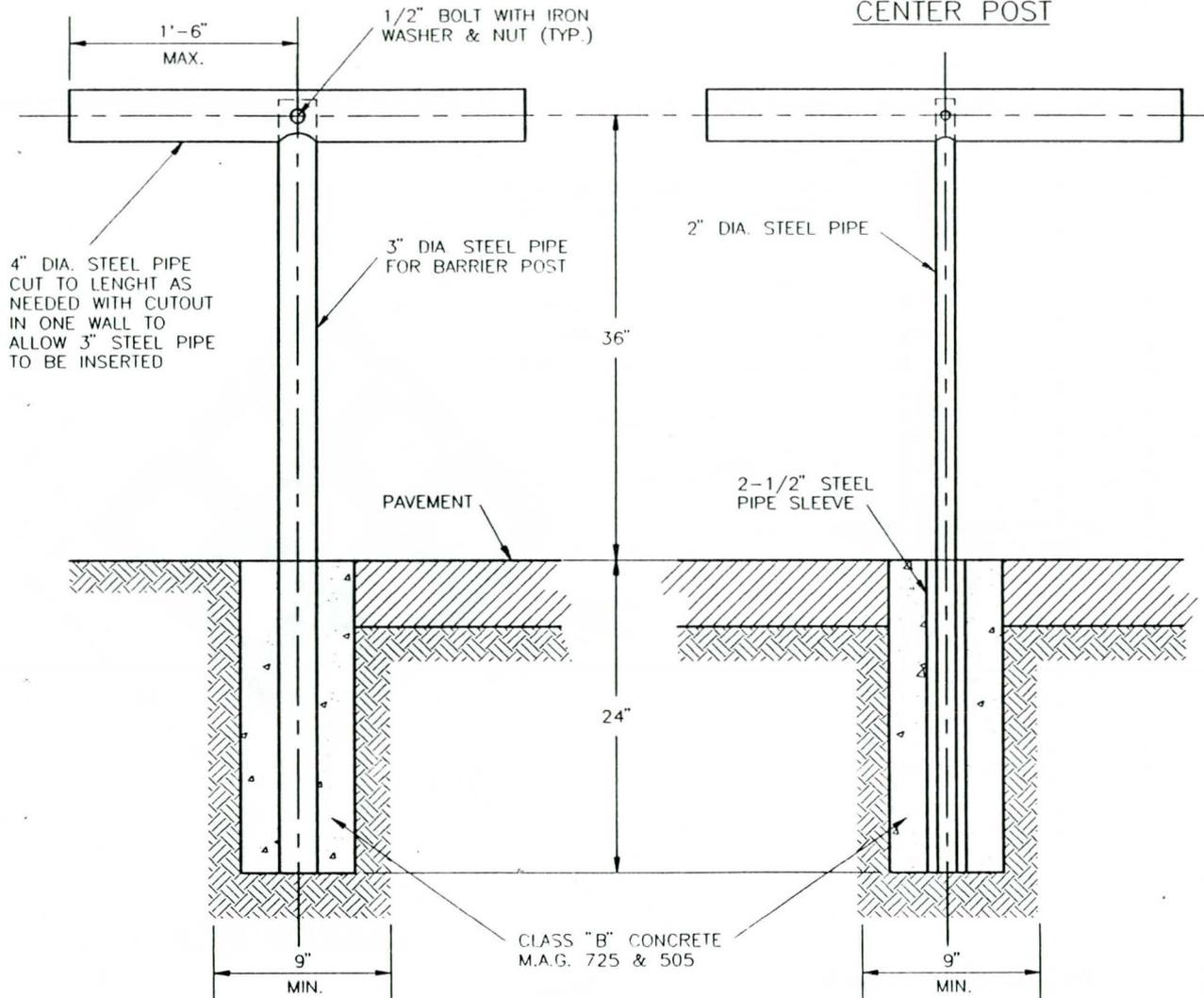
Kenny W. Hain
CITY ENGINEER

7-8-92
DATE

DETAIL NO.
P1023



"T" SLEEVE OPTION



NOTES:

1. 1'-6" MAX. OVERHANG
2. MAX. OVERALL LENGTH IS 33'
3. CENTER POST REQUIRED IF CLEAR SPAN EXCEEDS 15'
4. CENTER POST SHALL BE 2" DIA. WITH A 2-1/2" DIA. SLEEVE IN THE FOOTING.
5. ALL PIPE IS SCHEDULE 40, GALVANIZED STEEL. (ASTM A 53)

DETAIL NO.
P1024



City of Phoenix
STANDARD DETAIL

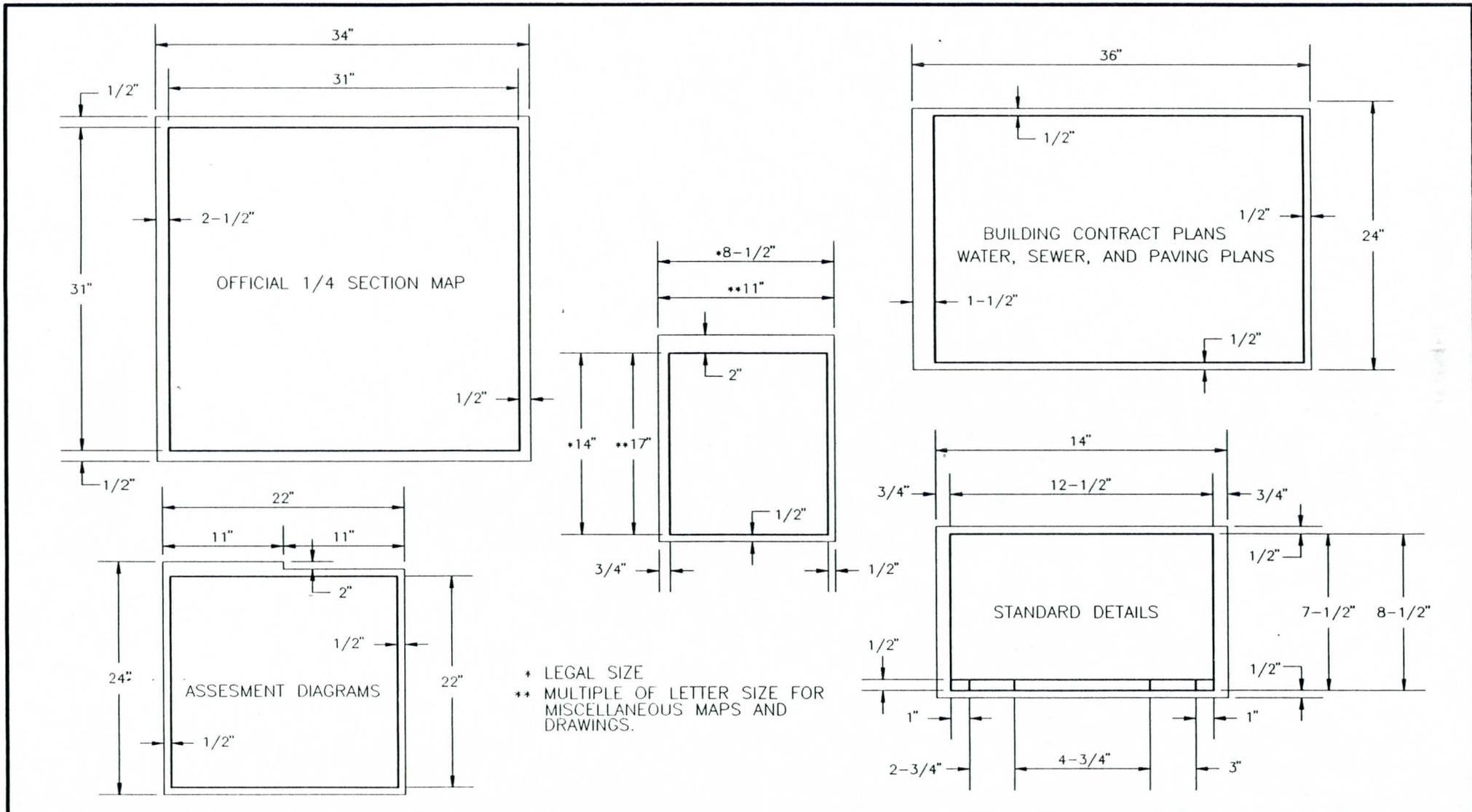
STEEL PIPE BARRICADE

APPROVED

Kenny Whelan
CITY ENGINEER

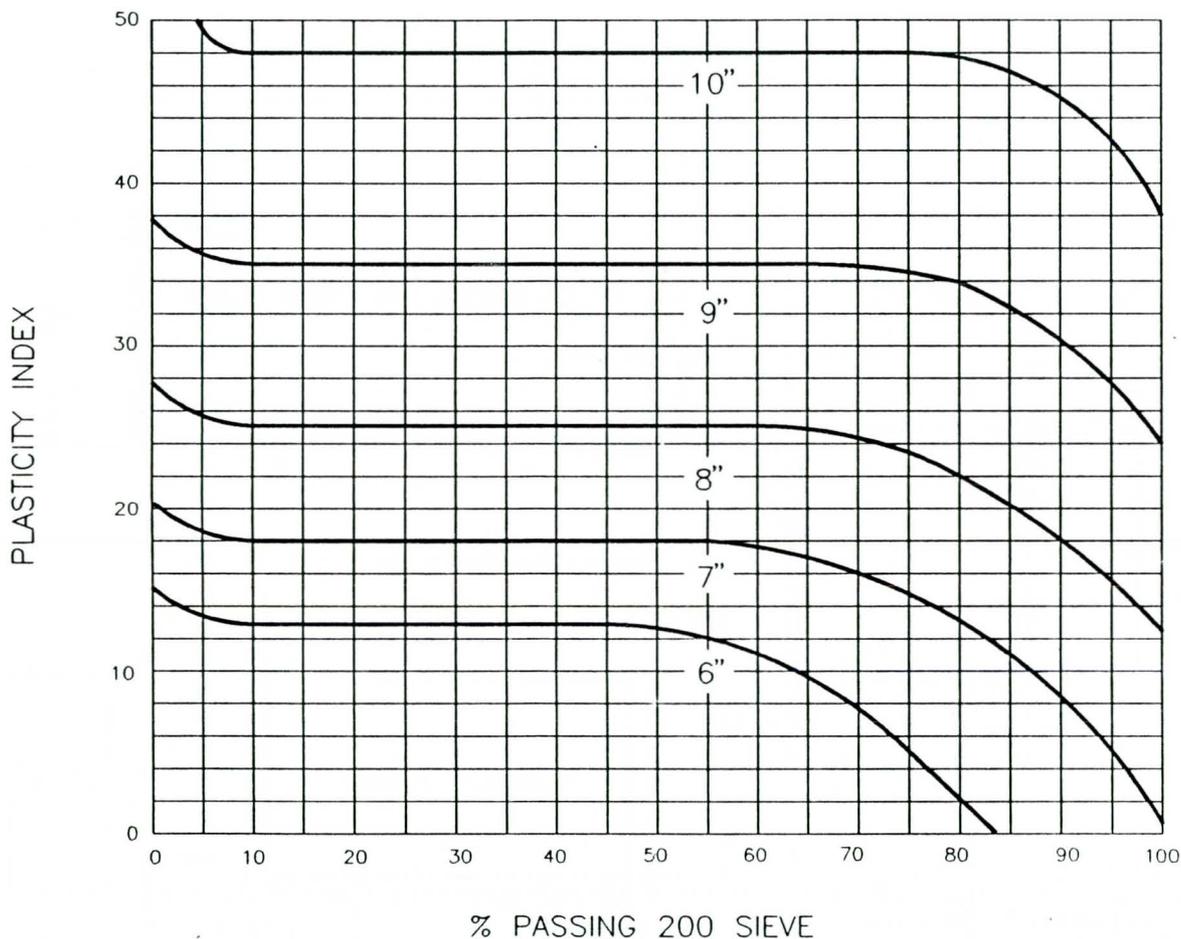
7-8-92
DATE

DETAIL NO.
P1024



* LEGAL SIZE
 ** MULTIPLE OF LETTER SIZE FOR MISCELLANEOUS MAPS AND DRAWINGS.

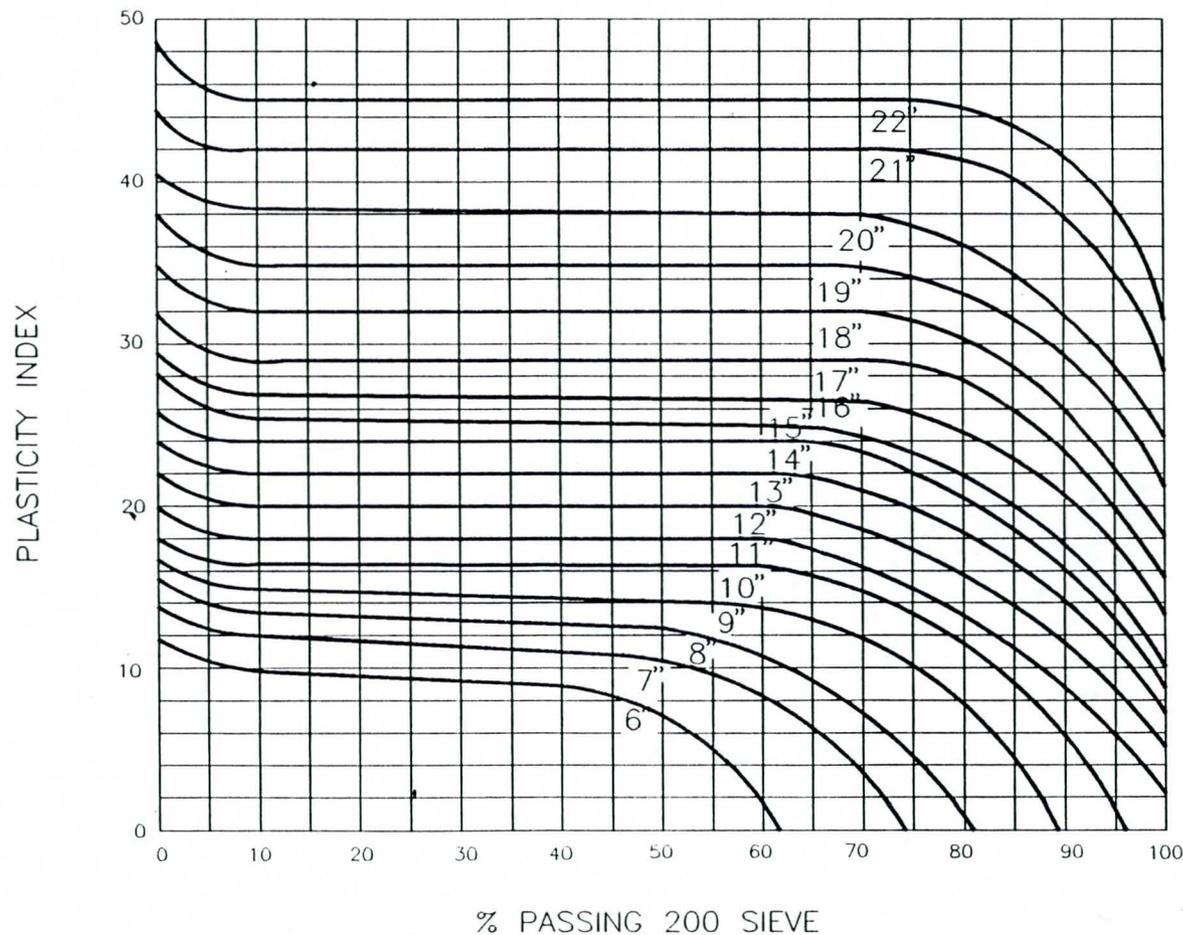
BASE THICKNESS CHART



NOTES:

1. TOP 4" OF BASE SHALL BE A.B.C. BALANCE SHALL BE A.B.C. OR SELECT MATERIAL.
2. MINIMUM-DEPTH OF FLEXIBLE BASE COURSE REQUIRED UNDER 2" (MIN.) BITUMINOUS SURFACE.
3. CHART TO BE USED ONLY WHEN "R" VALUES ARE NOT AVAILABLE.

BASE THICKNESS CHART



NOTES:

1. TOP 4" OF BASE SHALL BE A.B.C. BALANCE SHALL BE A.B.C. OR SELECT MATERIAL.
2. MINIMUM-DEPTH OF FLEXIBLE BASE COURSE REQUIRED UNDER 2" (MIN.) BITUMINOUS SURFACE.
3. CHART TO BE USED ONLY WHEN "R" VALUES ARE NOT AVAILABLE.

DETAIL NO.
P1103



City of Phoenix
STANDARD DETAIL

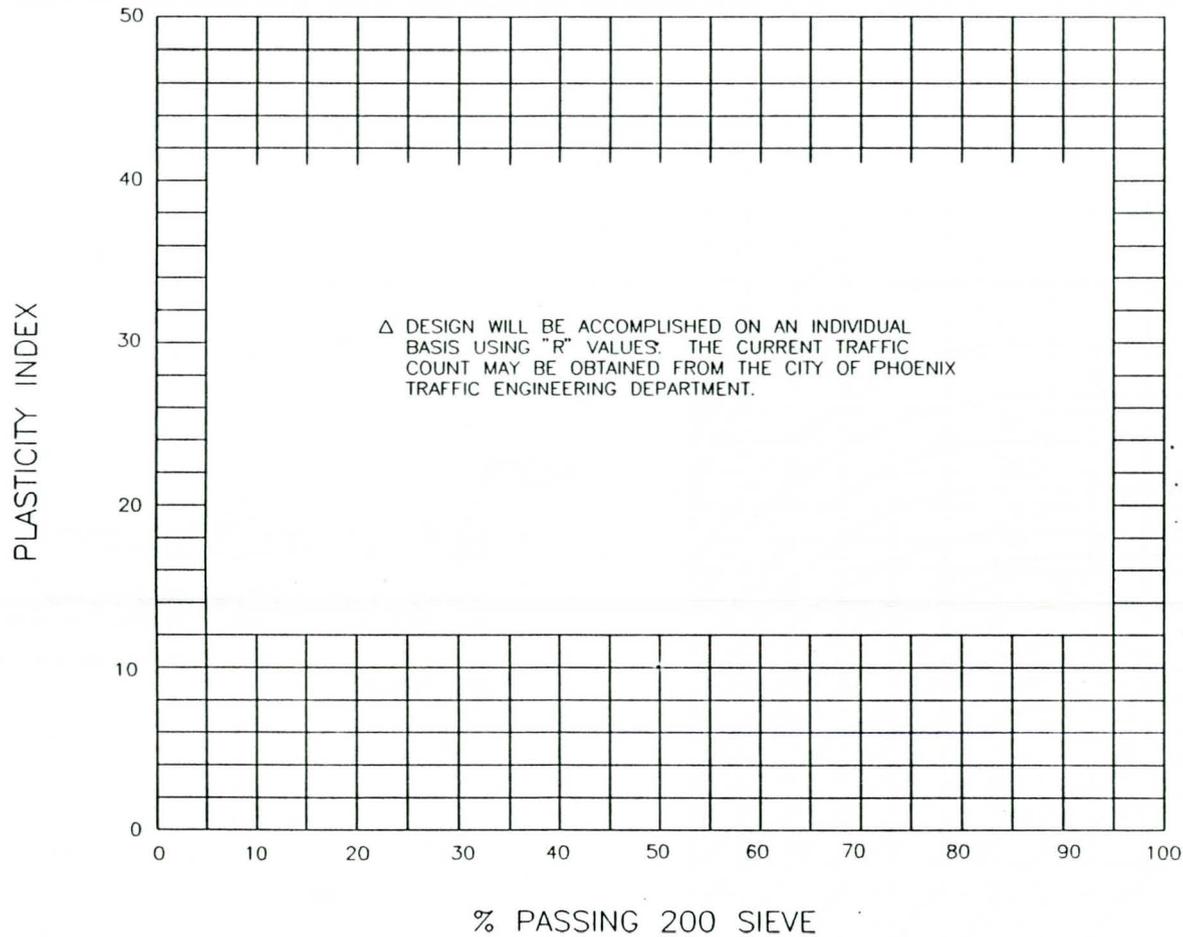
DEPTH OF BASE COURSE
(LOCAL COMMERCIAL & LIGHT INDUSTRIAL STREETS)

APPROVED
Kenny W. Hain
CITY ENGINEER

7-8-92
DATE

DETAIL NO.
P1103

BASE THICKNESS CHART



NOTES:

1. TOP 4" OF BASE SHALL BE A.B.C. BALANCE SHALL BE A.B.C. OR SELECT MATERIAL.
2. MINIMUM-DEPTH OF FLEXIBLE BASE COURSE REQUIRED UNDER 4" (MIN.) BITUMINOUS SURFACE.
3. CHART TO BE USED ONLY WHEN "R" VALUES ARE NOT AVAILABLE.

DETAIL NO.
P1104



City of Phoenix
STANDARD DETAIL

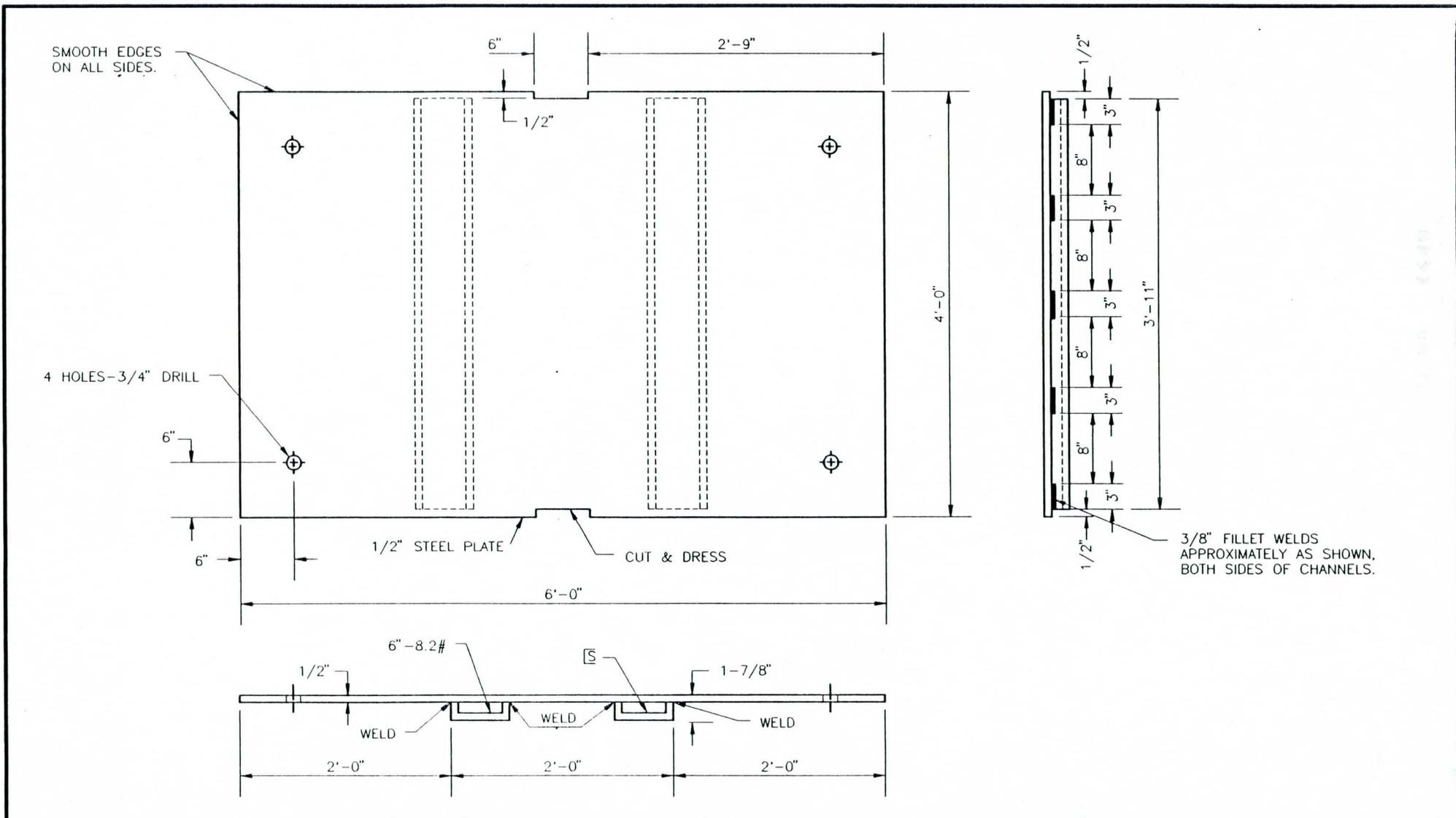
DEPTH OF BASE COURSE
(MAJOR STREETS & HEAVY INDUSTRIAL STREETS)

APPROVED

Kenny W. Hain
CITY ENGINEER

7-8-94
DATE

DETAIL NO.
P1104



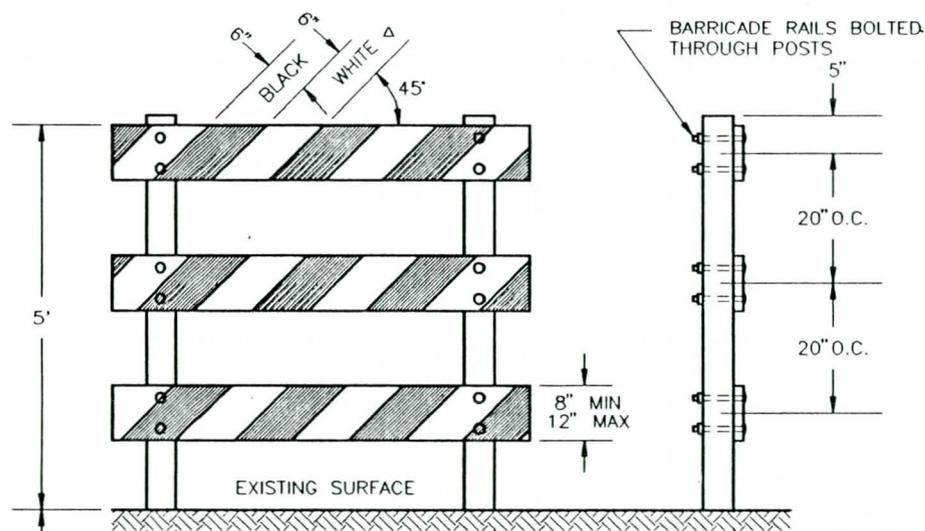
DETAIL NO.
P1105

City of Phoenix
STANDARD DETAIL

STEEL COVER FOR OPEN TRENCHES

APPROVED
Kenny W. Hain
CITY ENGINEER
7-8-92
DATE

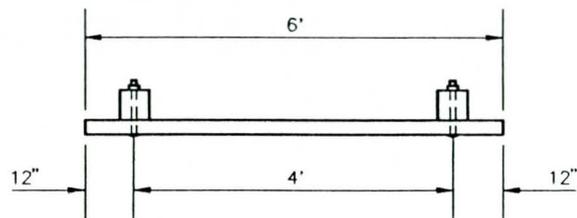
DETAIL NO.
P1105



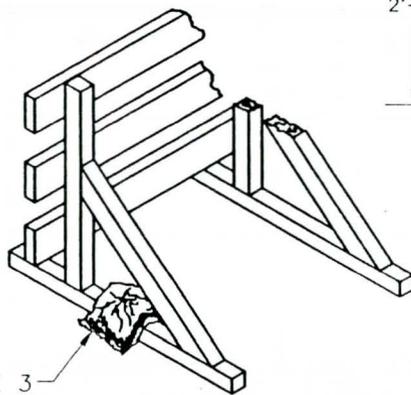
TYPE "A" Δ

Δ TYPE "A" MARKINGS SHALL BE ALTERNATE BLACK AND WHITE REFLECTIVE STRIPES (SLOPING DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS.)

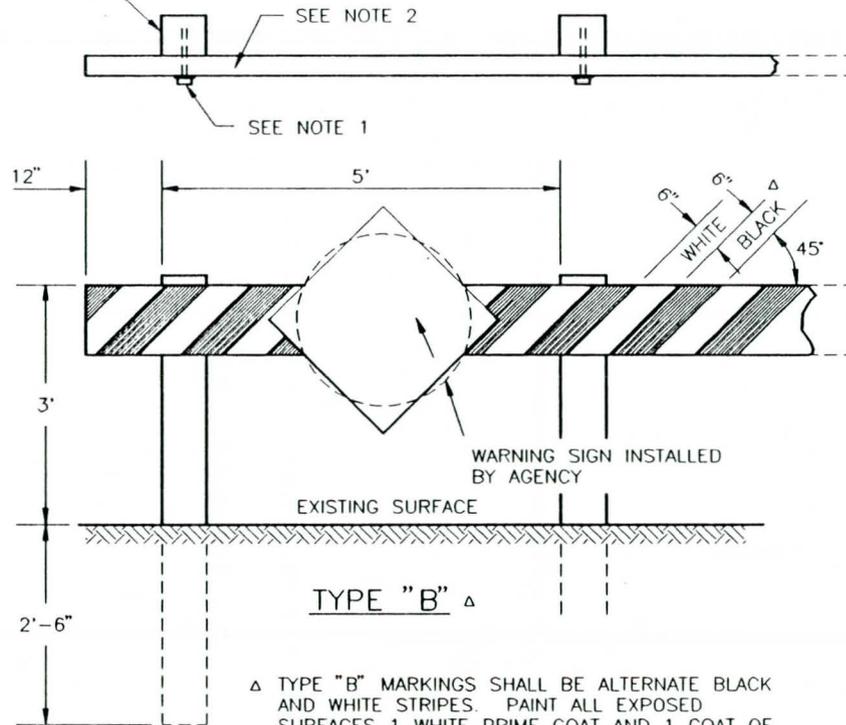
2'-11"



SEE NOTE 3



6" x 6" REDWOOD POST



TYPE "B" Δ

Δ TYPE "B" MARKINGS SHALL BE ALTERNATE BLACK AND WHITE STRIPES. PAINT ALL EXPOSED SURFACES 1 WHITE PRIME COAT AND 1 COAT OF WHITE EXTERIOR ENAMEL BLACK STRIPING, 1 COAT OF EXTERIOR BLACK ENAMEL.

NOTES:

1. FASTEN WITH 1/2" X 8" LAG SCRWES WITH 2 FLAT WASHERS OR (2) 5/8" BOLTS, WITH 4 FLAT WASHERS.
2. 3" X 10" DOUGLAS FIR PLANK (LENGTH TO BE DETERMINED ON PLANS).
3. WHEN BARRICADE (TYPE "A") IS CONSTRUCTED ON BASES INSTEAD OF POSTS SET INTO THE GROUND, IT MAY BE DESIRABLE TO BALLAST THE BASES WITH SAND BAGS OR BY STAKING TO PROVIDE RESISTANCE TO OVERTURNING DURING PERIODS OF HIGH WINDS.

Δ REVISED 6/2/82

DETAIL NO.
P1106



City of Phoenix
STANDARD DETAIL

BARRICADE

APPROVED

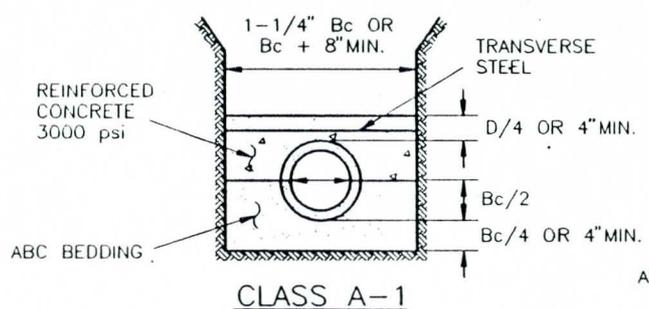
Kenny Whitman
CITY ENGINEER

7-8-92
DATE

DETAIL NO.
P1106

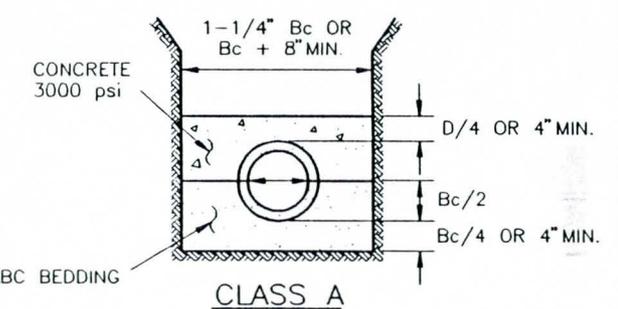
ALLOWABLE V.C.P. TRENCH LOADING

| PIPE SIZE (INCHES) | V.C.P. THREE EDGE BEARING STRENGTH MIN. | ALLOWABLE TRENCH LOAD PER CLASS OF BEDDING SOIL WT.=130#/CU.FT. SAFETY FACTOR=1.5 | | |
|--------------------|---|---|------------------|---------------------|
| | | CLASS A-1 L.F.=3.4 | CLASS A L.F.=2.8 | *CLASS B-1 L.F.=2.2 |
| 8 | 2200 | 4987 | 4107 | 3227 |
| 10 | 2400 | 5440 | 4480 | 3520 |
| 12 | 2600 | 5893 | 4853 | 3813 |
| 15 | 2900 | 6573 | 5413 | 4253 |
| 18 | 3300 | 7480 | 6160 | 4840 |
| 21 | 3850 | 8727 | 7187 | 5647 |
| 24 | 4400 | 9973 | 8213 | 6453 |
| 27 | 4700 | 10653 | 8773 | 6893 |
| 30 | 5000 | 11333 | 9333 | 7333 |
| 33 | 5500 | 12467 | 10267 | 8067 |
| 36 | 6000 | 13600 | 11200 | 8800 |
| 39 | 6600 | 14960 | 12320 | 9680 |



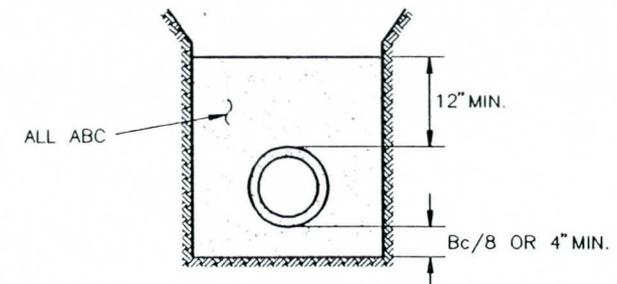
CLASS A-1

LOAD FACTOR: 3.4 REINFORCED CONCRETE, $p=0.4\%$



CLASS A

LOAD FACTOR: 2.8 PLAIN CONCRETE



*CLASS B-1

LOAD FACTOR: 2.2 ABC ENCASEMENT

NOTE:

MAG SECTION 601 AND CITY OF PHOENIX SUPPLEMENT APPLIES FOR FOUNDATION, BEDDING, BACKFILL, MATERIALS AND COMPACTION.

* REV. 11/1/84

DETAIL NO. P1120

City of Phoenix STANDARD DETAIL

V.C.P. TRENCH LOADING

APPROVED *Kenny W. Hain* CITY ENGINEER

7-8-92 DATE

DETAIL NO. P1120

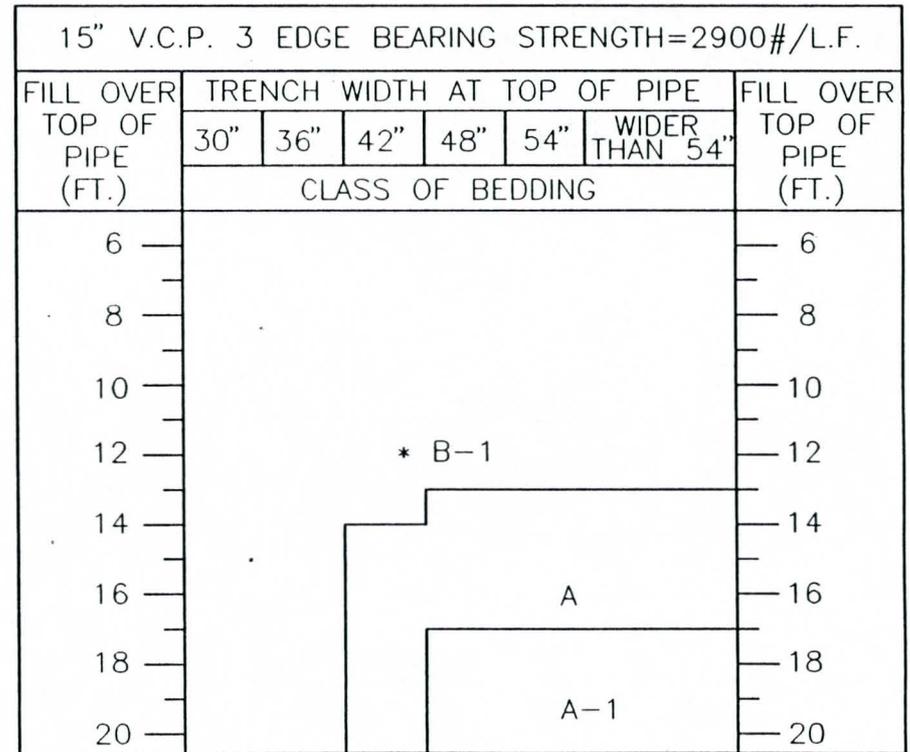
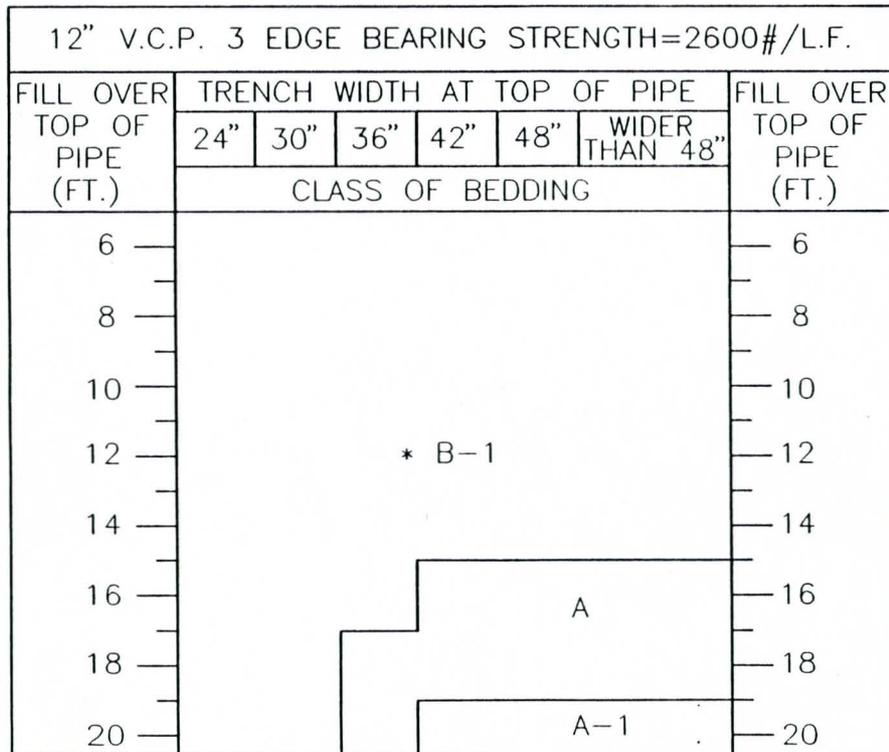
| 8" V.C.P. 3 EDGE BEARING STRENGTH=2200#/L.F. | | | | | | | | | | | | |
|--|-----------------------------|-----|-----|-----|-----|-------------------|--------------------------------------|--|--|--|--|--|
| FILL OVER TOP OF PIPE (FT.) | TRENCH WIDTH AT TOP OF PIPE | | | | | | FILL OVER TOP OF PIPE (FT.) | | | | | |
| | 18" | 24" | 30" | 36" | 42" | WIDER THAN 42" | | | | | | |
| CLASS OF BEDDING | | | | | | | | | | | | |
| 6 | * B-1 | | | | | | 6 | | | | | |
| 8 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| A | | | | | | | 20 | | | | | |

| 10" V.C.P. 3 EDGE BEARING STRENGTH=2400#/L.F. | | | | | | | | | | | | |
|---|-----------------------------|-----|-----|-----|-----|-------------------|--------------------------------------|--|--|--|--|--|
| FILL OVER TOP OF PIPE (FT.) | TRENCH WIDTH AT TOP OF PIPE | | | | | | FILL OVER TOP OF PIPE (FT.) | | | | | |
| | 24" | 30" | 36" | 42" | 48" | WIDER THAN 48" | | | | | | |
| CLASS OF BEDDING | | | | | | | | | | | | |
| 6 | * B-1 | | | | | | 6 | | | | | |
| 8 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| A | | | | | | | 20 | | | | | |

SEE DETAIL P1120 FOR BEDDING DETAILS

* REV. 11/1/84

| | | | | | |
|---------------------|--|--------------------------------|-------------------------------|----------------|---------------------|
| DETAIL NO. P1121 | City of Phoenix STANDARD DETAIL | 8" & 10" V.C.P. TRENCH LOADING | APPROVED CITY ENGINEER | 7-8-92 DATE | DETAIL NO. P1121 |
|---------------------|--|--------------------------------|-------------------------------|----------------|---------------------|



SEE DETAIL P1120 FOR BEDDING DETAILS

* REV. 11/1/84

DETAIL NO.
P1122



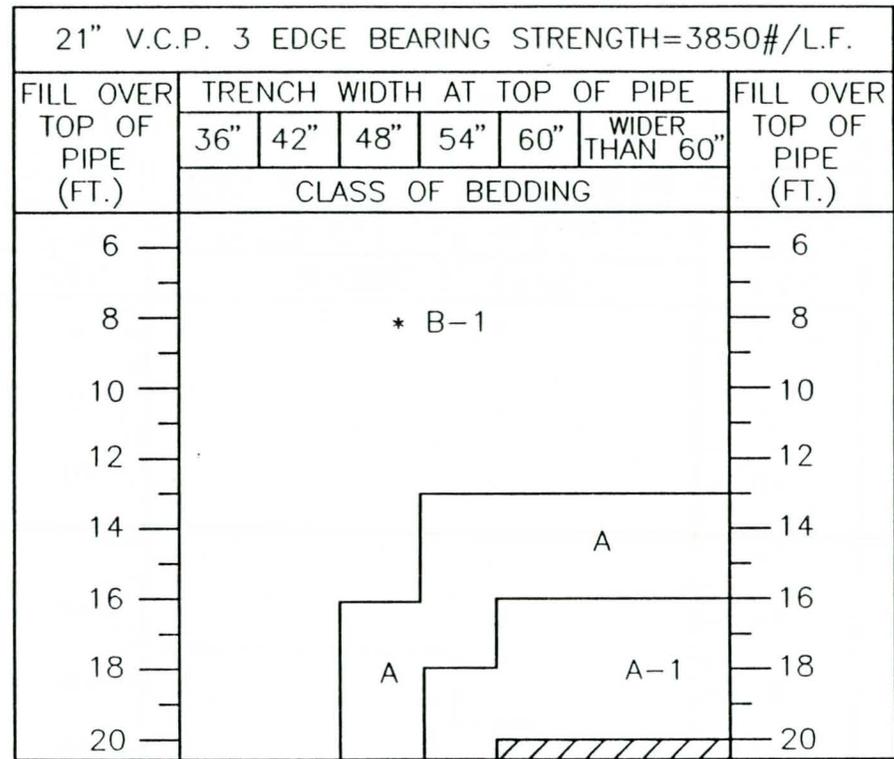
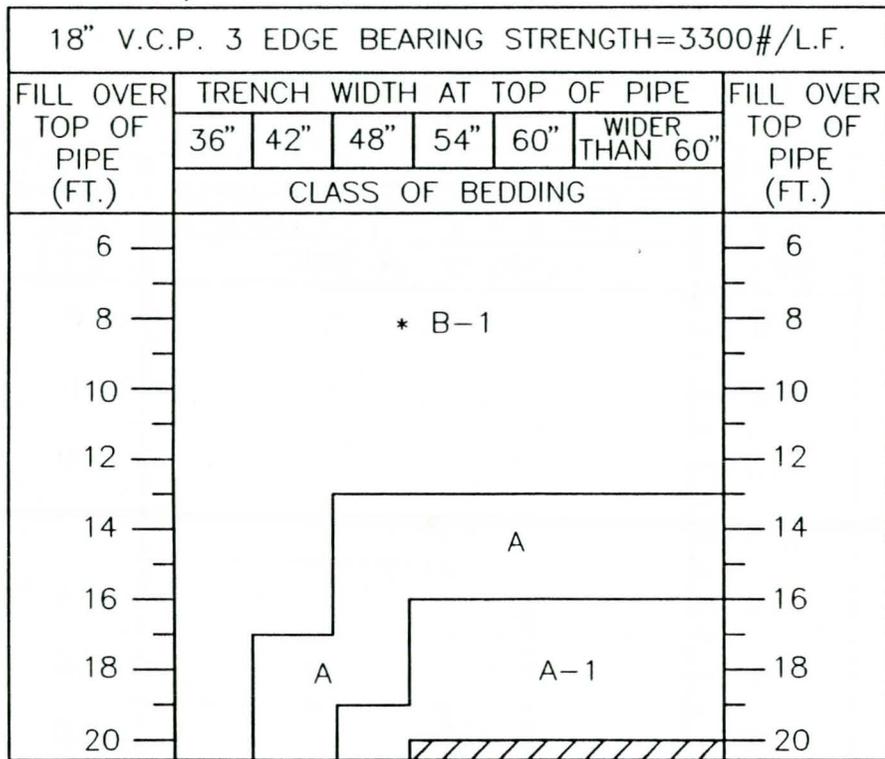
City of Phoenix
STANDARD DETAIL

12" & 15" V.C.P. TRENCH LOADING

APPROVED
Kenny Whelan
CITY ENGINEER

7-8-92
DATE

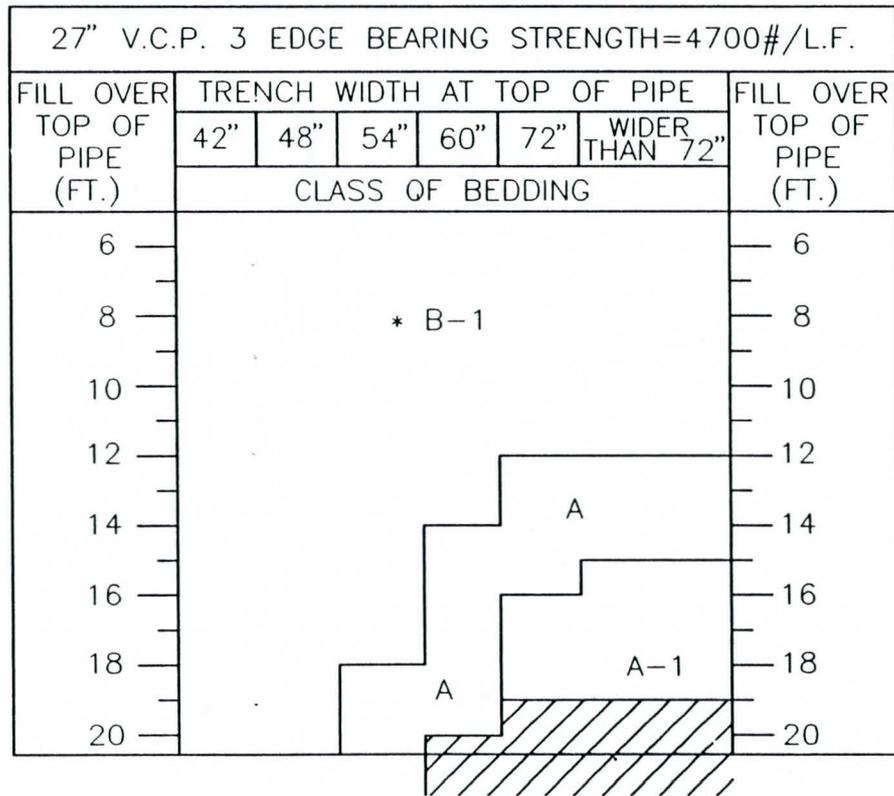
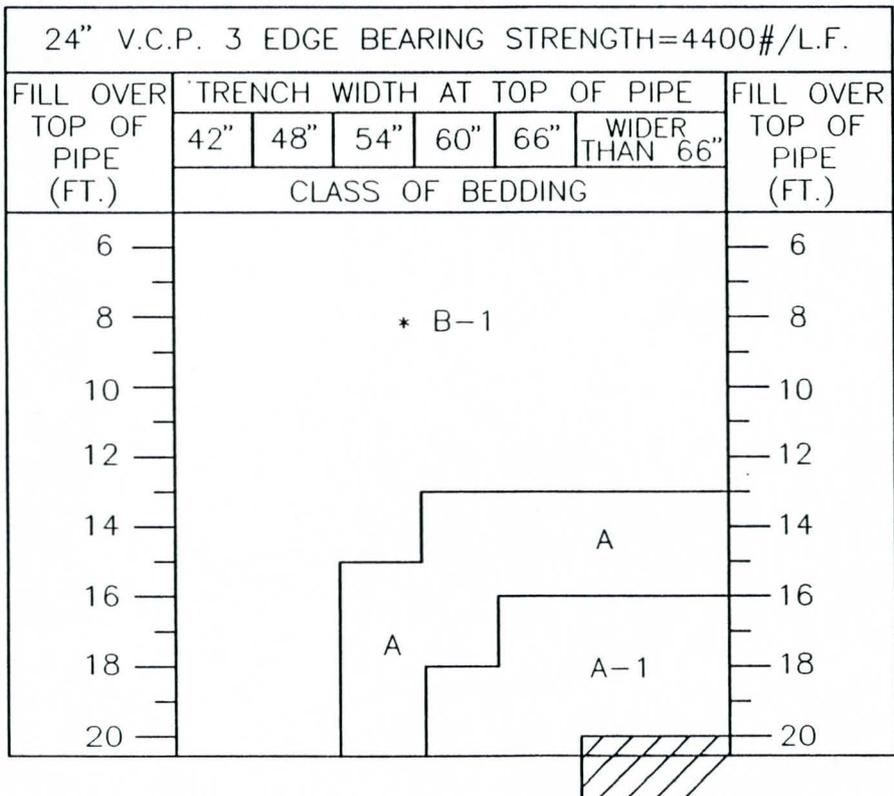
DETAIL NO.
P1122

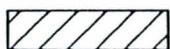


 REQUIRES DESIGN ACTION

SEE DETAIL P1120 FOR BEDDING DETAILS

• REV. 11/1/84



 REQUIRES DESIGN ACTION

SEE DETAIL P1120 FOR BEDDING DETAILS

• REV. 11/1/84

DETAIL NO.
P1124



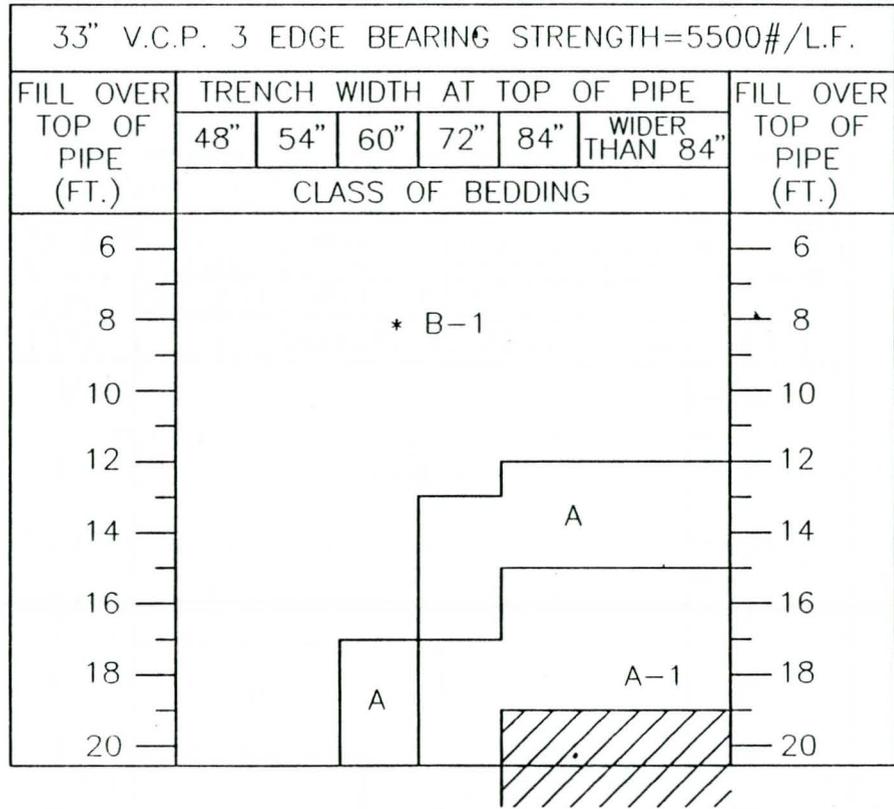
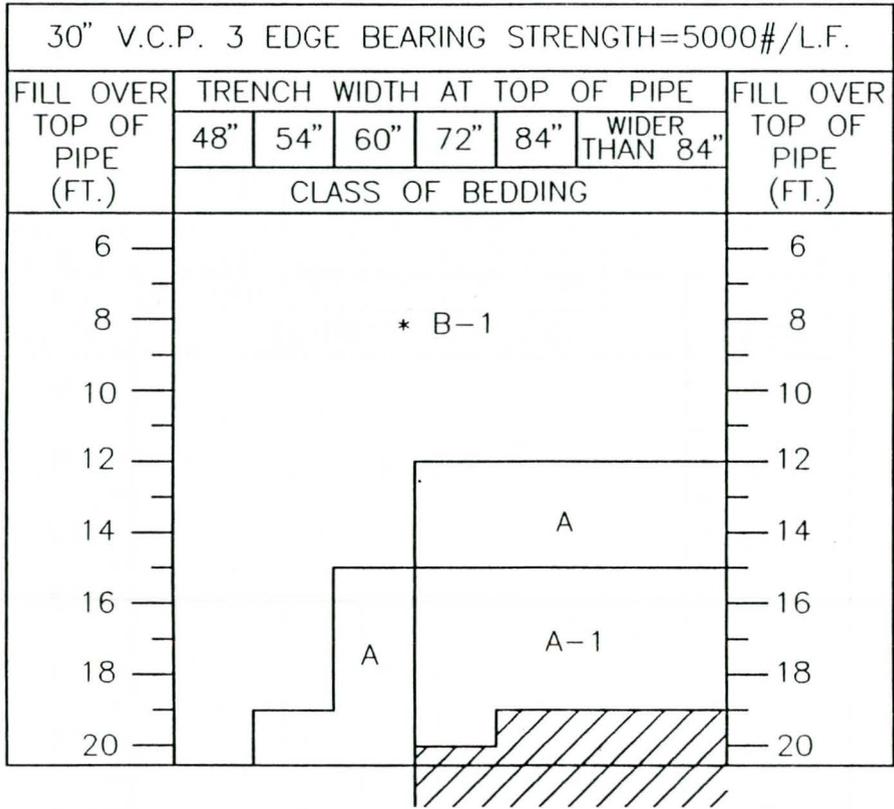
City of Phoenix
STANDARD DETAIL

24" & 27" V.C.P. TRENCH LOADING

APPROVED
Kenny Whelan
CITY ENGINEER

7-8-92
DATE

DETAIL NO.
P1124



 REQUIRES DESIGN ACTION

SEE DETAIL P1120 FOR BEDDING DETAILS

• REV. 11/1/84

DETAIL NO.
P1125



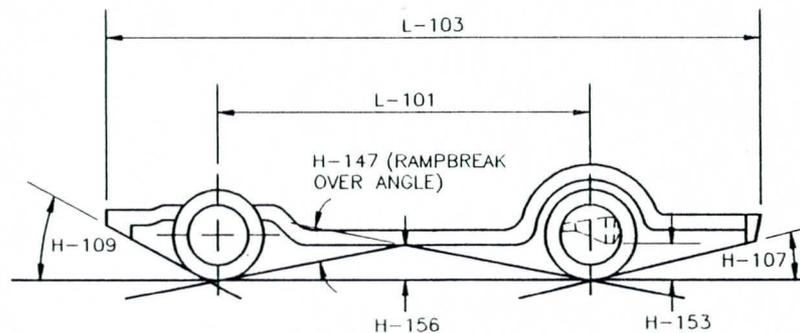
City of Phoenix
STANDARD DETAIL

30" & 33" V.C.P. TRENCH LOADING

APPROVED
Kenny W. Han
CITY ENGINEER

7-8-92
DATE

DETAIL NO.
P1125



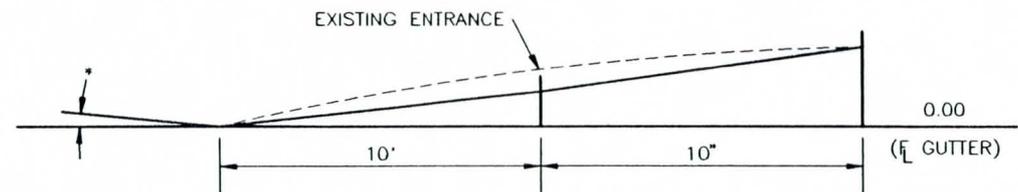
NOTES

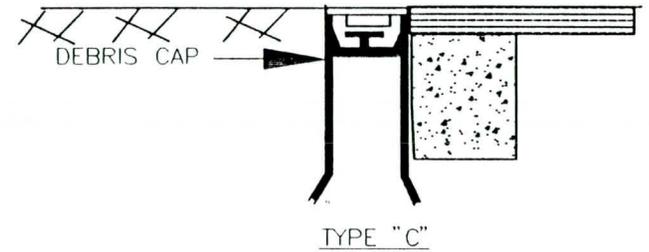
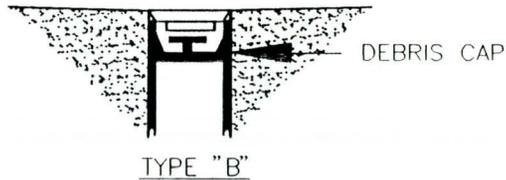
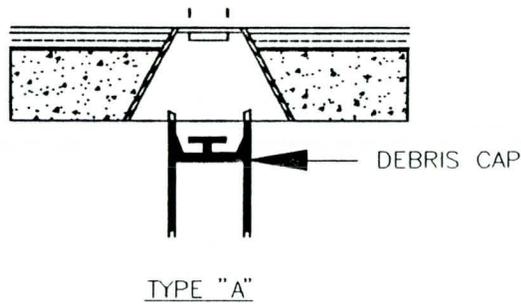
1. IF THE SUM OF THE STREET CROWN SLOPE, NORMALLY A NEGATIVE SLOPE OF 1.72' (0.03), AND THE POSITIVE SLOPE IF THE DRIVEWAY IS EQUAL TO OR EXCEEDS THE ANGLE OF DEPARTURE, 8.3' (0.146), THE DRIVEWAY MUST BE REDESIGNED TO A POSITIVE SLOPE OF NOT MORE THAN 6' (0.15).
2. ADDITIONAL INCREASES IN THE POSITIVE SLOPE MAY BE MADE AT TEN (10) FOOT INTERVALS. EACH CHANGE CANNOT EQUAL OR EXCEED THE ANGLE OF DEPARTURE, 8.3' (0.146).
3. CHANGES FROM A POSITIVE SLOPE TO A NEGATIVE SLOPE CANNOT EQUAL OR EXCEED THE BREAKOVER ANGLE OF 5.53' (0.097).
4. WHEN MAKING CHANGE FROM A NEGATIVE SLOPE TO A POSITIVE SLOPE, THE SUM OF THE TWO SLOPES CANNOT EQUAL OR EXCEED THE ANGLE OF DEPARTURE, 8.3' (0.146).

GROUND CLEARANCE DIMENSIONS

H-106 - ANGLE OF APPROACH = 8.6 DEGREES
 H-107 - ANGLE OF DEPARTURE = 8.3 DEGREES
 H-147 - RAMP BREAKOVER ANGLE = 5.53 DEGREES
 H-153 - REAR AXLE TO GROUND = 5.5 INCHES
 H-156 - MINIMUM GROUND CLEARANCE = 3.1 INCHES
 L-101 - WHEELBASE = 9.88 FEET
 L-103 - VEHICLE LENGTH = 18.42 FEET

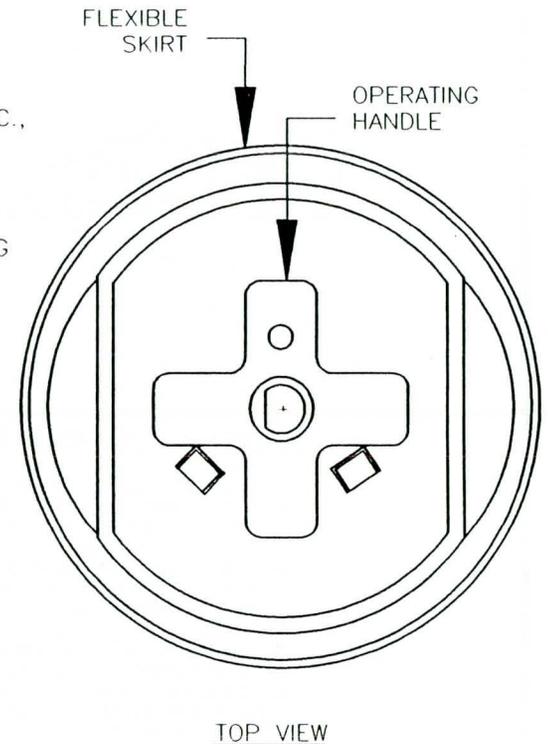
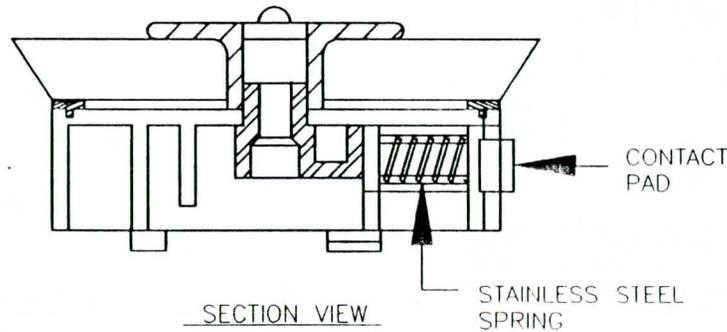
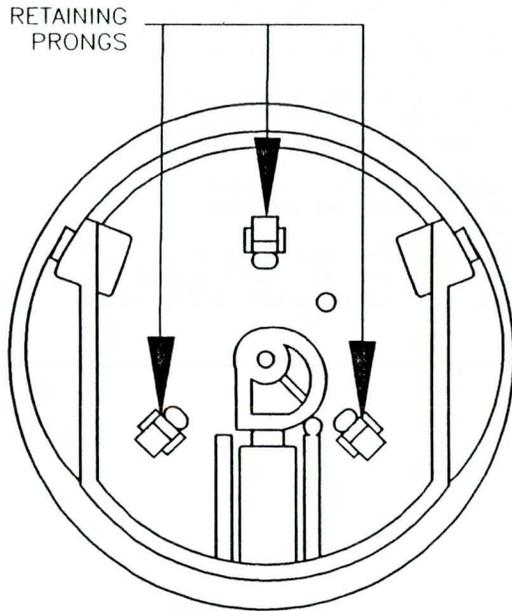
THESE DIMENSIONS ARE FROM THE 1982 MOTOR VEHICLE MANUFACTURERS ASSOCIATION PUBLICATION. COPIES MAY BE OBTAINED FROM TECHNICAL AFFAIRS DIVISION, MOTOR VEHICLE MANUFACTURERS ASSOCIATION, 300 NEW CENTER BUILDING, DETROIT, MICHIGAN 48202.





NOTES

1. DEBRIS CAP SHALL BE INSTALLED AS CLOSE UNDER THE CAST IRON COVER WITHOUT INTERFERING WITH COVER OPERATION.
2. FLEXIBLE SKIRT SHALL BE TRIMMED TO PROVIDE A SMOOTH CONTACT WITH THE INTERIOR DIAMETER OF THE PIPE.
3. THE DEBRIS CAP SHALL BE MANUFACTURED BY SW SERVICES, INC., PHOENIX, ARIZONA OR EQUAL.
4. THE DEBRIS CAP SHALL BE COMPRISED OF A HOLLOW MEMBER HAVING A CYLINDRICAL OUTER SURFACE, A CLOSURE FOR ONE END AND THREE POINT RESILIENT CONTACT PADS PROJECTING FROM THE OUTER SURFACE. THE CAP SHALL HAVE A FLEXIBLE SKIRT PROVIDING AN OUTWARD SEAL PREVENTING DEBRIS FROM GETTING PAST THE CAP. THE CAP MUST WITHSTAND, WITHOUT SLIPPAGE, A MINIMUM VERTICAL FORCE OF 50 POUNDS, AT A LOADING RATE OF 1.0 IN/MINUTE. THE CAP SHALL BE MOLDED USING GENERAL ELECTRIC ABS #HIM 4500. THE CAP SHALL HAVE RETAINING PRONGS TO RETAIN A STANDARD LOCATING COIL.



REVISED 05-31-94

DETAIL NO.
P1165



City of Phoenix
STANDARD DETAIL

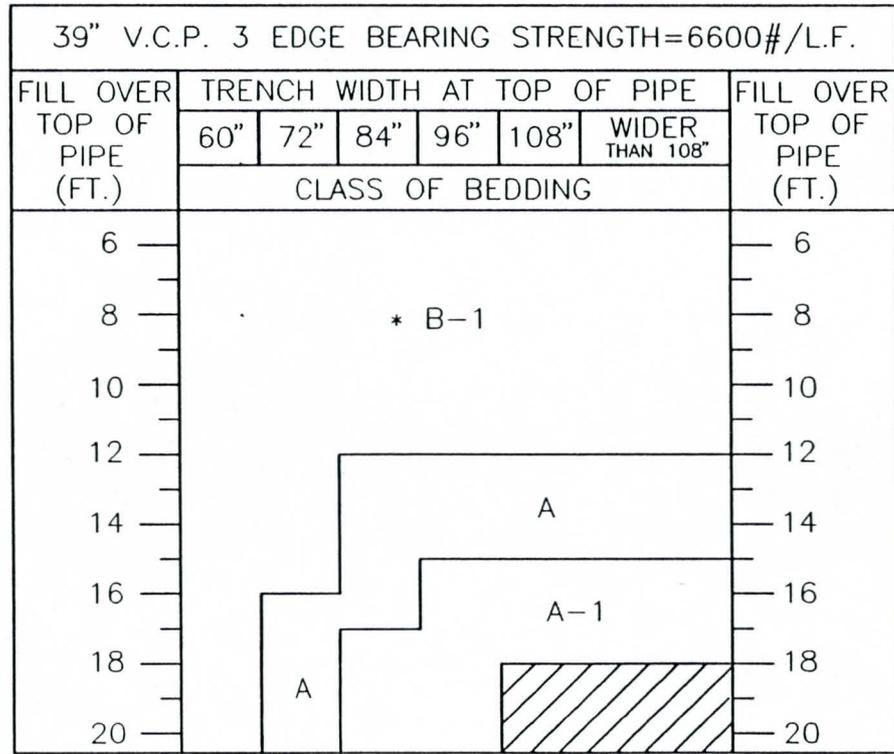
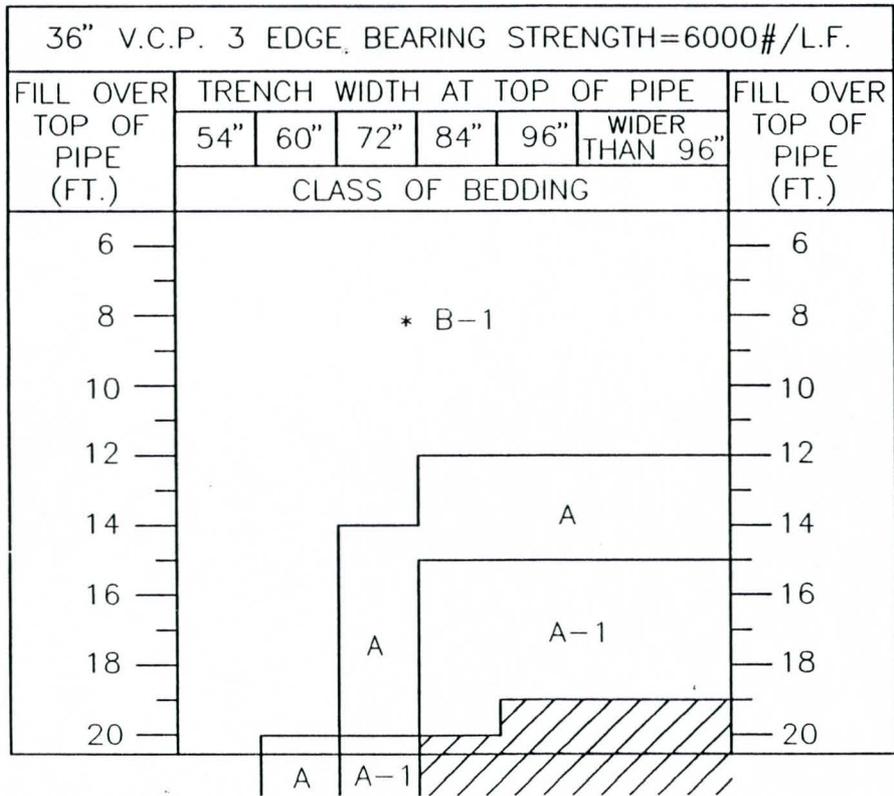
DEBRIS CAP INSTALLATION

APPROVED

Kenny W. Han
CITY ENGINEER

5-31-94
DATE

DETAIL NO.
P1165



 REQUIRES DESIGN ACTION

SEE DETAIL P1120 FOR BEDDING DETAILS

• REV. 11/1/84

ALLOWABLE V.C.P. TRENCH LOADING

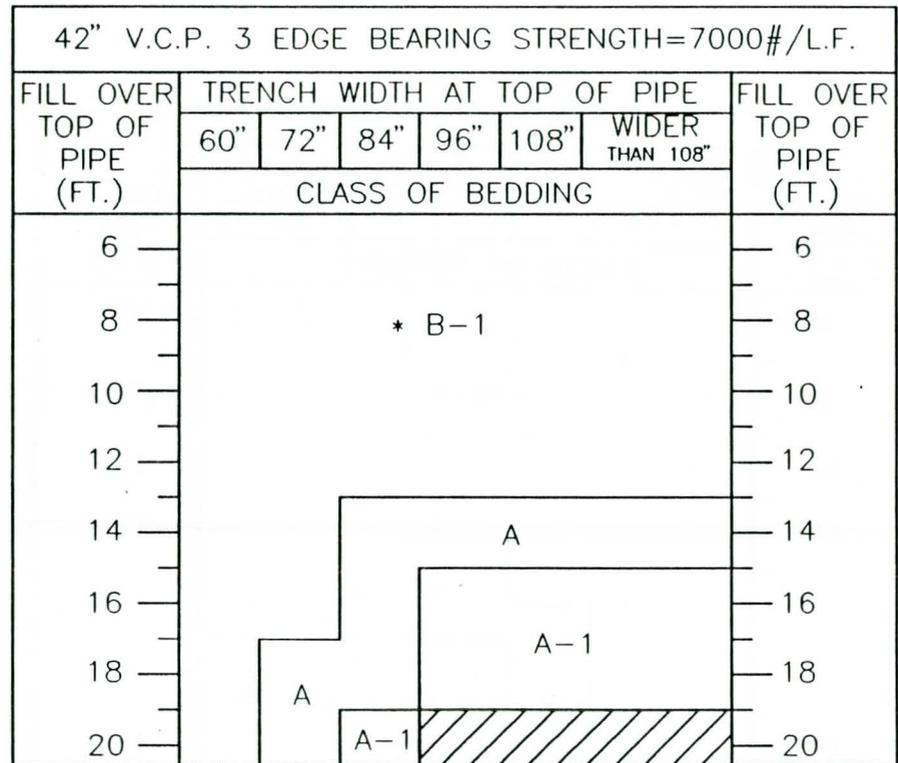
| PIPE SIZE (INCHES) | V.C.P. THREE EDGE BEARING STRENGTH MIN. | ALLOWABLE TRENCH WIDTH PER CLASS OF BEDDING SOIL WT.=130#/CU.FT. SAFETY FACTOR=1.5 | | |
|--------------------|---|--|------------------|---------------------|
| | | CLASS A-1 L.F.=3.4 | CLASS A L.F.=2.8 | *CLASS B-1 L.F.=2.2 |
| 42 | 7000 | 15867 | 13067 | 10267 |

SEE DETAIL P1120 FOR BEDDING DETAILS



REQUIRES DESIGN ACTION

42" V.C.P. 3 EDGE BEARING STRENGTH=7000#/L.F.



• REV. 11/1/84

DETAIL NO.
P1127



City of Phoenix
STANDARD DETAIL

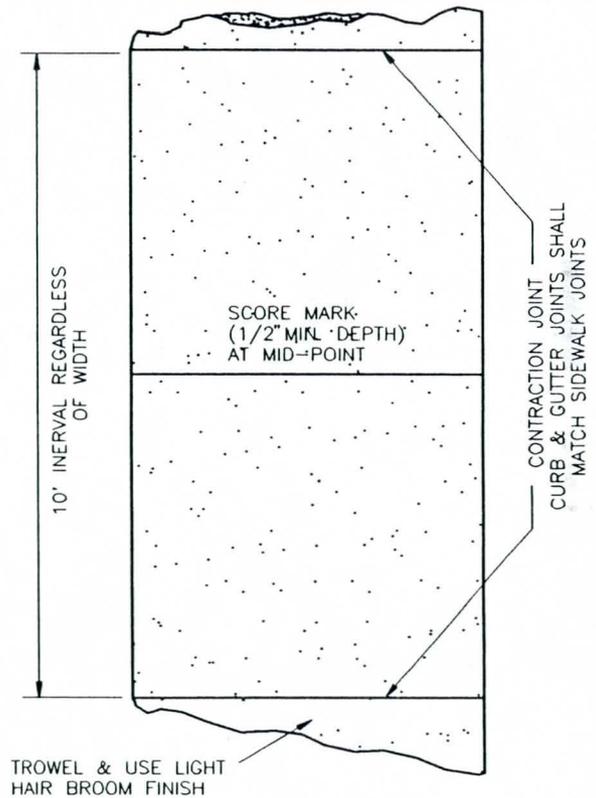
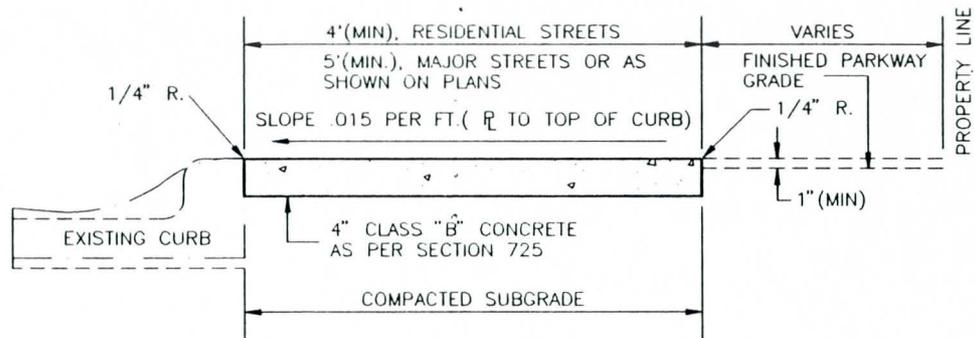
42" V.C.P. TRENCH LOADING

APPROVED

Kenny W. Han
CITY ENGINEER

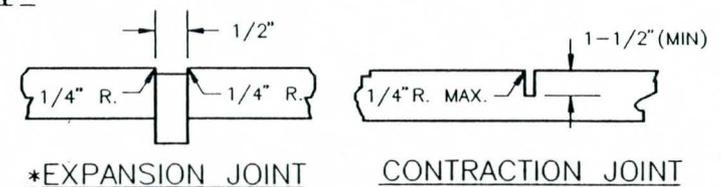
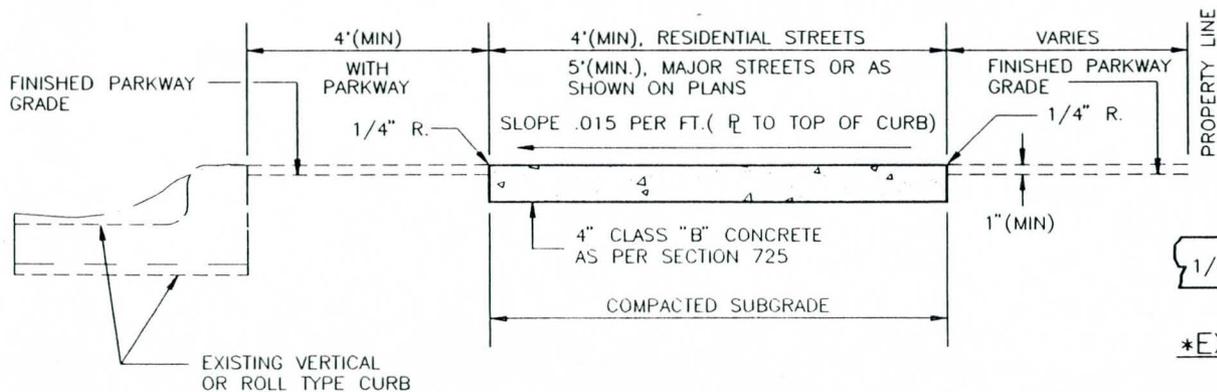
7-8-92
DATE

DETAIL NO.
P1127

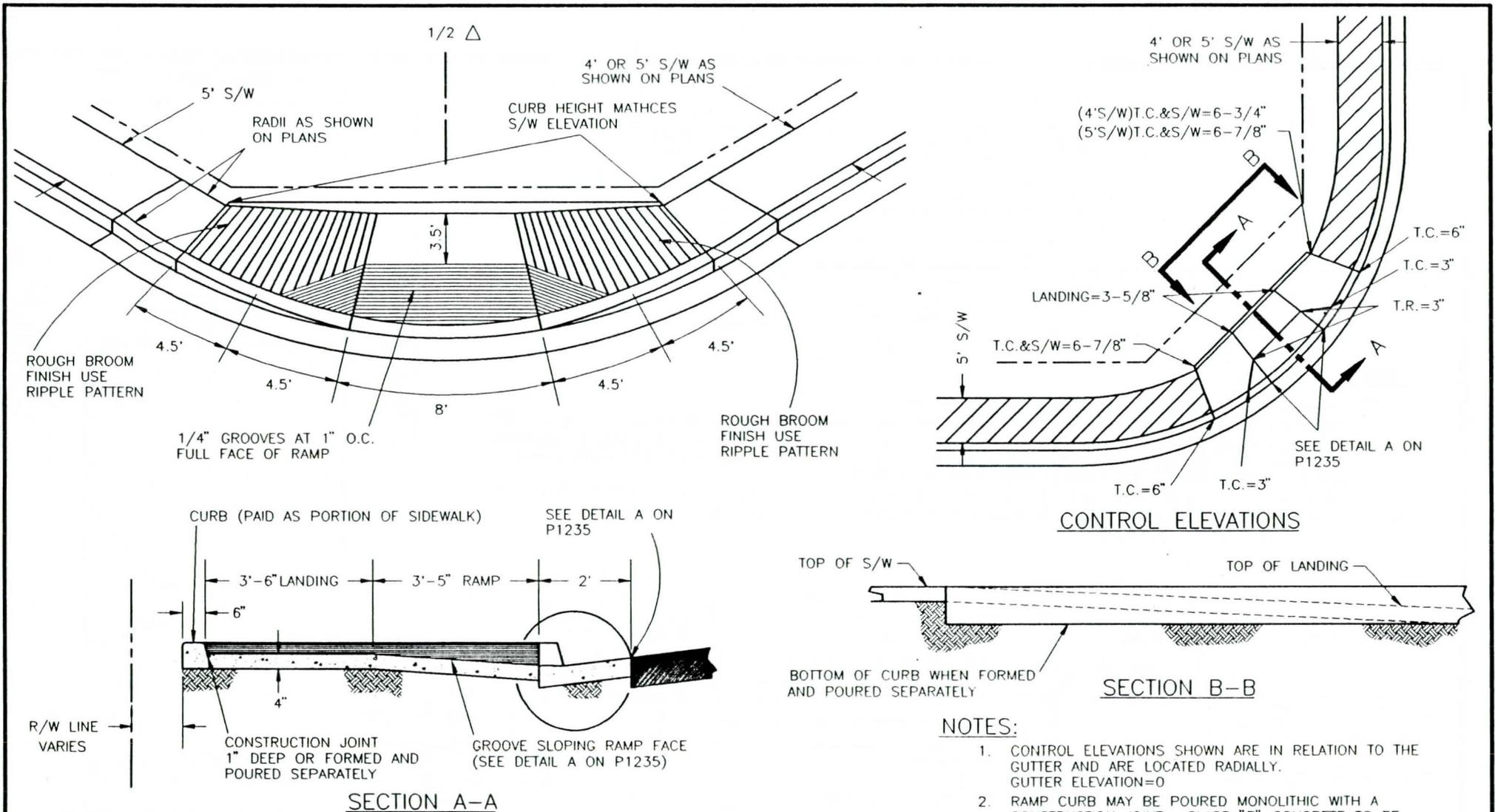


NOTES:

1. SIDEWALK CONSTRUCTION SHALL CONFORM TO SECTION 340.
2. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, A.S.T.M. D-1751.
3. EXPANSION JOINTS SHALL BE CONSTRUCTED AT THE END OF ALL POURS, AT POINTS OF CURVATURE, AT ADJOINING STRUCTURES, AT DRIVEWAYS AND AT A MAXIMUM SPACING OF 100'. THE EXPANSION JOINT MUST PROVIDE FOR COMPLETE SEPARATION OF THE SIDEWALK FROM ADJOINING CONCRETE.
- * 4. THE EXPANSION JOINT MATERIAL SHALL EXTEND FROM THE SURFACE OF THE SIDEWALK TO 1" INTO THE SUBGRADE.
- ** 5. WHEN SIDEWALK AND ADJACENT CURB ARE INSTALLED MONOLITHICALLY, THE MID-POINT SCORE LINE MUST EXTEND ACROSS THE CURB.



* REV. 11/1/84
 ** REV. 6/92



Δ REV. 6/2/82

DETAIL NO.
P1233



City of Phoenix
STANDARD DETAIL

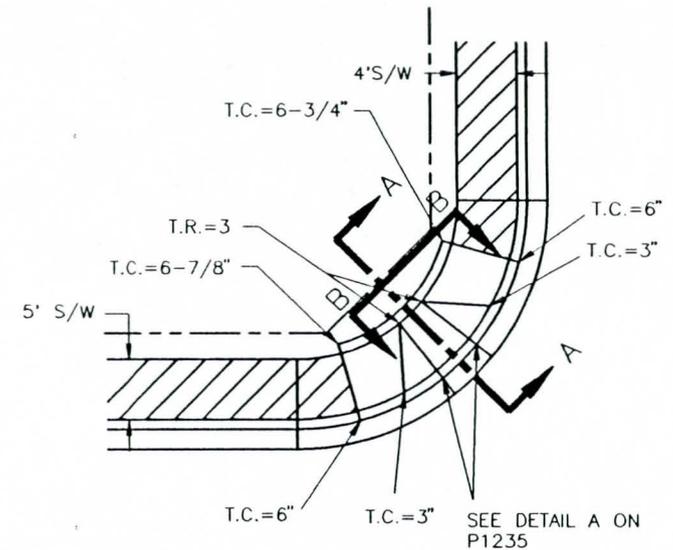
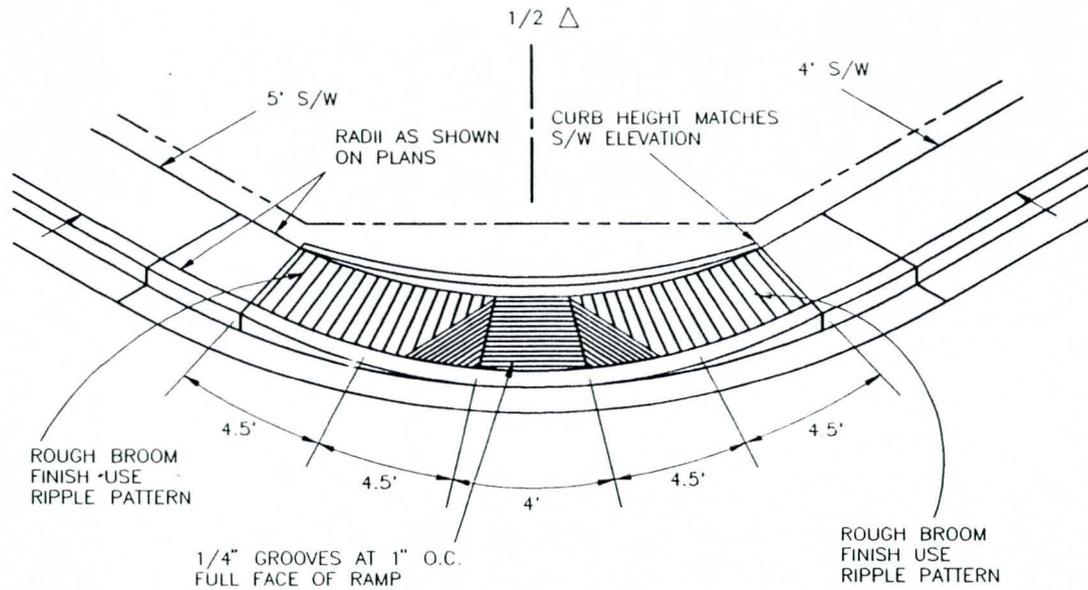
SIDEWALK RAMP DETAIL-TYPE "A"

APPROVED

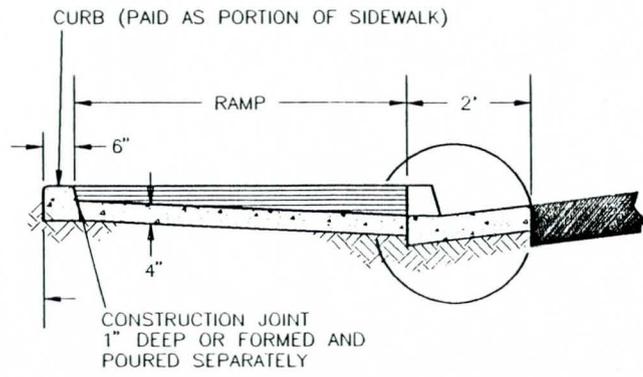
Kenny Whelan
CITY ENGINEER

7-8-92
DATE

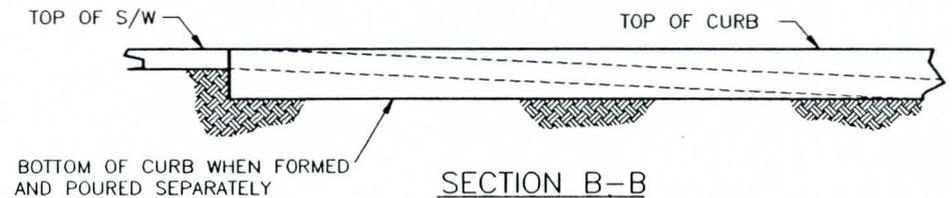
DETAIL NO.
P1233



CONTROL ELEVATIONS



SECTION A-A



SECTION B-B

NOTES:

- CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADIALLY. GUTTER ELEVATION=0
- RAMP CURB MAY BE Poured MONOLITHIC WITH A CONSTRUCTION JOINT. CLASS "B" CONCRETE TO BE USED AS PER SECTION 725.

Δ REV. 6/2/82

DETAIL NO.
P1234



City of Phoenix
STANDARD DETAIL

SIDEWALK RAMP DETAIL-TYPE "B"

APPROVED

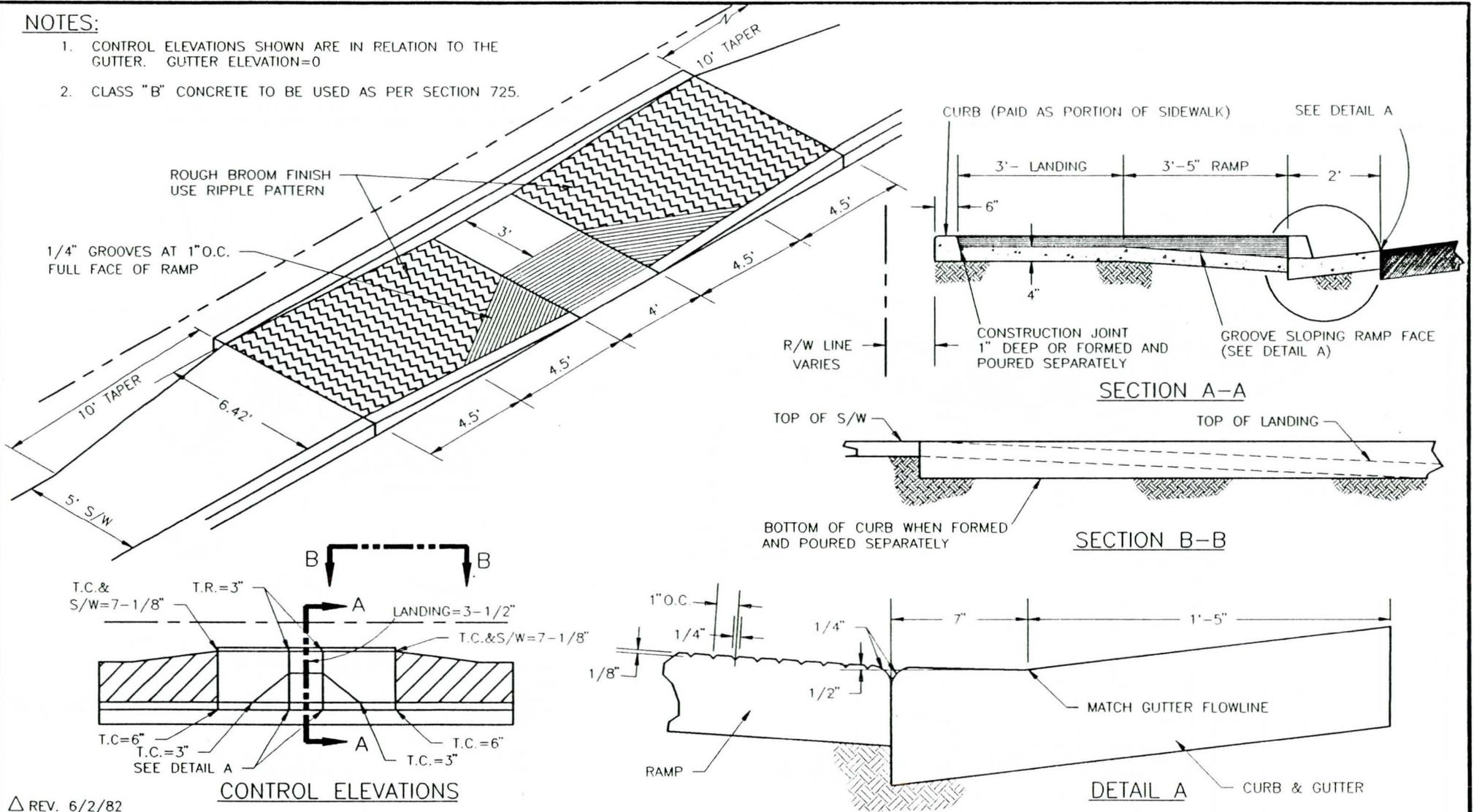
Kenny Whelan
CITY ENGINEER

7-8-92
DATE

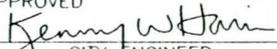
DETAIL NO.
P1234

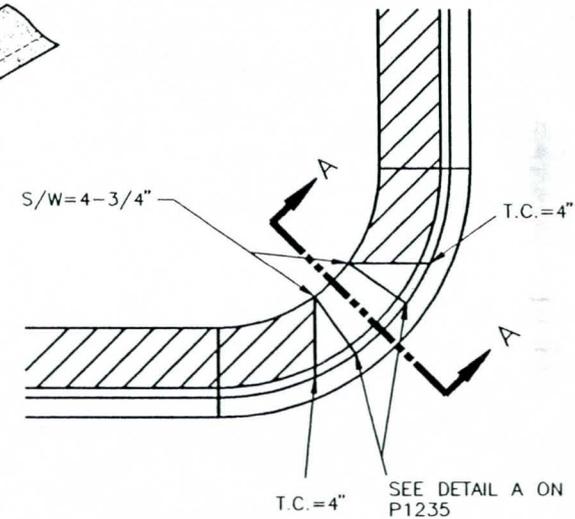
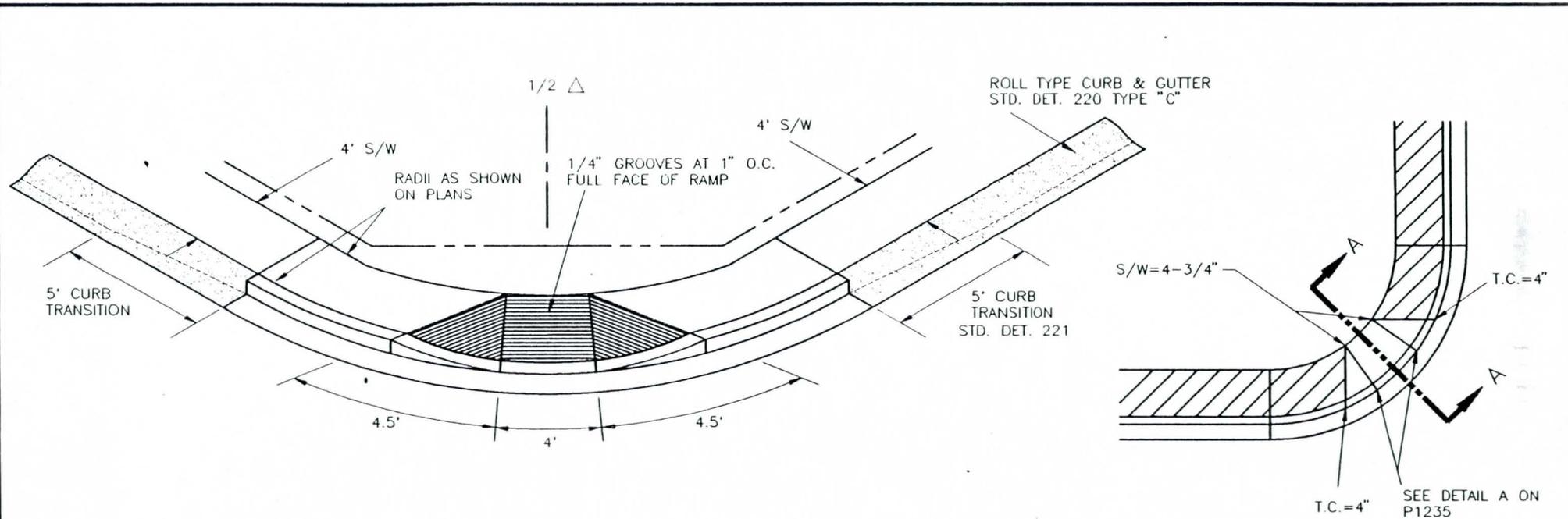
NOTES:

- CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER. GUTTER ELEVATION=0
- CLASS "B" CONCRETE TO BE USED AS PER SECTION 725.

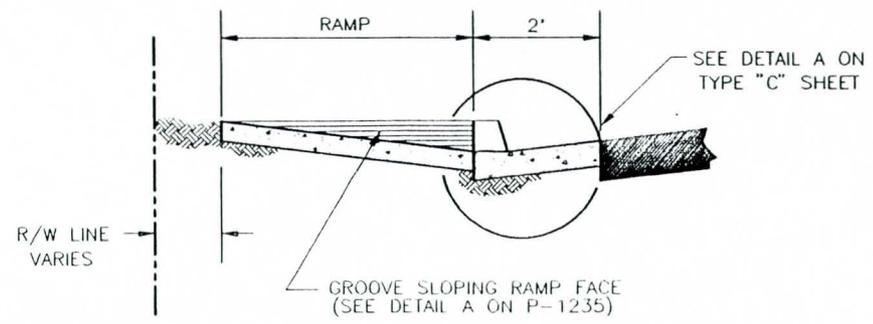


Δ REV. 6/2/82

| | | | | | |
|---------------------|--|-------------------------------|--|----------------|---------------------|
| DETAIL NO. P1235 |  City of Phoenix STANDARD DETAIL | SIDEWALK RAMP DETAIL-TYPE "C" | APPROVED  CITY ENGINEER | 7-8-92 DATE | DETAIL NO. P1235 |
|---------------------|--|-------------------------------|--|----------------|---------------------|



CONTROL ELEVATIONS



SECTION A-A

NOTES:

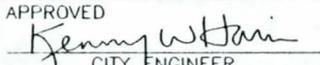
1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADIALLY. GUTTER ELEVATION=0
2. CLASS "B" CONCRETE IS TO BE USED AS PER SECT. 725.

△ REV. 6/2/82

DETAIL NO.
P1236

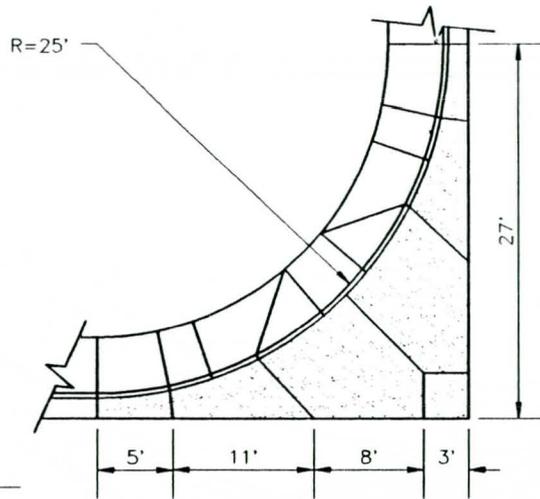
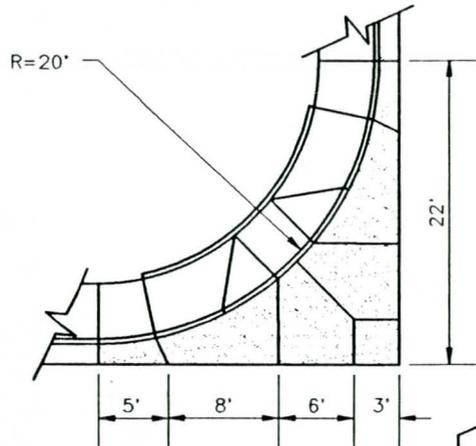
 City of Phoenix
STANDARD DETAIL

SIDEWALK RAMP DETAIL-TYPE "D"

APPROVED

CITY ENGINEER

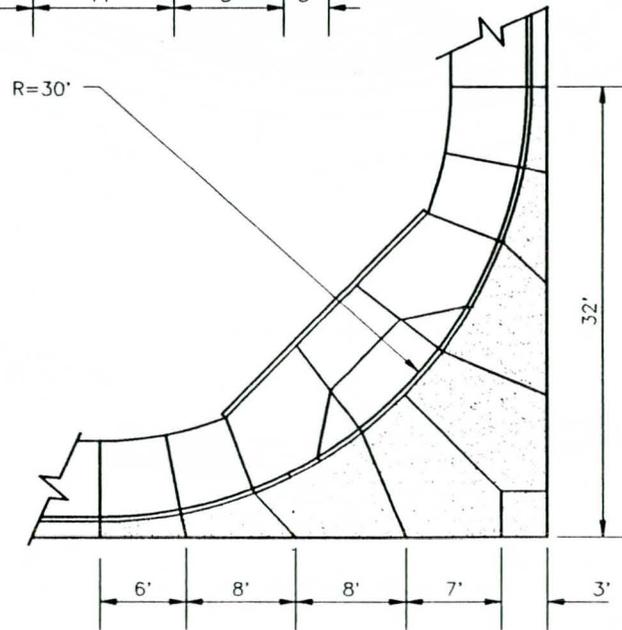
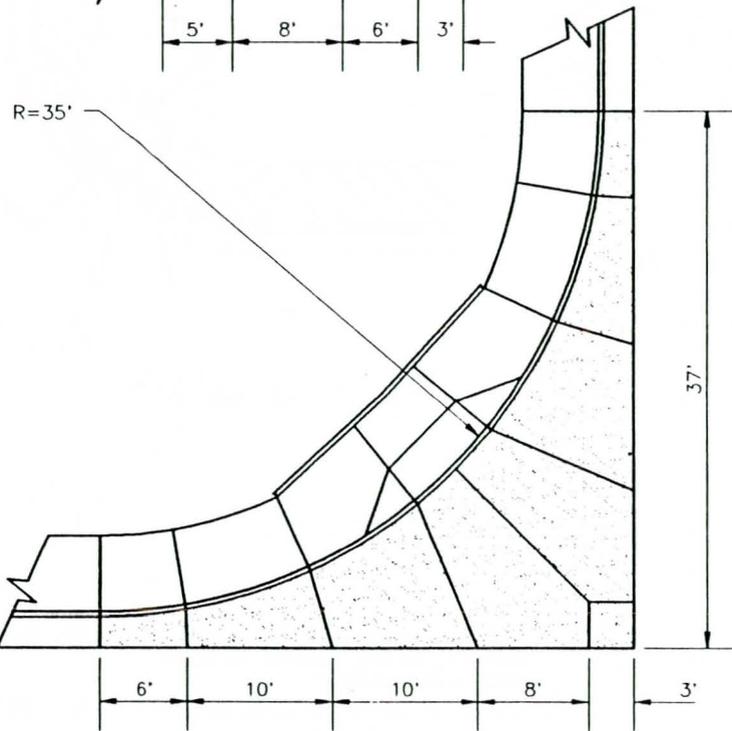
7-8-92
DATE

DETAIL NO.
P1236



NOTES:

1. CONSTRUCT THE CONTRACTION JOINTS AS SHOWN ON CONCRETE APRON FOR THE RADIUS REQUIRED.
2. WHEN PLANS CALL FOR A CLASS "A" CONCRETE VALLEY GUTTER THE CONTRACTION JOINTS SHALL BE SPACED SYMMETRICAL WITH AT LEAST ONE JOINT EVERY 10 FEET.
3. WHEN PLANS CALL FOR A 7' VALLEY GUTTER, MAKE A 7' SQUARE INSTEAD OF A 3' SQUARE.



NOT TO SCALE

DETAIL NO.
P1237



City of Phoenix
STANDARD DETAIL

APRON JOINTS

APPROVED

Kenny Whelan
CITY ENGINEER

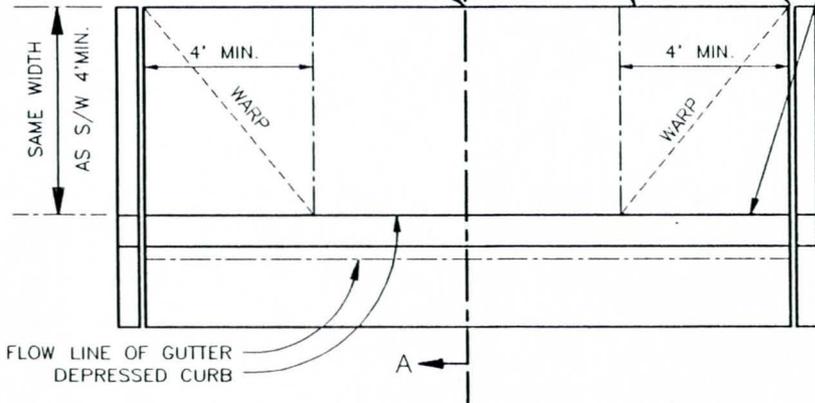
7-8-92
DATE

DETAIL NO.
P1237

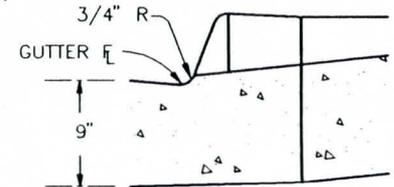
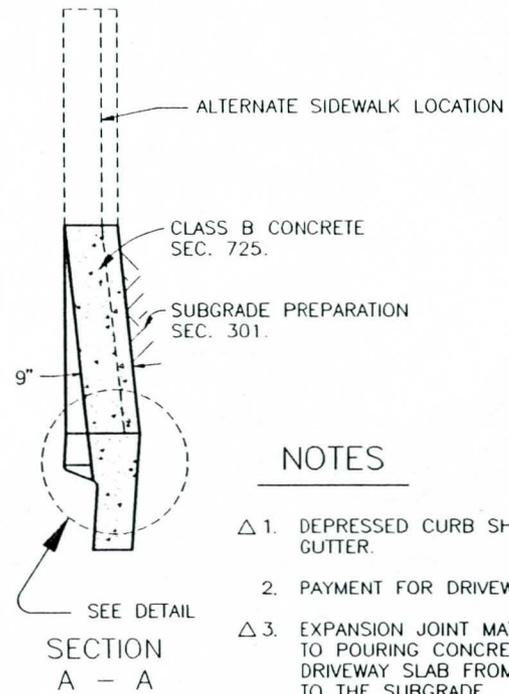
EXPANSION JOINT THROUGH DRIVEWAY AND CURB & GUTTER. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER A.S.T.M. D-1751.

BACK OF EXISTING OR FACE OF FUTURE SIDEWALK.

WHEN WIDTH EXCEEDS 22' PROVIDE A CONTRACTION JOINT ON D/W CENTER-LINE.



BACK OF CURB-CONSTRUCTION JOINT OR SCORE MARK.



DETAIL-NO SCALE

NOTES

- △ 1. DEPRESSED CURB SHALL BE PAID FOR AS COMBINED CURB AND GUTTER.
- 2. PAYMENT FOR DRIVEWAY SHALL BE ON A SQUARE FOOTAGE BASIS.
- △ 3. EXPANSION JOINT MATERIAL SHALL BE SECURED IN PLACE PRIOR TO POURING CONCRETE AND SHALL COMPLETELY SEPARATE THE DRIVEWAY SLAB FROM SIDEWALK, EXTENDING FROM THE SURFACE TO THE SUBGRADE.

| DRIVEWAY WIDTH | MINIMUM | MAXIMUM |
|--------------------|-----------------|---------|
| COMMERCIAL ZONING | 16'* | 50' |
| INDUSTRIAL ZONING | 16'* | 50' |
| RESIDENTIAL ZONING | | |
| MAJOR STREET | 16' | 40' |
| COLLECTOR STREET | 12'** | 40' |
| LOCAL STREET | 12' | 30' |
| *ONE WAY ONLY | **16' DESIRABLE | |

△ REVISED 5-31-94

DETAIL NO.
P1255



City of Phoenix
STANDARD DETAIL

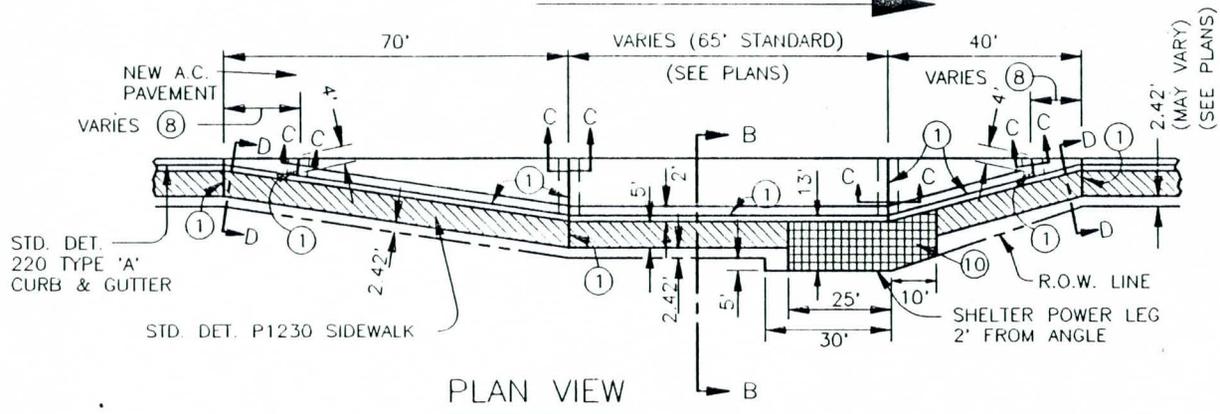
DRIVEWAY ENTRANCE

APPROVED
Kenny W. Hain
CITY ENGINEER

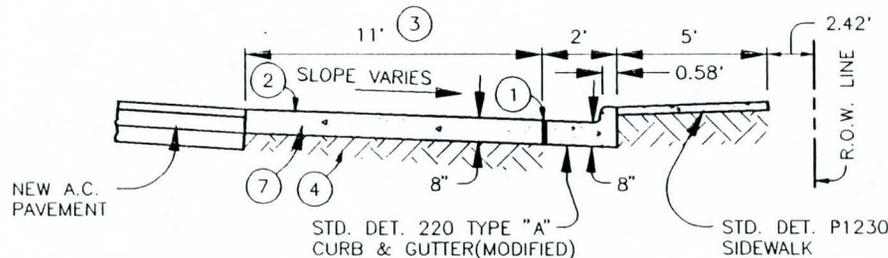
5-31-94
DATE

DETAIL NO.
P1255

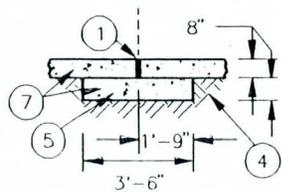
DIRECTION OF TRAVEL



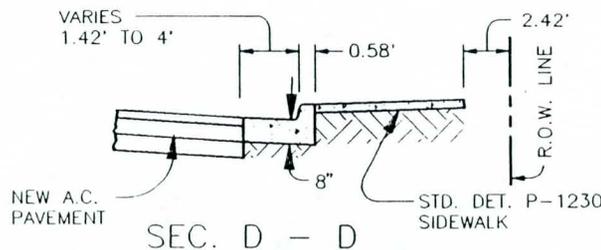
PLAN VIEW



SEC. B - B



SEC. C - C



SEC. D - D

- ① 1/2" BITUMINUS PREFORMED EXPANSION JOINT FILLER, A.S.T.M. D-1751
- ② CONCRETE BUS BAY PAVEMENT SHALL BE BROOM FINISHED.
- ③ MAY BE REDUCED TO 10' MINIMUM IF APPROVED BY CITY.
- ④ SUBGRADE PREPARATION PER SPECIFICATIONS.
- ⑤ CONCRETE PAD TO BE POURED SEPARATELY FROM CONCRETE BUS BAY PAVEMENT.
- ⑥ CONTRACTION JOINTS IN THE BUS BAY PAVEMENT SHALL MATCH THOSE IN THE CURB.
- ⑦ CONCRETE SHALL BE CLASS "A" PER M.A.G. SPECS. OR CLASS "S", f'c = 3000psi PER A.D.O.T. SPECS.
- ⑧ CURB & GUTTER-TO-BUS BAY PAVEMENT-TRANSITION(LENGTH VARIES)
- ⑨ DRIVEWAYS SHALL NOT BE LOCATED WITHIN THE SHELTER PAD AREA.
- ⑩ BUS SHELTER PAD, SEE DETAIL P1261

REVISED 03-01-92

DETAIL NO.
P1256-2

City of Phoenix
STANDARD DETAIL

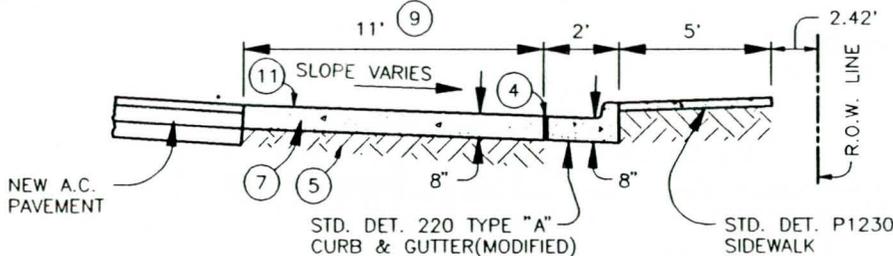
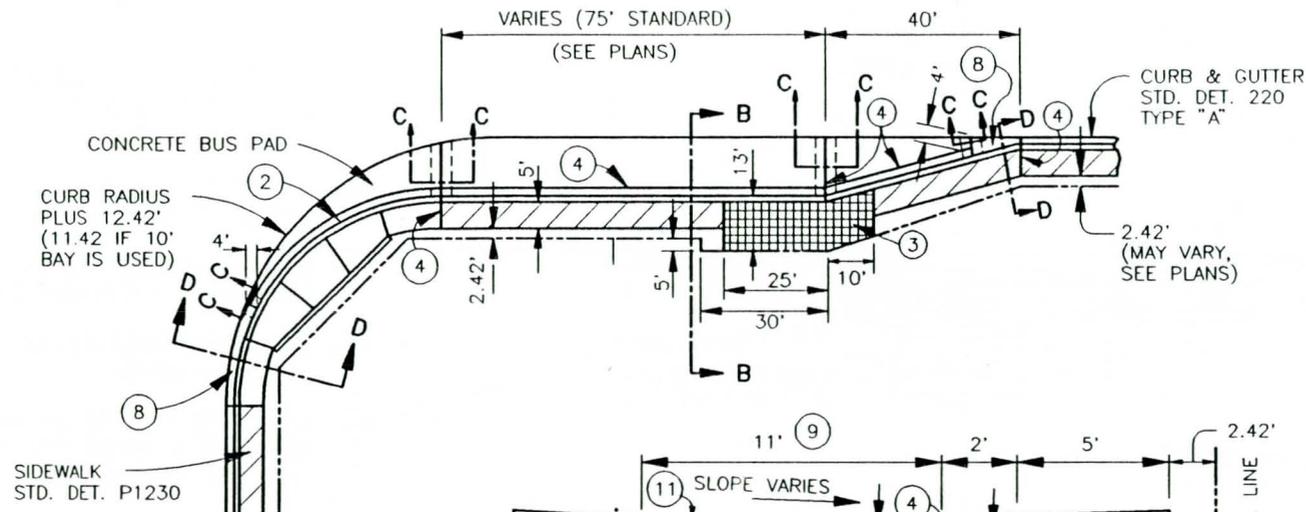
MID-BLOCK BUS BAY (TYPE 2)

APPROVED
Kenny Whelan
CITY ENGINEER

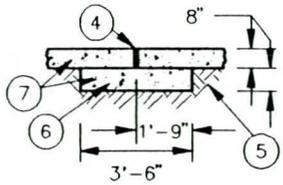
5-31-94
DATE

DETAIL NO.
P1256-2

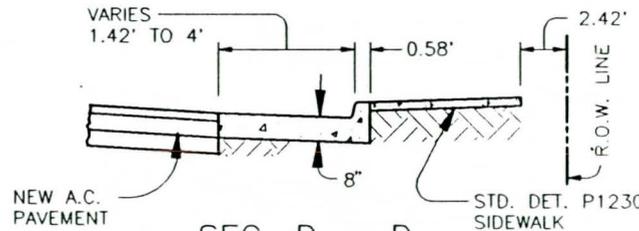
DIRECTION OF TRAVEL



SEC. B - B



SEC. C - C



SEC. D - D

- ① DRIVEWAYS SHALL NOT BE LOCATED WITHIN THE SHELTER PAD AREA.
- ② CURB RADIUS AS SHOWN ON THE PLANS.
- ③ BUS SHELTER PAD. SEE DETAIL P1261
- ④ 1/2" BITUMINOUS PREFORMED EXPANSION JOINT FILLER, A.S.T.M. D-1751
- ⑤ SUBGRADE PREPARATION PER SPECIFICATIONS.
- ⑥ CONCRETE PAD TO BE POURED SEPARATELY FROM CONCRETE BUS BAY PAVEMENT.
- ⑦ CONCRETE SHALL BE CLASS "A" PER M.A.G. SPECS. OR CLASS "S", f'c=3000psi PER A.D.O.T. SPECS.
- ⑧ CURB AND GUTTER-TO-BUS BAY PAVEMENT-TRANSITION (LENGTH VARIES)
- ⑨ MAY BE REDUCED TO 10' MINIMUM IF APPROVED BY CITY.
- ⑩ CONTRACTION JOINTS IN THE BUS BAY PAVEMENT SHALL MATCH THOSE IN THE CURB.
- ⑪ CONCRETE BUS BAY PAVEMENT SHALL BE BROOM FINISHED.

REVISED 5-31-94

DETAIL NO.
P1257



City of Phoenix
STANDARD DETAIL

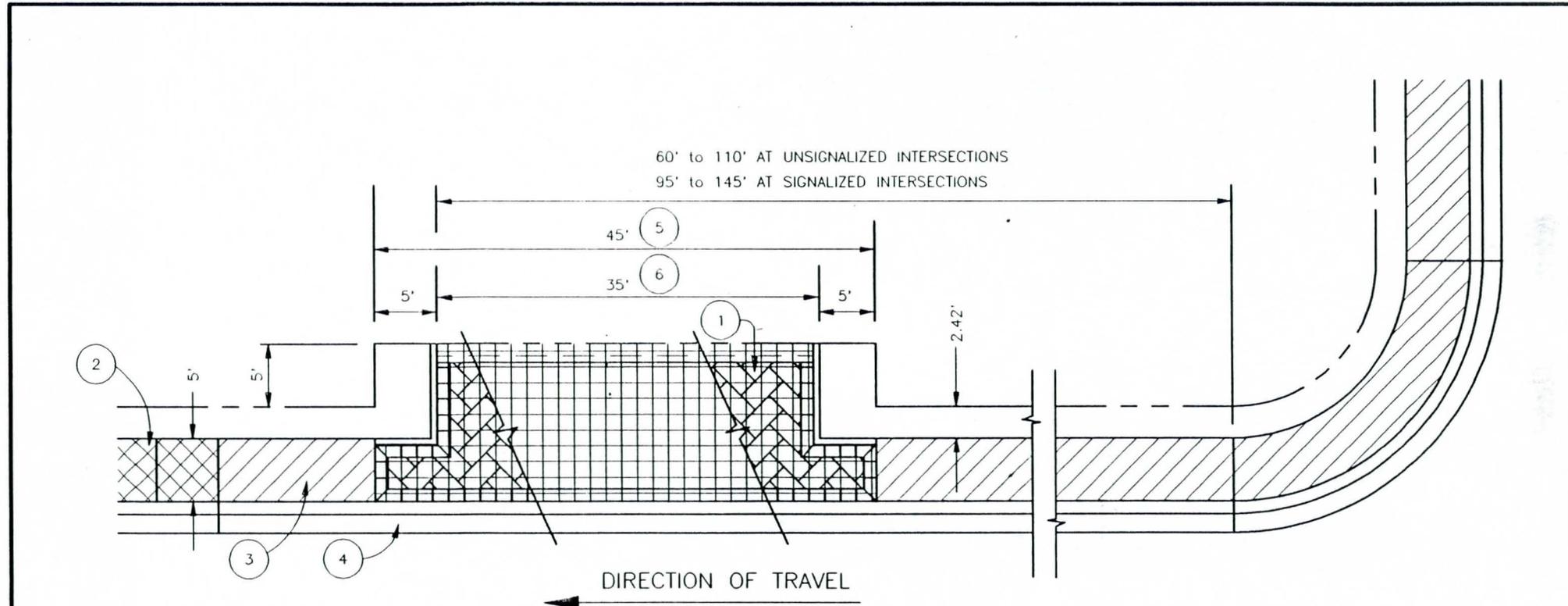
FAR-SIDE BUS BAY

APPROVED

Kenny W. Han
CITY ENGINEER

7-8-92
DATE

DETAIL NO.
P1257



60' to 110' AT UNSIGNALIZED INTERSECTIONS
 95' to 145' AT SIGNALIZED INTERSECTIONS

DIRECTION OF TRAVEL

- ① BUS SHELTER PAD.
SEE DETAIL P1260 OR P1262
- ② DRIVEWAYS SHALL NOT BE
LOCATED WITHIN THE SHELTER
PAD AREA.
- ③ SIDEWALK STD DET P1230
- ④ CURB & GUTTER STD. DET. 220
TYPE "A".
- ⑤ REDUCE TO 30' IN
SINGLE FAMILY RESIDENTIAL
AREAS.
- ⑥ REDUCE TO 20' IN
SINGLE-FAMILY RESIDENTIAL
AREAS.

REVISED 5-31-94

DETAIL NO.
P1258



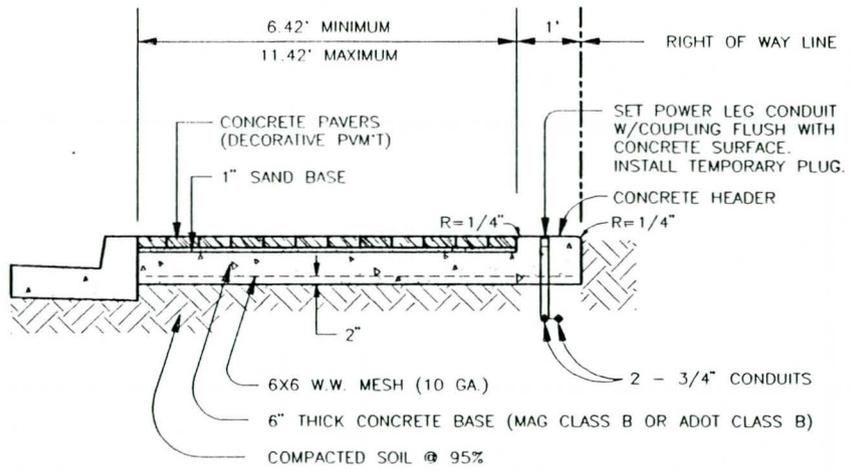
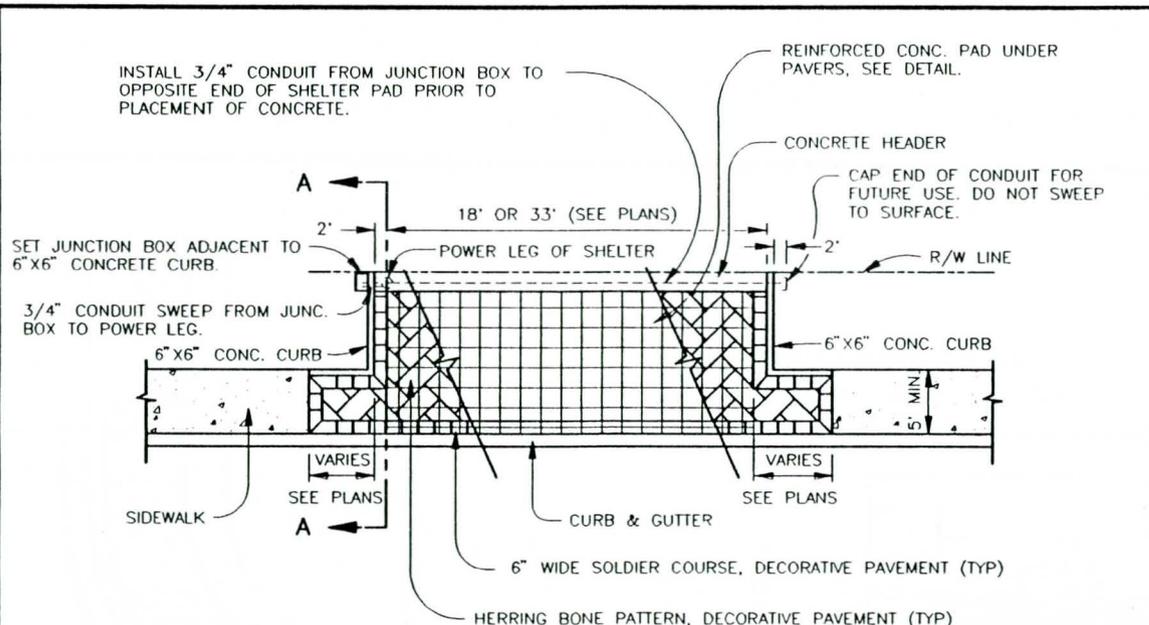
City of Phoenix
STANDARD DETAIL

BUS SHELTER PAD LOCATION (BUS STOP)

APPROVED
Kenny W. Han
 CITY ENGINEER

5-31-94
DATE

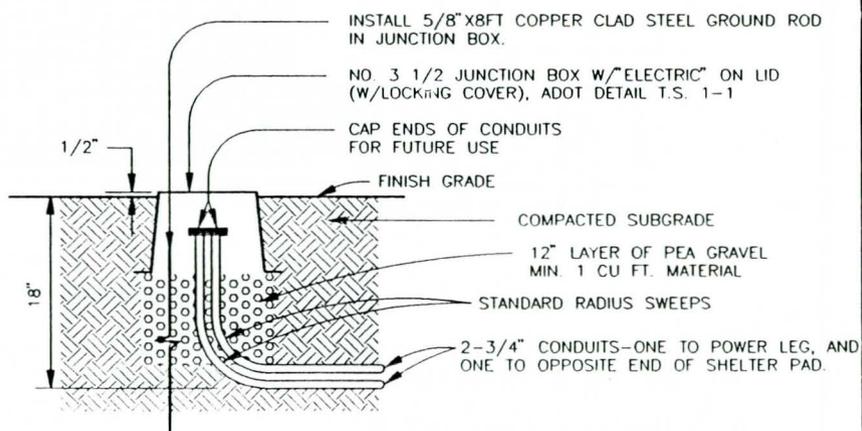
DETAIL NO.
P1258



SECTION A - A

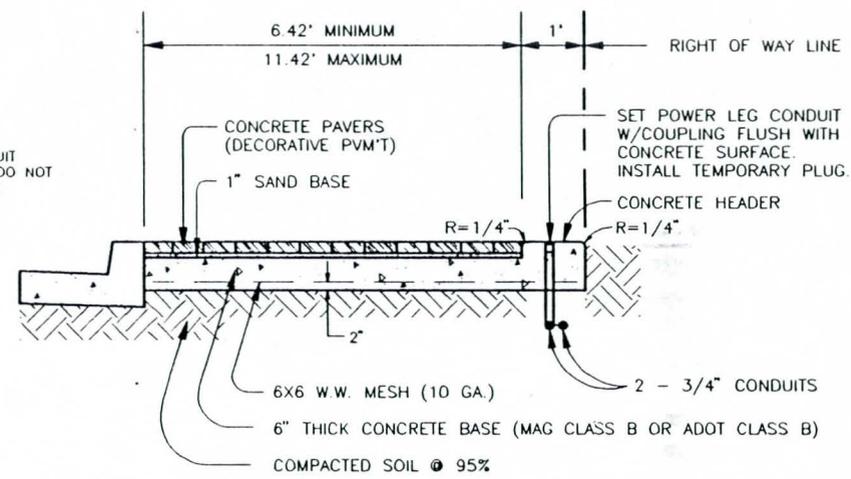
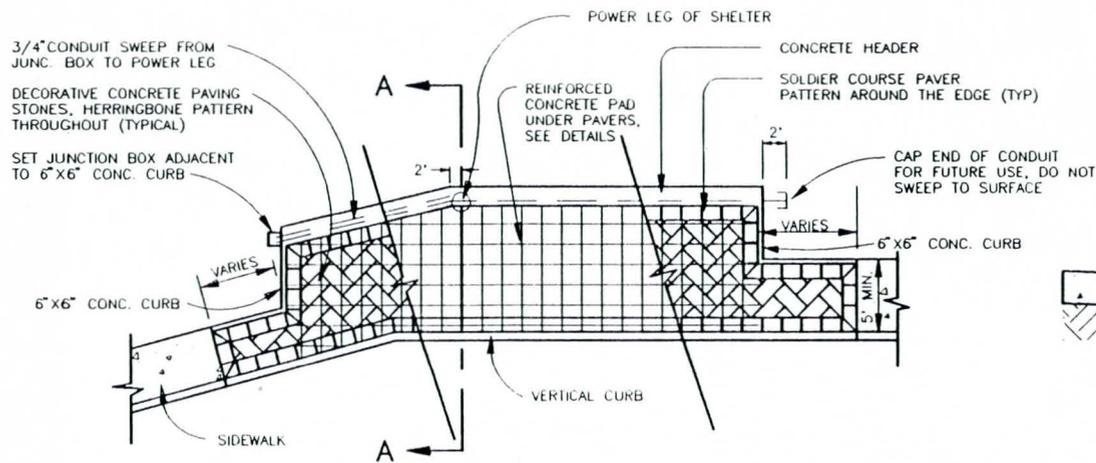
GENERAL NOTES:

1. ALL CONDUIT SHALL BE P.V.C. SCHEDULE 40, U.L. LISTED.
2. ACTUAL PLAN LAYOUT MAY VARY. ALL OTHER DETAIL INFORMATION REMAINS THE SAME. SEE PLANS FOR SPECIFIC LOCATIONS AND DIMENSIONS OF BUS SHELTER PAD CONCRETE BASE AND DECORATIVE PAVEMENT TREATMENT.
3. ANY DECORATIVE PAVEMENT TREATMENT OUTSIDE THE AREA OF THE BUS SHELTER PAD CONCRETE BASE SHALL BE CONSTRUCTED ON A 1-INCH SAND BASE OVER 4-INCHES CEMENT-ENRICHED AGGREGATE BASE SLURRY (1 SACK TYPE II PORTLAND CEMENT PER CUBIC YARD OF AGGREGATE BASE COURSE MATERIAL) OVER 95% COMPACTED SUBGRADE SOIL.
4. ANY SHELTER OR BUS STOP FURNITURE PLACEMENT SHALL BE LOCATED TO PROVIDE A MIN. 5 ft. WIDE CLEAR SIDEWALK.
5. ALL COSTS ASSOCIATED WITH ELECTRICAL AND RELATED ITEMS SHOWN ON THESE DETAILS (CONDUITS, JUNCTION BOXES, GROUND ROD, ETC.) SHALL BE CONSIDERED INCLUDED IN THE COST OF THE PAY ITEM FOR CONCRETE BUS SHELTER PAD.
6. BUS BAY PAVEMENT, DECORATIVE PAVEMENT (INCLUDING CEMENT-ENRICHED A.B.C. SLURRY AND SANDBASE), 6"X6" CONCRETE CURB, SINGLE CURB, CURB & GUTTER, SIDEWALKS, & DRIVEWAYS ARE SEPARATE PAY ITEMS.



SLEEVE SWEEP & JUNCTION BOX DETAIL

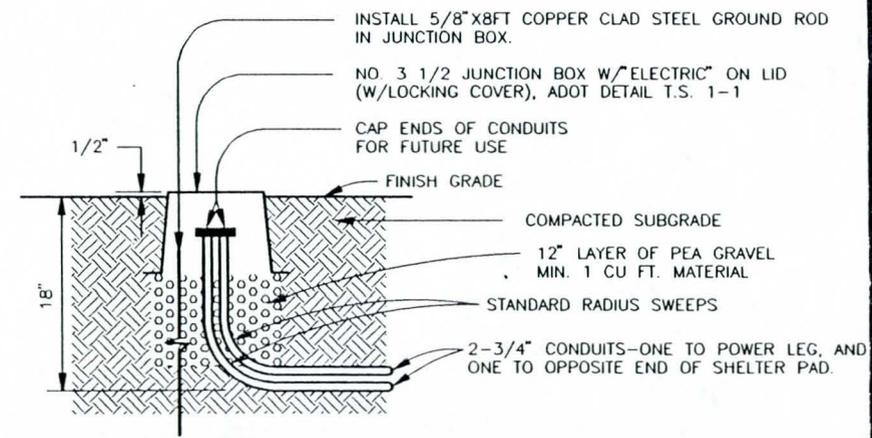
| | | | | | |
|---------------------|--|--------------------------------------|---|----------------|---------------------|
| DETAIL NO. P1260 |  City of Phoenix STANDARD DETAIL | BUS SHELTER/ACCESSORY PAD (BUS STOP) | APPROVED <i>Kenny W. Harris</i> CITY ENGINEER | 7-9-92 DATE | DETAIL NO. P1260 |
|---------------------|--|--------------------------------------|---|----------------|---------------------|



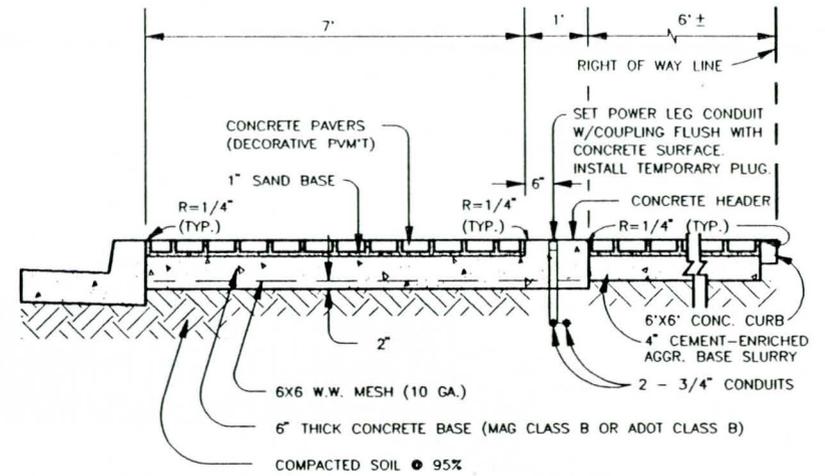
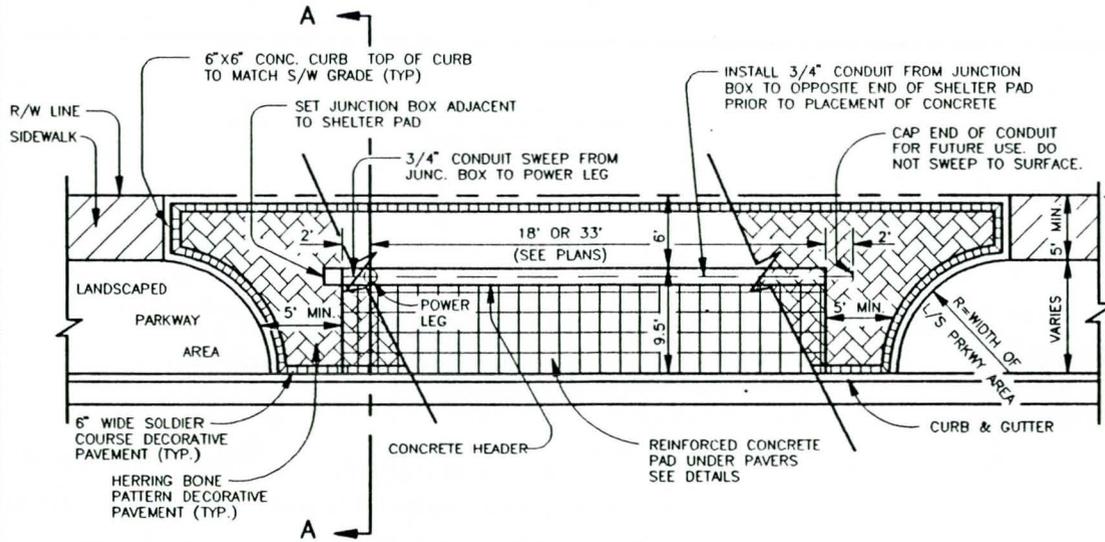
SECTION A - A

GENERAL NOTES:

1. ALL CONDUIT SHALL BE P.V.C. SCHEDULE 40, U.L. LISTED.
2. ACTUAL PLAN LAYOUT MAY VARY. ALL DETAIL INFORMATION REMAINS THE SAME. SEE PLANS FOR SPECIFIC LOCATIONS AND DIMENSIONS OF BUS SHELTER PAD CONCRETE BASE AND DECORATIVE PAVEMENT TREATMENT.
3. ANY DECORATIVE PAVEMENT TREATMENT OUTSIDE THE AREA OF THE BUS SHELTER PAD CONCRETE BASE SHALL BE CONSTRUCTED ON A 1-INCH SAND BASE OVER 4-INCHES CEMENT-ENRICHED AGGREGATE BASE SLURRY (1 SACK TYPE II PORTLAND CEMENT PER CUBIC YARD OF AGGREGATE BASE COURSE MATERIAL) OVER 95% COMPACTED SUBGRADE SOIL.
4. ANY SHELTER OR BUS STOP FURNITURE PLACEMENT SHALL BE LOCATED TO PROVIDE A MIN. 5 ft. WIDE CLEAR SIDEWALK.
5. ALL COSTS ASSOCIATED WITH ELECTRICAL AND RELATED ITEMS SHOWN ON THESE DETAILS (CONDUITS, JUNCTION BOXES, GROUND ROD, ETC.) SHALL BE CONSIDERED INCLUDED IN THE COST OF THE PAY ITEM FOR CONCRETE BUS SHELTER PAD.
6. BUS BAY PAVEMENT, DECORATIVE PAVEMENT (INCLUDING CEMENT-ENRICHED A.B.C. SLURRY AND SANDBASE), 6" X 6" CONCRETE CURB, SINGLE CURB, CURB & GUTTER, SIDEWALKS, & DRIVEWAYS ARE SEPARATE PAY ITEMS.



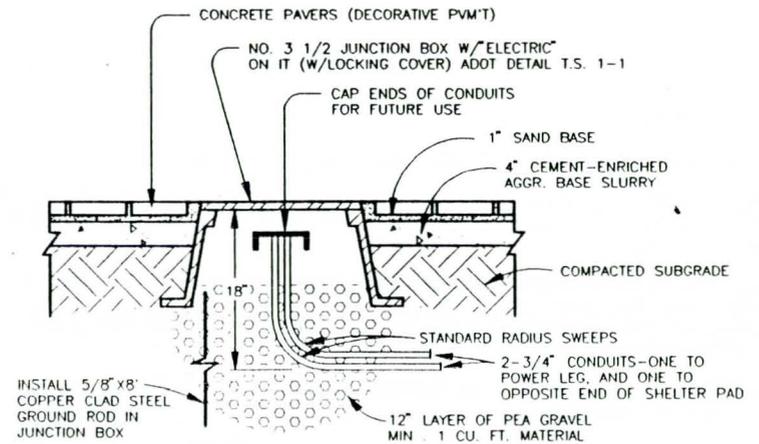
SLEEVE SWEEP & JUNCTION BOX DETAIL



SECTION A - A

GENERAL NOTES:

1. ALL CONDUIT SHALL BE P.V.C. SCHEDULE 40, U.L. LISTED.
2. ACTUAL PLAN LAYOUT MAY VARY. ALL DETAIL INFORMATION REMAINS THE SAME. SEE PLANS FOR SPECIFIC LOCATIONS AND DIMENSIONS OF BUS SHELTER PAD CONCRETE BASE AND DECORATIVE PAVEMENT TREATMENT.
3. ANY DECORATIVE PAVEMENT TREATMENT OUTSIDE THE AREA OF THE BUS SHELTER PAD CONCRETE BASE SHALL BE CONSTRUCTED ON A 1-INCH SAND BASE OVER 4-INCHES CEMENT-ENRICHED AGGREGATE BASE SLURRY (1 SACK TYPE II PORTLAND CEMENT PER CUBIC YARD OF AGGREGATE BASE COURSE MATERIAL) OVER 95% COMPACTED SUBGRADE SOIL.
4. ANY SHELTER OR BUS STOP FURNITURE PLACEMENT SHALL BE LOCATED TO PROVIDE A MIN. 5 ft. WIDE CLEAR SIDEWALK.
5. ALL COSTS ASSOCIATED WITH ELECTRICAL AND RELATED ITEMS SHOWN ON THESE DETAILS (CONDUITS, JUNCTION BOXES, GROUND ROD, ETC.) SHALL BE CONSIDERED INCLUDED IN THE COST OF THE PAY ITEM FOR CONCRETE BUS SHELTER PAD.
6. BUS BAY PAVEMENT, DECORATIVE PAVEMENT (INCLUDING CEMENT-ENRICHED A.B.C. SLURRY AND SANDBASE), 6"X6" CONCRETE CURB, SINGLE CURB, CURB & GUTTER, SIDEWALKS, & DRIVEWAYS ARE SEPARATE PAY ITEMS.
7. SHELTER PADS AND DRIVEWAYS SHALL BE LOCATED TO PROVIDE MINIMUM INTERSECTION SIGHT DISTANCE IN ACCORDANCE WITH CURRENT AASHTO STANDARDS (CASE IIIA).



SLEEVE SWEEP & JUNCTION BOX DETAIL

DETAIL NO.
P1262



City of Phoenix
STANDARD DETAIL

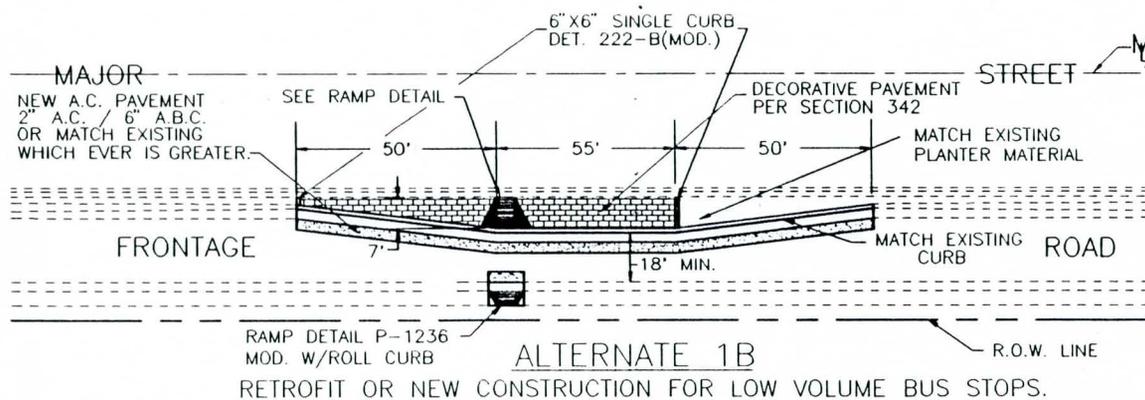
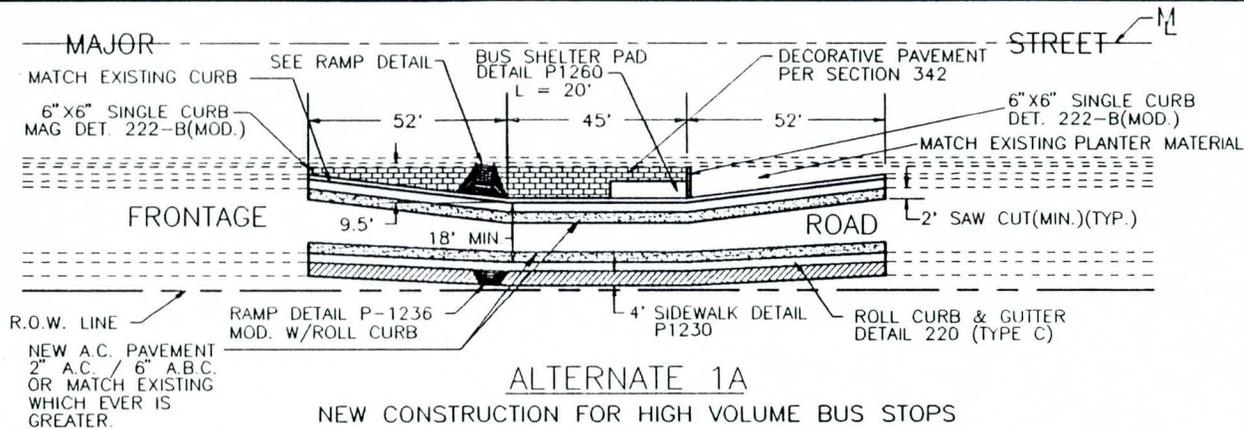
PARKWAY BUS SHELTER/ACCESSORY PAD

APPROVED

Kenny Whelan
CITY ENGINEER

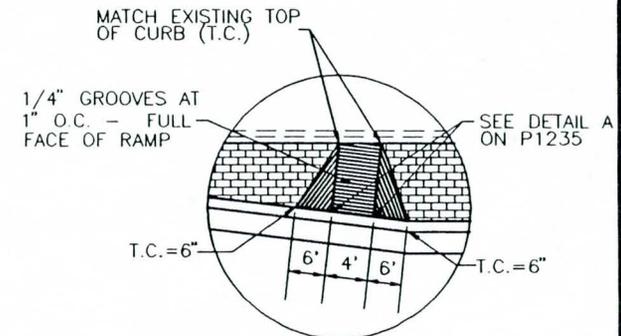
7-9-92
DATE

DETAIL NO.
P1262



NOTES:

1. ALL DIMENSIONS ARE TO FACE OF CURB.
2. WHEEL CHAIR RAMP AND WING SLOPES SHALL NOT EXCEED 12:1.
3. COORDINATE REMOVAL OF LANDSCAPING WITH STREET TRANSPORTATION DEPARTMENT'S LANDSCAPE ARCHITECT.
4. EXISTING LANDSCAPE IRRIGATION LINES SHALL BE SLEEVED UNDER BUS SHELTER/ACCESSORY PAD. SLEEVE SHALL EXTEND 12" BEYOND EACH SIDE OF PAD.
5. NOTIFY PARKS DEPARTMENT MAINTENANCE DISTRICT IF LANDSCAPE IRRIGATION SYSTEM WILL BE INTERRUPTED FOR MORE THAN 24 HOURS.
6. ALL CONCRETE AND ASPHALT REMOVALS SHALL BE SAW CUT. MIN. 2" ASPHALT REPLACEMENT ADJACENT TO NEW CURBS.

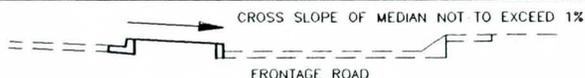
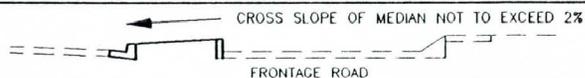


RAMP DETAIL
N.T.S.

NOTES:

1. USE CLASS 'B' CONCRETE PER SECTION 725.
2. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER. GUTTER ELEVATION = 0.

SLOPE LIMITS FOR ALTERNATES 1A THRU 2B



IF CROSS SLOPE LIMITS CANNOT BE MET, COORDINATE ANY PROPOSED DESIGN MODIFICATIONS WITH THE STREET TRANSPORTATION DEPARTMENT.

DETAIL NO.
P1263-1



City of Phoenix
STANDARD DETAIL

FRONTAGE ROAD MID-BLOCK
BUS SHELTER/ACCESSORY PAD

APPROVED

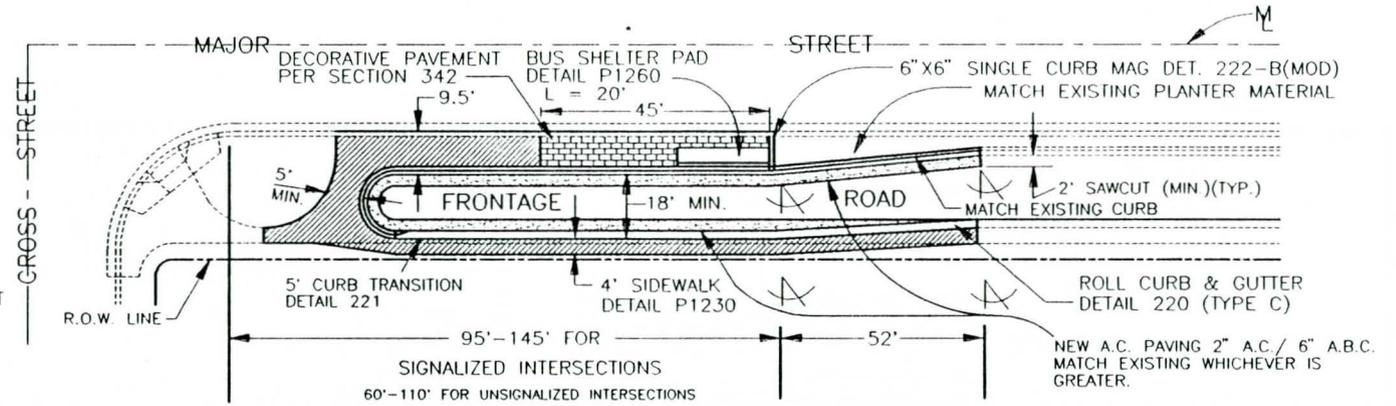
Kenny W. Hain
CITY ENGINEER

7-23-92
DATE

DETAIL NO.
P1263-1

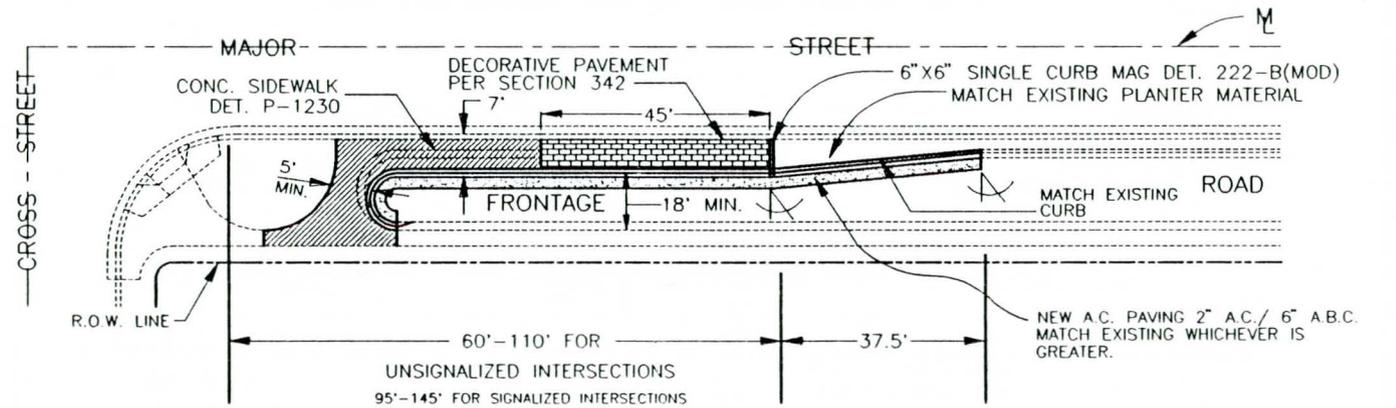
NOTES:

1. ALL DIMENSIONS ARE TO FACE OF CURB.
2. WHEEL CHAIR RAMP AND WING SLOPES SHALL NOT EXCEED 12:1.
3. COORDINATE REMOVAL OF LANDSCAPING WITH STREET TRANSPORTATION DEPARTMENT'S LANDSCAPE ARCHITECT.
4. EXISTING LANDSCAPE IRRIGATION LINES SHALL BE SLEEVED UNDER BUS SHELTER/ACCESSORY PAD. SLEEVE SHALL EXTEND 12" BEYOND EACH SIDE OF PAD.
5. NOTIFY PARKS DEPARTMENT MAINTENANCE DISTRICT IF LANDSCAPE IRRIGATION SYSTEM WILL BE INTERRUPTED FOR MORE THAN 24 HOURS.
6. ALL CONCRETE AND ASPHALT REMOVALS SHALL BE SAW CUT. MIN. 2' ASPHALT REPLACEMENT ADJACENT TO NEW CURBS.
7. SEE DETAIL P1263-1 FOR CROSS SLOPE LIMITS.



ALTERNATE 2A

NEW CONSTRUCTION FOR HIGH VOLUME BUS STOPS



ALTERNATE 2B

RETROFIT OR NEW CONSTRUCTION FOR LOW VOLUME BUS STOPS.

DETAIL NO.
P1263-2



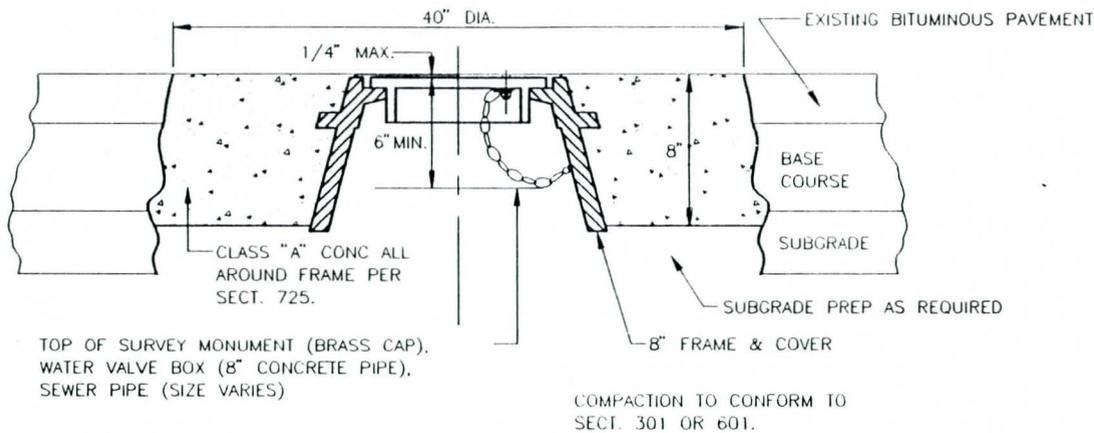
City of Phoenix
STANDARD DETAIL

FRONTAGE ROAD TERMINATION
BUS SHELTER/ACCESSORY PAD

APPROVED
Kenny W. Jan
CITY ENGINEER

7-23-92
DATE

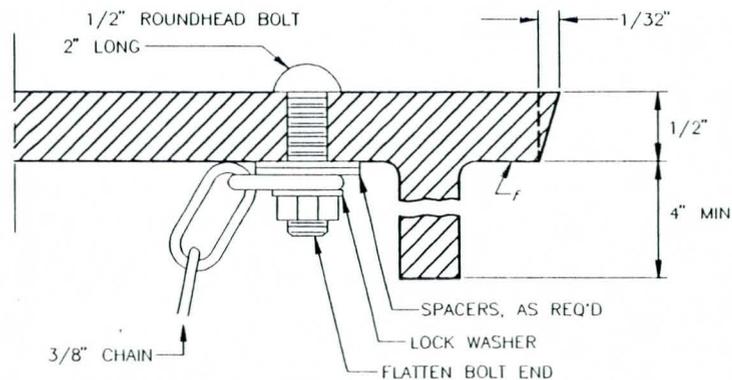
DETAIL NO.
P1263-2



TOP OF SURVEY MONUMENT (BRASS CAP),
WATER VALVE BOX (8" CONCRETE PIPE),
SEWER PIPE (SIZE VARIES)

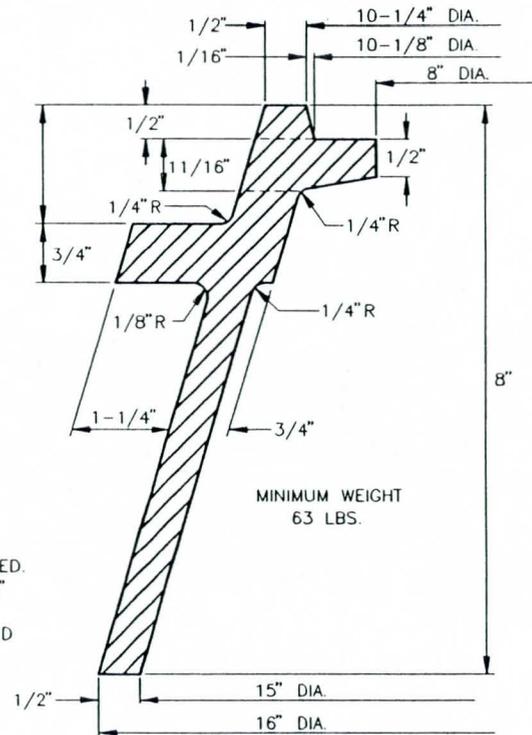
COMPACTION TO CONFORM TO
SECT. 301 OR 601.

WATER VALVE, SURVEY MONUMENT, OR SEWER
CLEAN OUT FRAME & GRADE ADJUSTMENT



CASTING TO CONFORM
TO SECT. 787. MINIMUM
WEIGHT 16 LBS. FOR COVER

CHAIN ATTACHMENT
(AS REQUIRED)

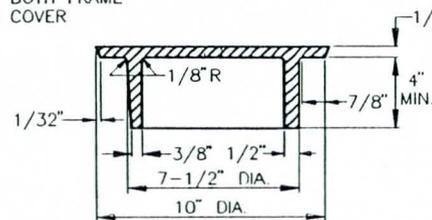


MINIMUM WEIGHT
63 LBS.

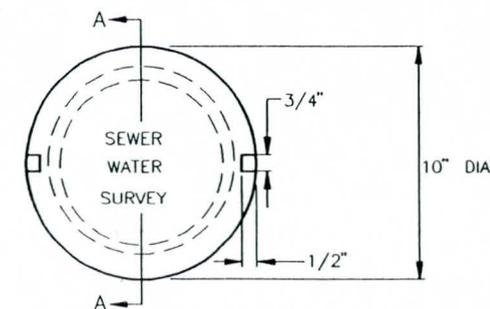
LETTERS ON COVER TO BE AS FOLLOWS:
"SEWER", "WATER", OR "SURVEY" AS DIRECTED.
TOTAL WIDTH OF WORD "SEWER" OR "WATER"
3-3/4". TOTAL WIDTH OF WORD "SURVEY"
4-1/2". LETTER SIZE 5/8" X 3/4", RAISED
1/16" ABOVE LEVEL OF COVER, TYPE OF
LETTERS TO BE SUBMITTED FOR APPROVAL

8" C.I. FRAME AND COVER

DETAIL TYPICAL
FOR BOTH FRAME
AND COVER



COVER
SECTION A-A



DETAIL NO.
P1270



City of Phoenix
STANDARD DETAIL

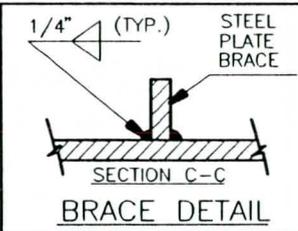
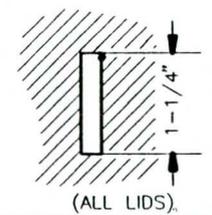
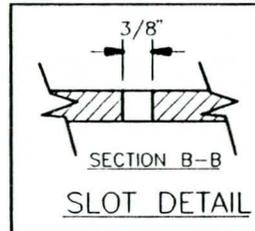
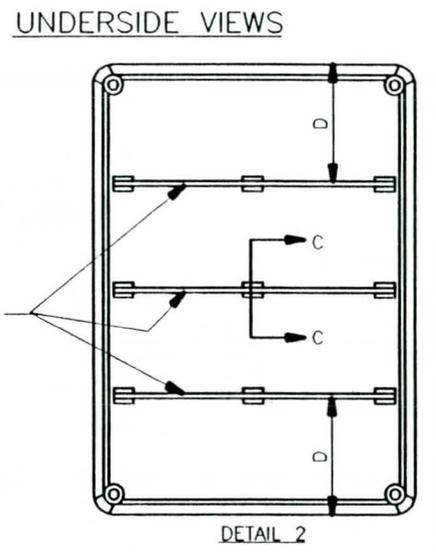
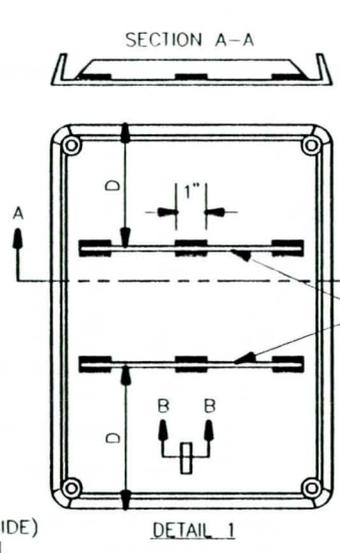
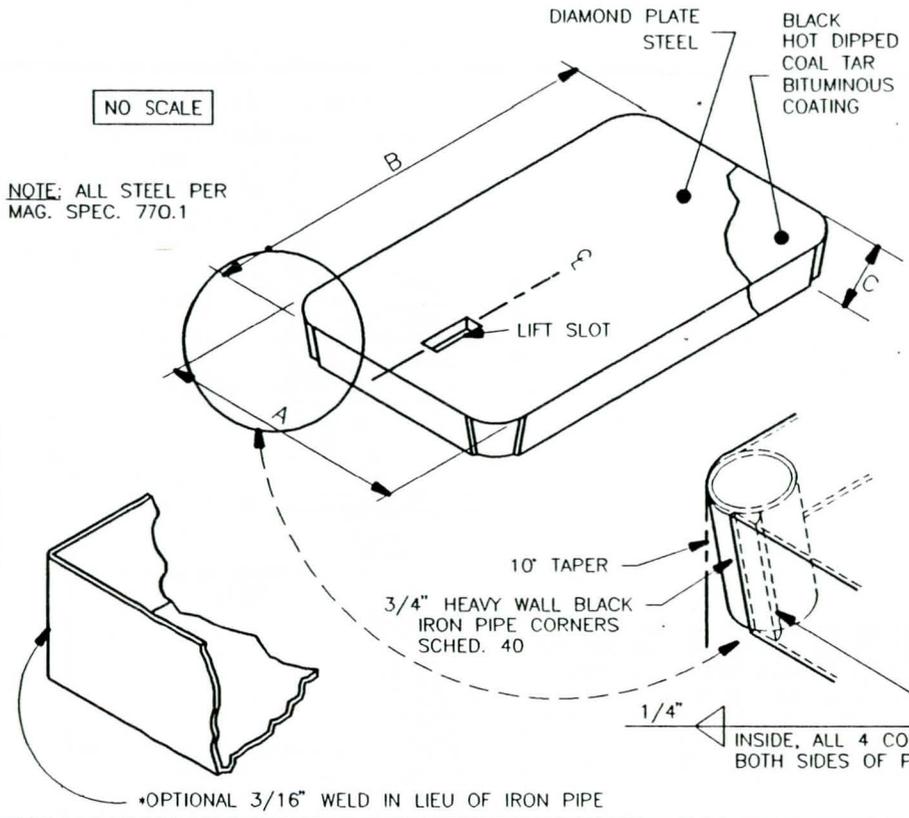
FRAME AND COVER
AND GRADE ADJUSTMENT

APPROVED

Kenny Whelan
CITY ENGINEER

5-31-94
DATE

DETAIL NO.
P1270

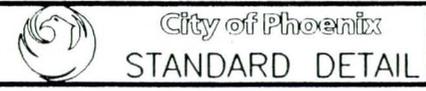


SPECIFICATIONS

| NO. | A | B | C | D | E | BRACES | WEIGHT | MATERIAL |
|-----|---------|---------|--------|--------|--------------------------|----------|-------------|----------|
| 1 | 9" | 15-7/8" | 1-3/8" | NONE | NONE | NONE | 5-1/4 LBS. | 14 GAGE |
| 2 | 14-1/8" | 21-3/4" | 1-1/2" | 6-1/2" | 3/16" X 1-1/4" X 13-1/8" | DETAIL 1 | 12-3/4 LBS. | 12 GAGE |
| 3 | 15-1/4" | 26-1/4" | 1-1/2" | 8-1/4" | 3/16" X 1-1/4" X 14-1/4" | DETAIL 1 | 19-1/4 LBS. | 12 GAGE |
| 4 | 19-1/2" | 30" | 1-1/2" | 7-1/8" | 3/16" X 1-1/4" X 18-3/4" | DETAIL 2 | 33 LBS. | 11 GAGE |

*REV. 11/1/84

DETAIL NO.
P1315

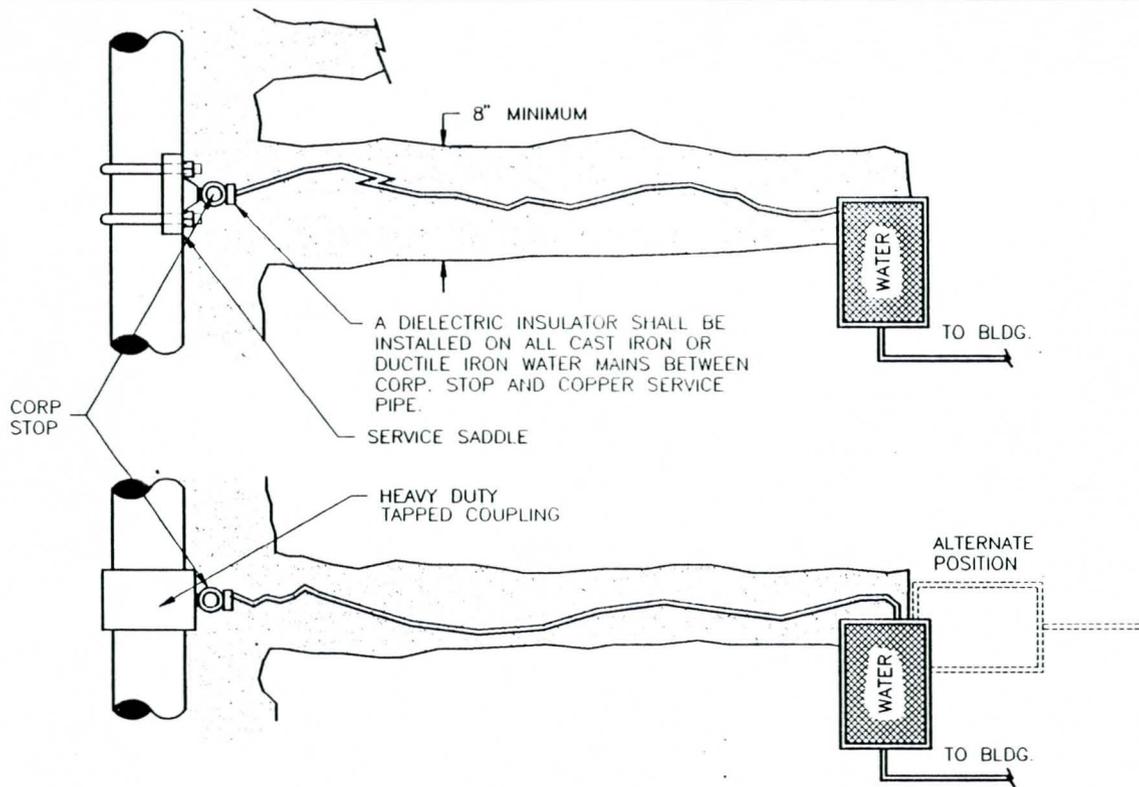


STEEL WATER METER BOX COVER

APPROVED
Kenny W. Han
CITY ENGINEER

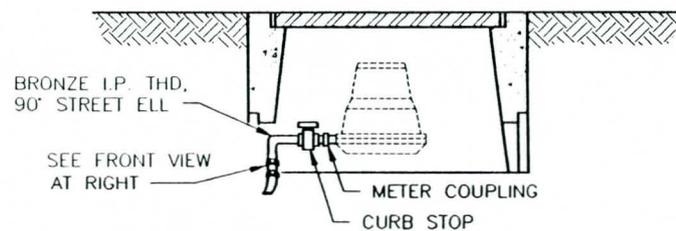
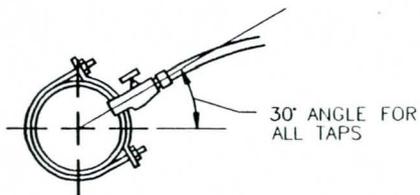
7-9-92
DATE

DETAIL NO.
P1315



GENERAL NOTES

- 1. NEW WATER SERVICE TAPS SHALL BE INSTALLED USING AN ALL-BRONZE DOUBLE-STRAP TAPPING SADDLE OR A TAPPED COUPLING.
- 2. 30" MINIMUM COVER IS REQUIRED FOR SERVICE LINES
- 3. WATER SERVICE INCLUDES THE CORP. STOP, SERVICE PIPE, APPURTENANT FITTINGS, CURB STOP, METER BOX & COVER. APPROVED WATER SERVICE COMPONENTS ARE LISTED IN CITY OF PHOENIX SUPPLEMENTS.
- 4. DELETED
- 5. ONLY AUTHORIZED PERSONNEL OF THE WATER & WASTEWATER DEPT. SHALL INSTALL THE SERVICE CONNECTION FOR ANY EXISTING CITY WATER MAIN SERVING ALL OR PART OF A NEW SUBDIVISION.
- 6. WATER METER WILL BE INSTALLED BY CITY FORCES.
- 7. FOR 3/4" THROUGH 2" SERVICE USE COPPER PIPE.
- 8. FOR WATER METER LOCATION SEE CITY OF PHOENIX DETAIL P1363.



FRONT VIEW

•••REV. 12/5/88
 ••REV. 10/30/86
 •REV. 11/1/84

DETAIL NO.
P1342



City of Phoenix
STANDARD DETAIL

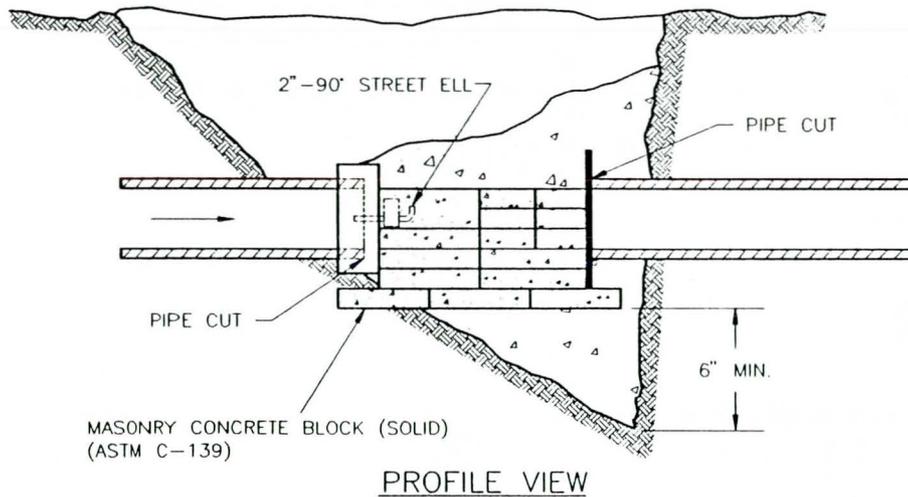
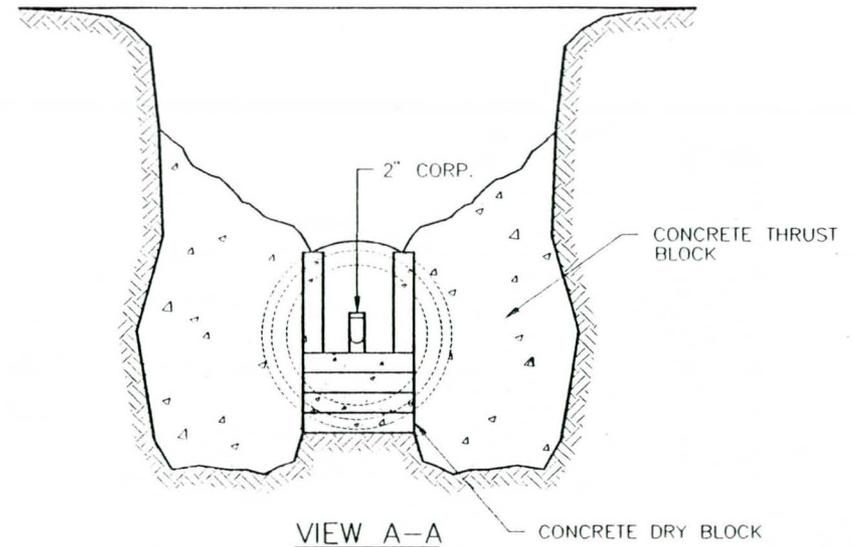
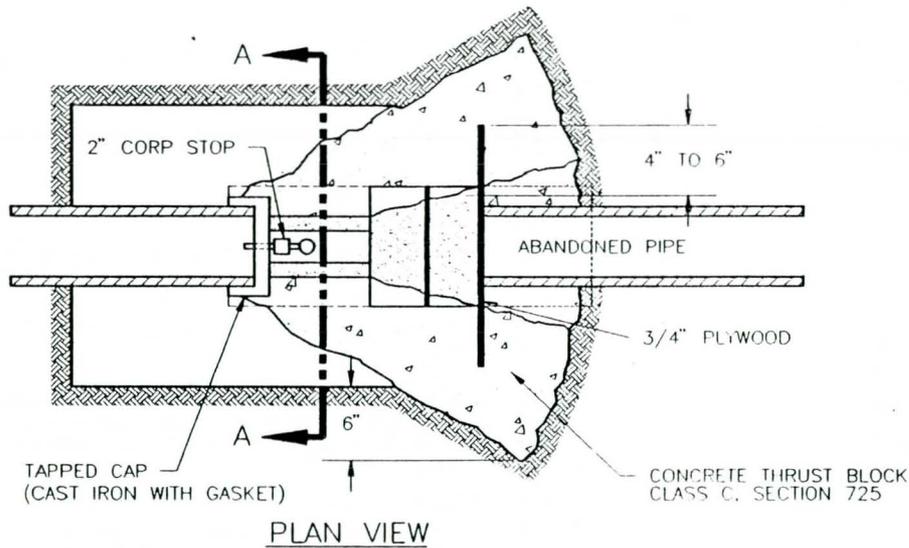
WATER SERVICE CONNECTIONS

APPROVED

Kenny W. Han
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1342



NOTES:

1. CUT AND PLUGS MUST BE ADEQUATELY "DRY BLOCKED".
2. DRY BLOCKS SHALL BE STANDARD SIZE SOLID MASONRY CONCRETE BLOCKS. (ASTM C-139)
3. THE QUANTITY AND ARRANGEMENT OF THE BLOCKING MUST WITHSTAND LINE PRESSURE BY HOLDING THE CAP OR PLUG IN POSITION.
4. DRY BLOCKING SHALL BE PROPERLY SHIMMED TIGHT AND SECURE AGAINST THE CAP BEFORE LINE PRESSURE IS RESTORED.
5. CONCRETE THRUST BLOCKS SHALL NOT BE POURED UNTIL LINE PRESSURE IS RESTORED AND THE CAP OR PLUG IS INSPECTED FOR LEAKAGE.
6. CONCRETE SHALL NOT BE POURED OVER ANY PORTION OF THE ABANDONED PIPE.
7. MINIMUM THRUST BLOCK AREA PER M.A.G. DETAIL 380.
8. WHERE A 4" OR LARGER LINE IS SPECIFIED TO BE ABANDONED, THE CUT AND PLUG SHOULD OCCUR AT THE SUPPLY MAIN TO AVOID CREATING AN UNUSED DEADEND LINE.

DETAIL NO.
P1343



City of Phoenix
STANDARD DETAIL

WATERLINE - CUT AND PLUG
FOR 12" DIA. MAIN AND SMALLER

APPROVED

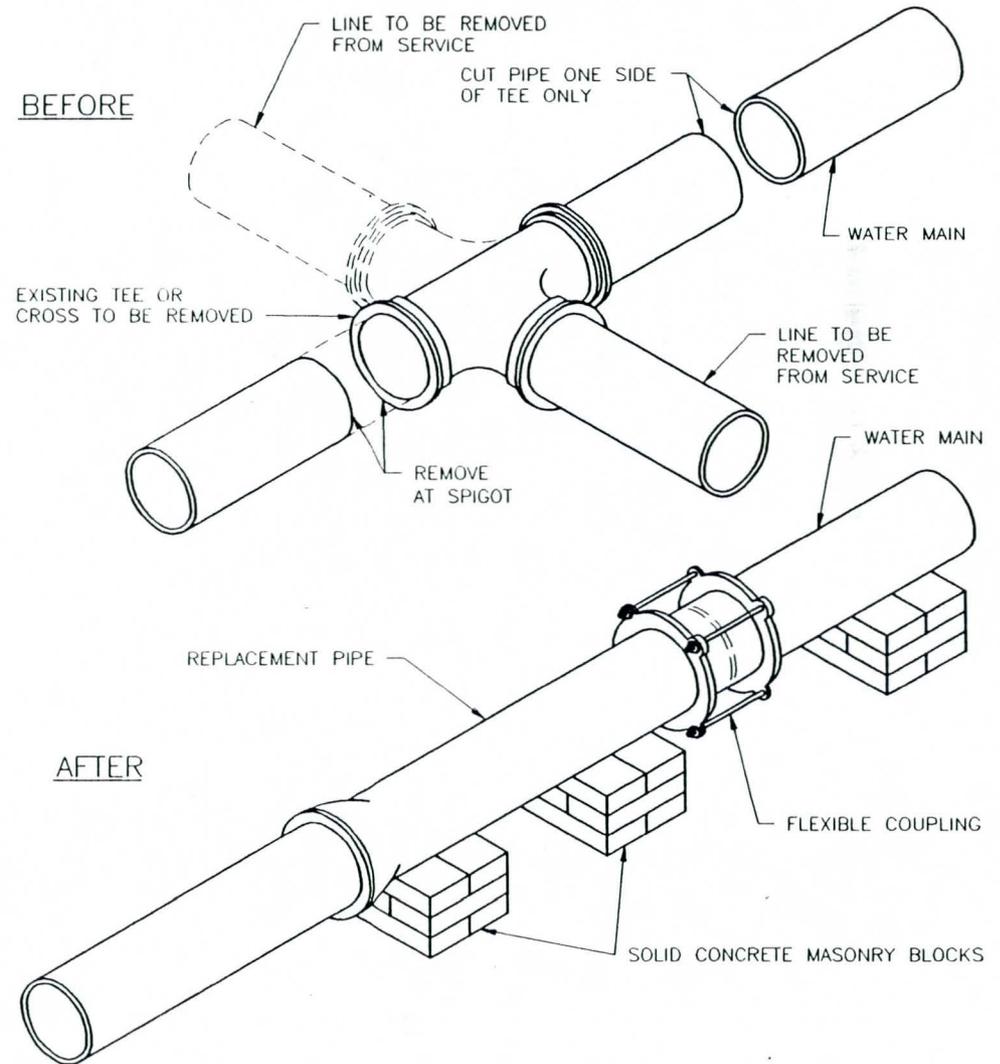
Kenny W. Han
CITY ENGINEER

5-31-94
DATE

DETAIL NO.
P1343

NOTES:

1. REPLACEMENT PIPE MATERIAL SHALL BE IN KIND OR DUCTILE IRON.
2. WHERE POSSIBLE, ONE END OF THE REPLACEMENT PIPE SECTION SHALL CONNECT TO AN EXISTING BELL OR SPIGOT.
3. FLEXIBLE COUPLING SHALL BE THE CAST IRON TYPE AND SPECIFICALLY DESIGNED FOR USE ON THE PIPE SIZE AND MATERIAL(S) BEING CONNECTED. USE OF FULL CIRCLE REPAIR CLAMPS IS PROHIBITED.
4. THE NEW REPLACEMENT PIPE SECTION SHALL BE ADEQUATELY DRY BLOCKED PRIOR TO BACKFILLING.
5. BACKFILLING SHALL NOT BEGIN UNTIL LINE PRESSURE IS RESTORED AND CONNECTIONS INSPECTED FOR LEAKAGE BY WATER DEPARTMENT PERSONNEL.
6. DRY BLOCKS SHALL BE STANDARD SIZE SOLID MASONRY CONCRETE BLOCKS. (ASTM C-139)
7. REPLACEMENT PIPE SHALL BE CLEANED IN ACCORDANCE WITH SECTION 611.1.



DETAIL NO.
P1344



City of Philadelphia
STANDARD DETAIL

WATERLINE CUT OUT (TEES & CROSSES)
FOR 12" DIA. MAIN AND SMALLER

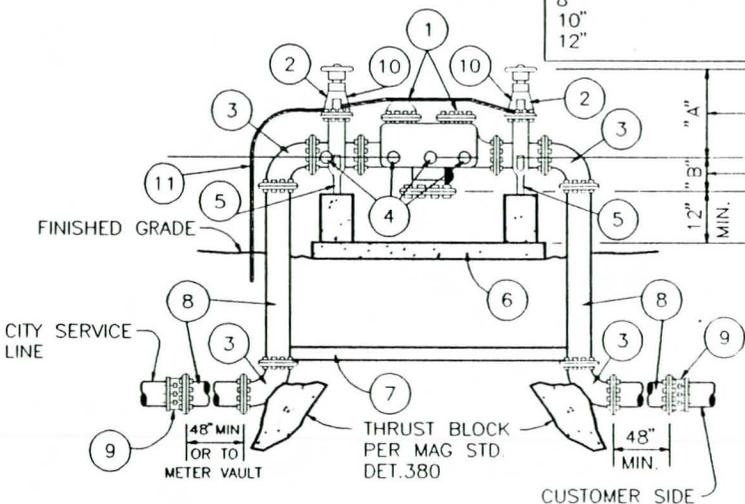
APPROVED
Kenny Whelan
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1344

| ASSEMBLY SIZE | APPROX. DIMENSION "A" |
|---------------|-----------------------|
| 3" | 14" |
| 4" | 16" - (22" OS&Y) |
| 6" | 20" - (30" OS&Y) |
| 8" | 25" - (40" OS&Y) |
| 10" | 29" - (48" OS&Y) |
| 12" | 32" - (56" OS&Y) |

| ASSEMBLY SIZE | APPROX DIM "B" |
|---------------|----------------|
| 3" | 10" |
| 4" | 11" |
| 6" | 12" |
| 8" | 22" |
| 10" | 23" |
| 12" | 24" |



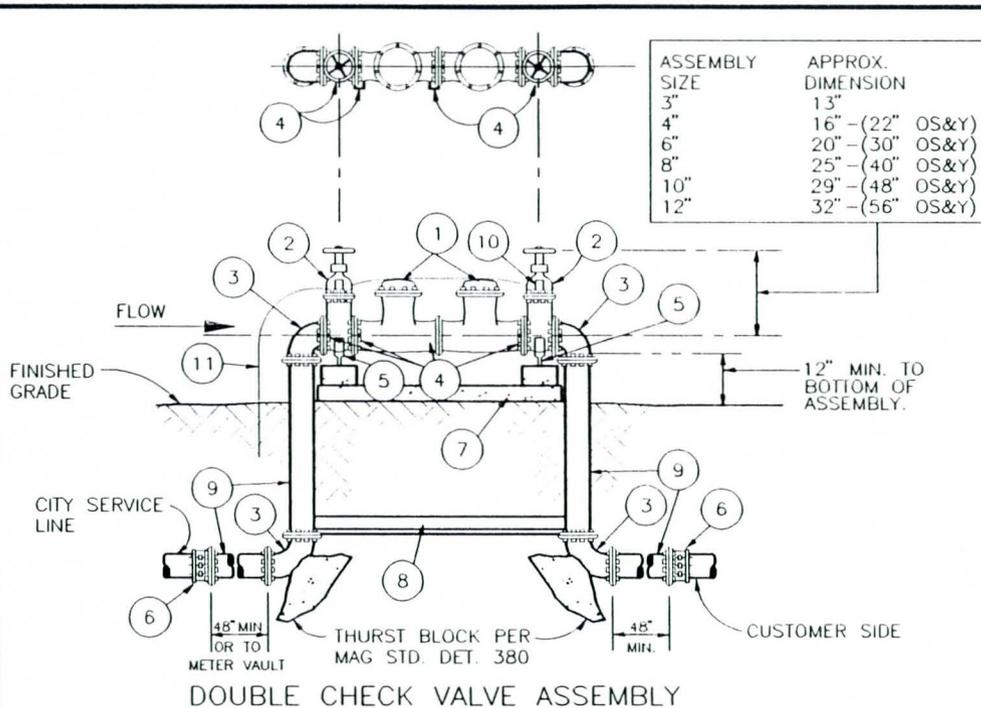
GENERAL NOTES.

1. ASSEMBLY SHALL BE APPROVED BY U.S.C. FOUNDATION FOR CROSS CONNECTION AND HYDRAULIC RESEARCH.
2. CONTACT CITY OF PHOENIX WATER SERVICES DEPARTMENT, WATER QUALITY DIVISION FOR A LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
3. FOUR (4) TEST COCKS TO BE INSTALLED PER U.S.C.
4. COPPER FITTINGS SHALL BE CONNECTED WITH LEAD-FREE SOLDER JOINTS.
5. FINISHED GRADE BELOW BACKFLOW PREVENTER SHALL BE 95% COMPACTION.
6. ASSEMBLY MAY BE PAINTED TO BLEND WITH LANDSCAPE SURFACE TREATMENT OR ON-SITE STRUCTURES.
7. THE ASSEMBLY MAY ALSO BE SCREENED WITH SHRUBBERY OR BE ENCLOSED WITHIN A WALL TYPE STRUCTURE. ADEQUATE DRAINAGE FOR SURFACE WATER IS REQUIRED.
8. ANY SCREENING/ENCLOSURE MUST PROVIDE A MINIMUM 18" ACCESS OPENING (UNSECURED GATES ARE ACCEPTABLE) AND SIDE WALLS OR SHRUBBERY MUST BE A MINIMUM OF 24" FROM THE OUTSIDE FACE OF ANY PORTION OF THE BACKFLOW PREVENTION DEVICE.
9. ASSEMBLY MAY BE PROTECTED BY GUARD POSTS (MODIFY P-1359, HYDRANT GUARDS, PHOENIX SUPPLEMENT TO MAG).

REDUCED PRESSURE PRINCIPLE DEVICE

LIST OF MATERIALS

- | | |
|---|--|
| <ul style="list-style-type: none"> ① APPROVED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION DEVICE. ② GATE VALVE, RESILIENT SEATED (NON-RISING STEM)(O.S.&Y. REQUIRED ON FIRELINES). ③ 90° ELL (FLANGED D.I.P. 3" THROUGH 12"). ④ TEST COCK, RESILIENT SEATED (4 REQUIRED) FIT WITH BRASS PLUG. ⑤ ADJUSTABLE PIPE SUPPORT PERMANENTLY ATTACHED TO BASE (4" AND LARGER ASSEMBLY ONLY). ⑥ CONCRETE SUPPORT PAD 4" THICK BY 18" WIDE MINIMUM BENEATH 4" AND LARGER ASSEMBLIES. (CLASS "A" CONCRETE) | <ul style="list-style-type: none"> ⑦ 3"x3"x1/4" STEEL ANGLE. BOLT TO FLANGE, EACH END WITH ONE BOLT. COAT WITH COAL TAR EPOXY (16 MILS) REQUIRED ON 4" AND LARGER ASSEMBLIES. ⑧ PIPE SPOOL (FLANGED D.I.P. 3" THRU 12"). ⑨ FLANGED ADAPTER (WHEN REQUIRED). ⑩ TAMPER SWITCH (ON PIPELINE ONLY, OPTIONAL). ⑪ ELECTRICAL CONDUIT FOR TAMPER SWITCH. |
|---|--|



| ASSEMBLY SIZE | APPROX. DIMENSION |
|---------------|-------------------|
| 3" | 13" |
| 4" | 16" - (22" OS&Y) |
| 6" | 20" - (30" OS&Y) |
| 8" | 25" - (40" OS&Y) |
| 10" | 29" - (48" OS&Y) |
| 12" | 32" - (56" OS&Y) |

GENERAL NOTES

1. ASSEMBLY SHALL BE APPROVED BY U.S.C. FOUNDATION FOR CROSS CONNECTION AND HYDRAULIC RESEARCH.
2. CONTACT CITY OF PHOENIX WATER SERVICES DEPARTMENT, WATER QUALITY DIVISION FOR A LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
3. FOUR (4) TEST COCKS TO BE INSTALLED PER U.S.C.
4. COPPER FITTINGS SHALL BE CONNECTED WITH LEAD-FREE SOLDER JOINTS.
5. FINISHED GRADE BELOW BACKFLOW PREVENTER SHALL BE 95% COMPACTION.
6. ASSEMBLY MAY BE PAINTED TO BLEND WITH LANDSCAPE SURFACE TREATMENT OR ON-SITE STRUCTURES.
7. THE ASSEMBLY MAY ALSO BE SCREENED WITH SHRUBBERY OR BE ENCLOSED WITHIN A WALL TYPE STRUCTURE. ADEQUATE DRAINAGE FOR SURFACE WATER IS REQUIRED.
8. ANY SCREENING/ENCLOSURE MUST PROVIDE A MINIMUM 18" ACCESS OPENING (UNSECURED GATES ARE ACCEPTABLE) AND SIDE WALLS OR SHRUBBERY MUST BE A MINIMUM OF 24" FROM THE OUTSIDE FACE OF ANY PORTION OF THE BACKFLOW PREVENTION DEVICE.
9. ASSEMBLY MAY BE PROTECTED BY GUARD POSTS (MODIFY P-1359, HYDRANT GUARDS, PHOENIX SUPPLEMENT TO MAG).

DOUBLE CHECK VALVE ASSEMBLY

LIST OF MATERIALS

- | | |
|---|---|
| <ol style="list-style-type: none"> 1 APPROVED DOUBLE CHECK VALVE ASSEMBLY. 2 GATE VALVE, RESILIENT SEATED (NON-RISING STEM)(O.S.&Y. REQUIRED ON FIRELINE). 3 90° ELL (FLANGED D.I.P. 3" THROUGH 12"). 4 TEST COCK, RESILIENT SEATED (4 REQUIRED) FIT WITH BRASS PLUG. 5 ADJUSTABLE PIPE SUPPORT PERMANENTLY ATTACHED TO BASE (4" AND LARGER ASSEMBLY ONLY). 6 FLANGE ADAPTER (WHEN REQUIRED). | <ol style="list-style-type: none"> 7 CONCRETE SUPPORT PAD 4" THICK BY 18" WIDE MINIMUM BENEATH 4" AND LARGER ASSEMBLIES. (CLASS "A" CONC). 8 3"x3"x1/4" STEEL ANGLE. BOLT TO FLANGE, EACH END WITH ONE BOLT. COAT WITH COAL TAR EPOXY (16 MILS) REQUIRED ON 4" AND LARGER ASSEMBLIES. 9 PIPE SPOOL (FLANGED D.I.P. 3" THRU 12"). 10 TAMPER SWITCH (ON FIRELINE ONLY, OPTIONAL). 11 ELECTRICAL CONDUIT FOR TAMPER SWITCH. |
|---|---|

DETAIL NO.
P1352



City of Phoenix
STANDARD DETAIL

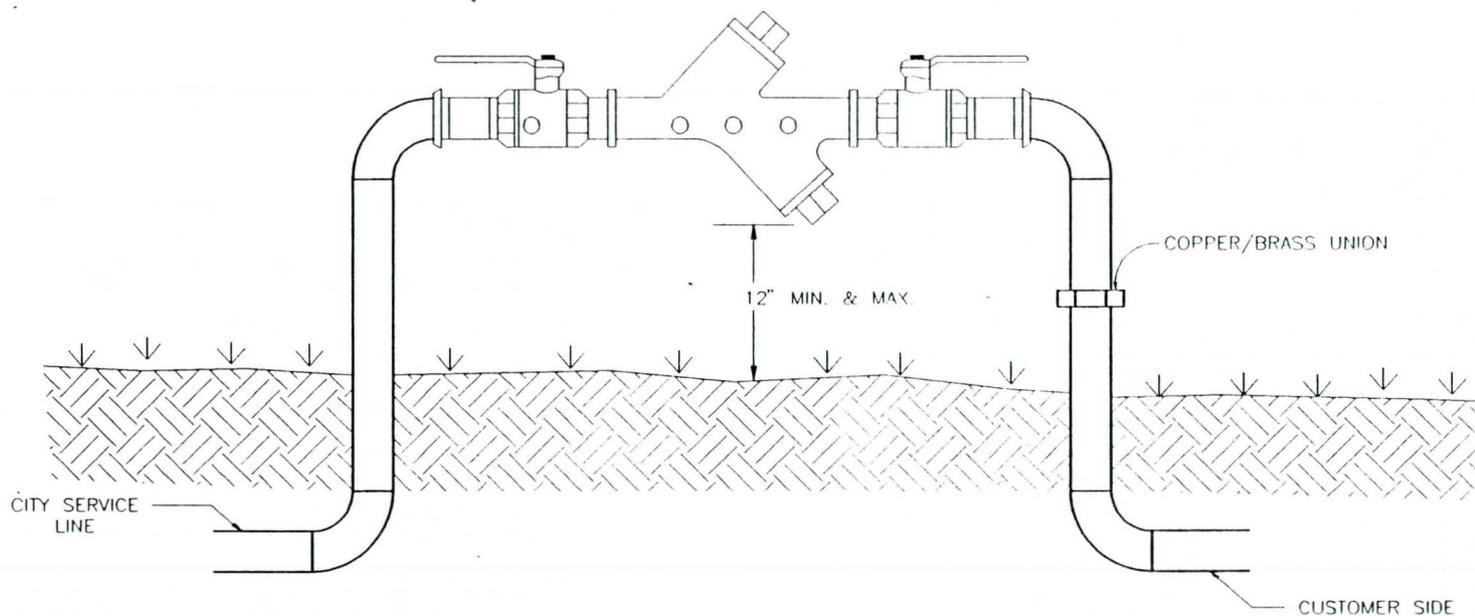
DOUBLE-CHECK VALVE
BACKFLOW PREVENTION ASSEMBLY
INSTALLATION - 3" AND OVER

APPROVED

Kenny W. Hain
CITY ENGINEER

5-31-94
DATE

DETAIL NO.
P1352



NOTES:

1. ALL PIPE/FITTINGS TO BE TYPE "K" COPPER.
2. CONTACT CITY OF PHOENIX WATER SERVICES DEPARTMENT, WATER QUALITY DIVISION FOR LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
3. BACKFLOW PREVENTION ASSEMBLY MUST BE LEVEL AND INSTALLED A MINIMUM AND A MAXIMUM OF 12 INCHES FROM ASSEMBLY BODY TO FINAL GRADE.
4. TEST COCKS, (4) SHALL BE FITTED WITH BRASS PLUGS INSTALLED WITH TEFLON TAPE.
5. SHUTOFF VALVES TO BE RESILIENT BALL TYPE WITH REMOVABLE HANDLES.
6. COMPRESSION TYPE FITTINGS ARE NOT ALLOWED.
7. INSTALL THE BACKFLOW PREVENTION ASSEMBLY IMMEDIATELY DOWNSTREAM OF THE CITY WATER METER.
8. A COPPER/BRASS UNION MUST BE INSTALLED IN THE MIDDLE OF THE DOWNSTREAM RISER.
9. ASSEMBLY SHALL BE APPROVED BY U.S.C. FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH.
10. COPPER FITTINGS SHALL BE CONNECTED WITH LEAD-FREE SOLDER JOINTS.

DETAIL NO.

P1353



City of Phoenix
STANDARD DETAIL

DOUBLE-CHECK VALVE
BACKFLOW PREVENTION ASSEMBLY
INSTALLATION - 2 1/2" AND UNDER

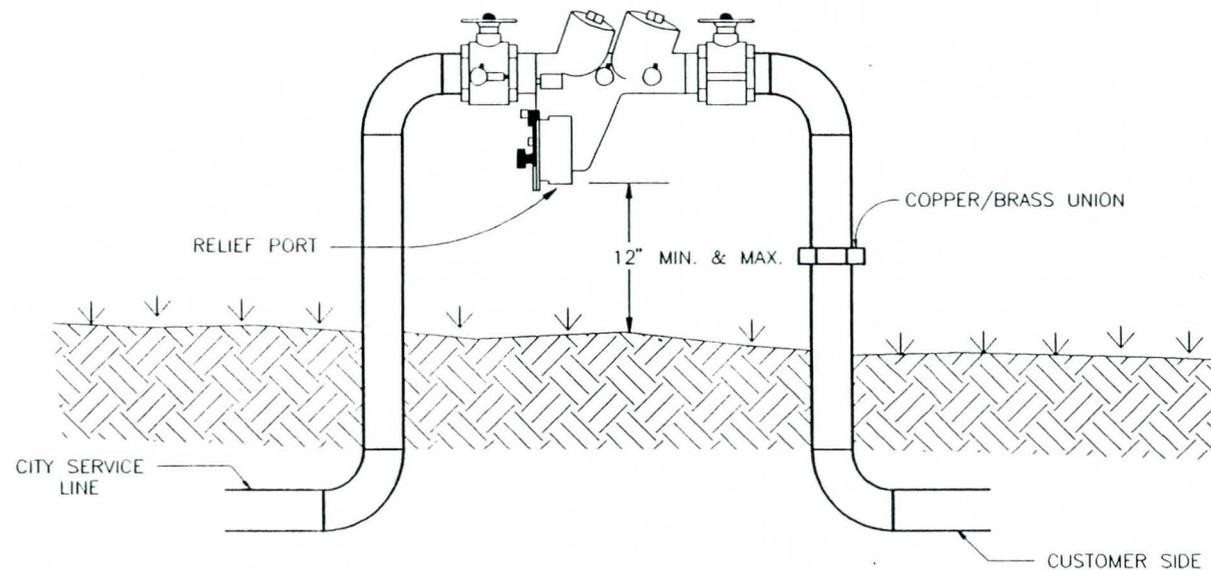
APPROVED

Kenny Whitman
CITY ENGINEER

7-9-92
DATE

DETAIL NO.

P1353



NOTES:

1. ALL PIPE/FITTINGS TO BE TYPE "K" COPPER.
2. ASSEMBLY SHALL BE APPROVED BY U.S.C. FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH.
3. INSTALL BACKFLOW PREVENTION ASSEMBLY WITH RELIEF PORT FACING TOWARD THE GROUND.
4. BACKFLOW PREVENTION ASSEMBLY MUST BE LEVEL AND INSTALLED A MINIMUM AND A MAXIMUM OF 12 INCHES FROM RELIEF PORT TO FINAL GRADE.
5. PAVER CONCRETE BLOCK UNDER RELIEF PORT, SET AT FINAL GRADE.
6. TEST COCKS, (4) SHALL BE FITTED WITH BRASS PLUGS AND INSTALLED WITH TEFLON TAPE.
7. SHUTOFF VALVES TO BE RESILIENT BALL TYPE WITH REMOVABLE HANDLES.
8. COMPRESSION TYPE FITTINGS ARE NOT ALLOWED.
9. INSTALL THE BACKFLOW PREVENTION ASSEMBLY IMMEDIATELY DOWNSTREAM OF THE CITY WATER METER.
10. A COPPER/BRASS UNION MUST BE INSTALLED IN THE MIDDLE OF THE DOWNSTREAM RISER.
11. CONTACT CITY OF PHOENIX WATER SERVICES DEPARTMENT, WATER QUALITY DIVISION FOR LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
12. COPPER FITTINGS SHALL BE CONNECTED WITH LEAD-FREE SOLDER JOINT.

DETAIL NO.

P1354



City of Phoenix
STANDARD DETAIL

REDUCED PRESSURE PRINCIPLE
BACKFLOW PREVENTION ASSEMBLY
INSTALLATION - 2 1/2" AND UNDER

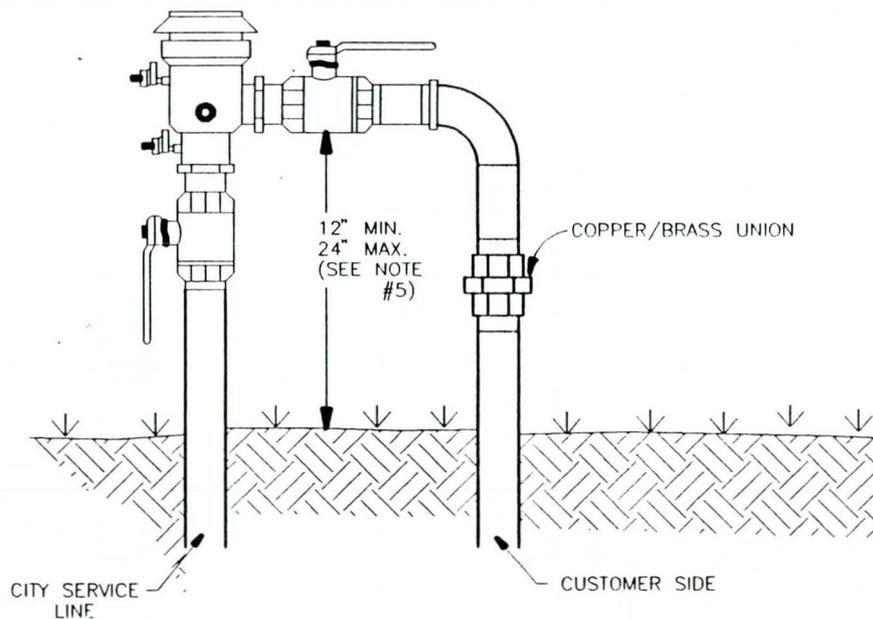
APPROVED

Kenny W. Han
CITY ENGINEER

7-9-92
DATE

DETAIL NO.

P1354



NOTES:

1. CONTACT CITY OF PHOENIX WATER SERVICES DEPARTMENT, WATER QUALITY DIVISION FOR LIST OF APPROVED PRESSURE VACUUM BREAKER ASSEMBLIES.
2. ASSEMBLY SHALL BE APPROVED BY U.S.C. FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH.
3. TWO (2) TEST COCKS SHALL BE FITTED WITH BRASS PLUGS INSTALLED WITH TEFLON TAPE.
4. SHUTOFF BALL VALVES MUST BE RESILIENT SEATED VALVES AS PER U.S.C..
5. ASSEMBLY MUST BE INSTALLED 12 INCHES ABOVE THE HIGHEST OUTLET ON THE SYSTEM. IF THE DISTANCE EXCEEDS 24 INCHES A REDUCED PRESSURE BACKFLOW PREVENTION ASSEMBLY MUST BE USED.
6. ALL PIPE/FITTINGS TO BE TYPE "K" COPPER.
7. A COPPER/BRASS UNION MUST BE INSTALLED IN THE MIDDLE OF THE DOWNSTREAM RISER.
8. INSTALL THE BACKFLOW PREVENTION ASSEMBLY IMMEDIATELY DOWNSTREAM OF THE CITY WATER METER.
9. COPPER FITTINGS TO BE CONNECTED WITH LEAD-FREE SOLDER JOINTS.

DETAIL NO.

P1355



City of Phoenix
STANDARD DETAIL

PRESSURE VACUUM
BREAKER ASSEMBLY
INSTALLATION - 2" AND UNDER

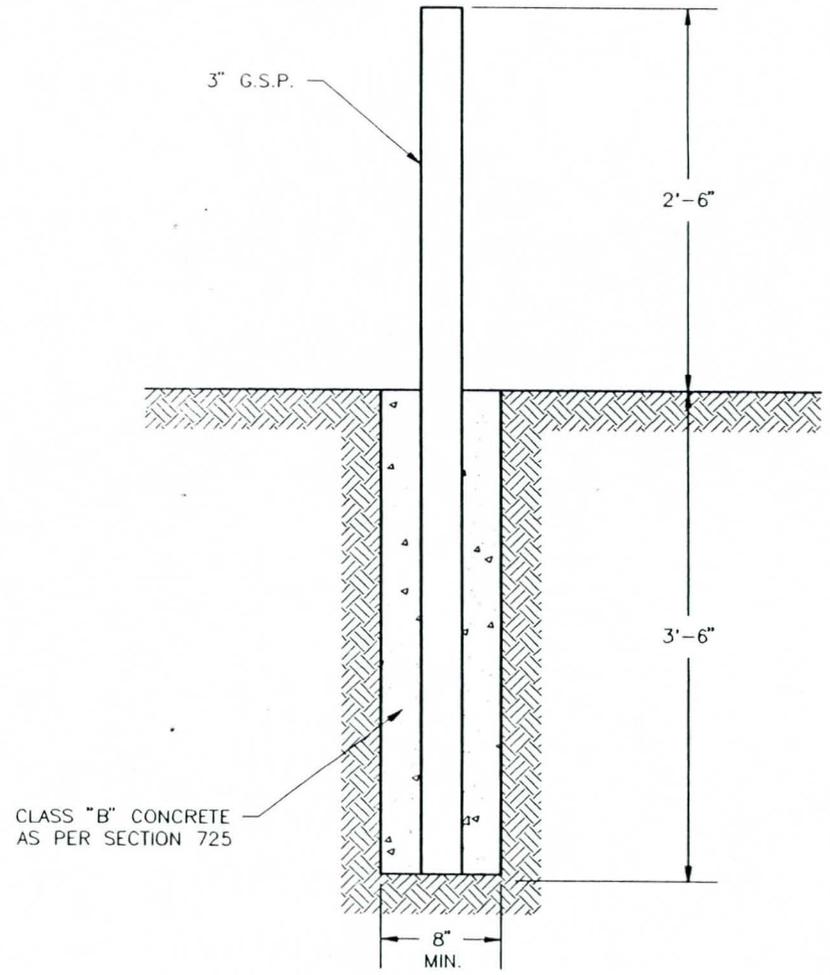
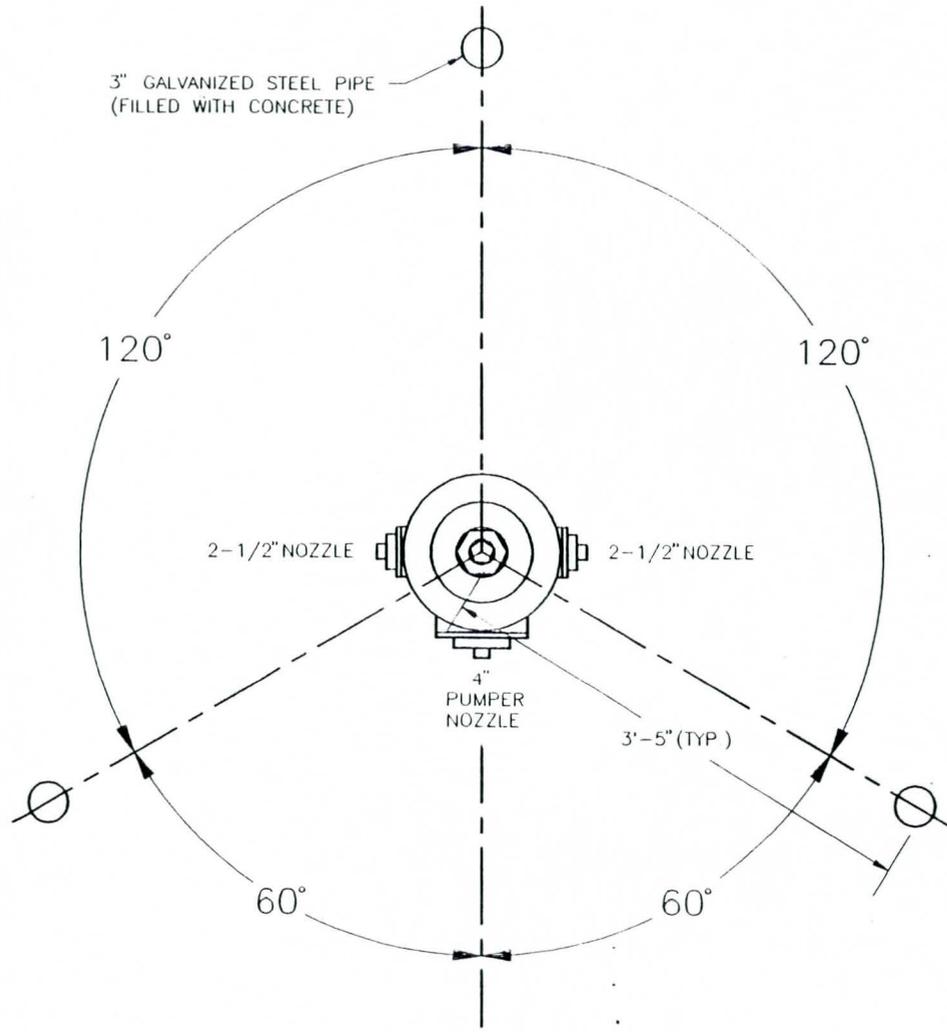
APPROVED

Kenny Whitman
CITY ENGINEER

7-9-92
DATE

DETAIL NO.

P1355



DETAIL NO.
P1359



City of Phoenix
STANDARD DETAIL

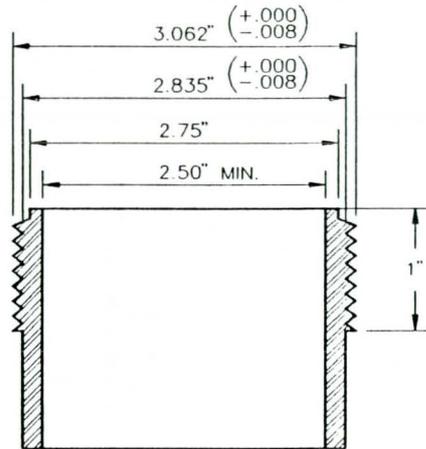
HYDRANT GUARDS

APPROVED
Kenny W. Hain
CITY ENGINEER

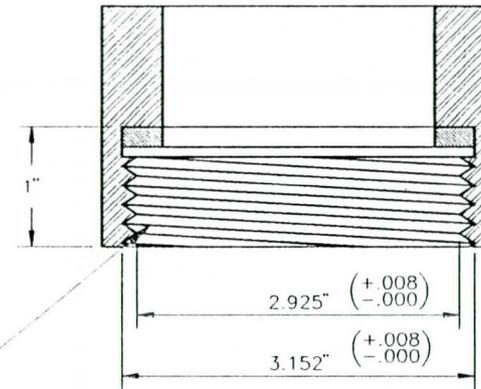
7-9-92
DATE

DETAIL NO.
P1359

2-1/2" HYDRANT NOZZLE

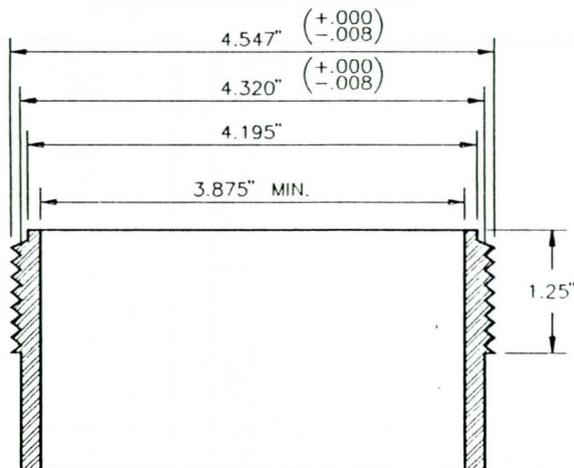


2-1/2" CAP

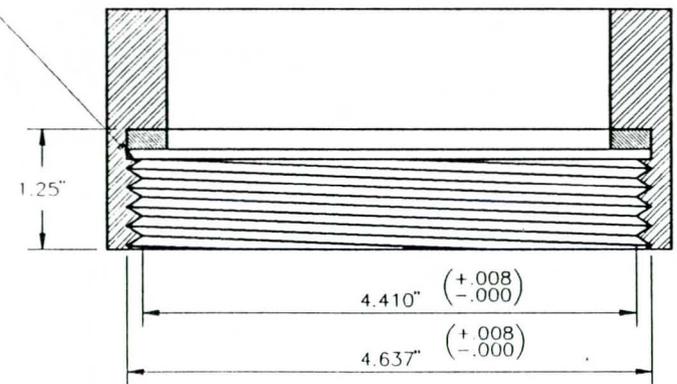


6 THREADS PER INCH

4" HYDRANT NOZZLE



4" CAP



DETAIL NO.

P1361



City of Phoenix
STANDARD DETAIL

FIRE HYDRANT THREADS
2-1/2" & 4"

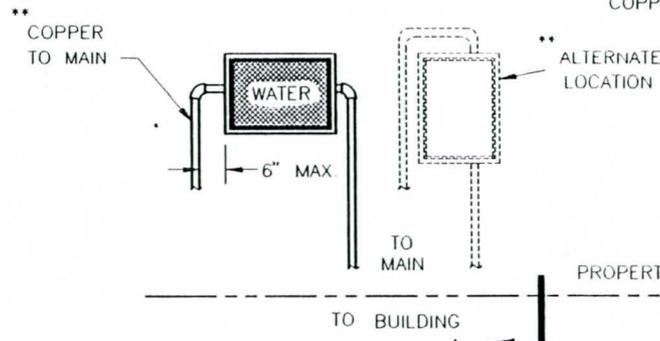
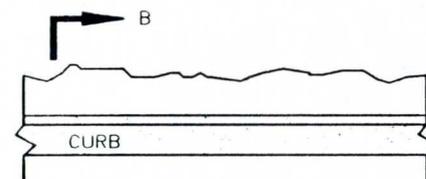
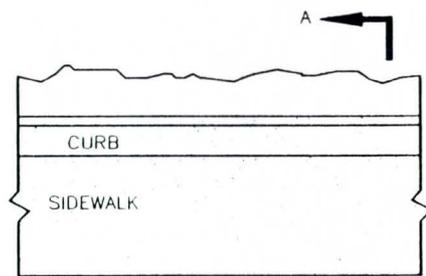
APPROVED

Kenny W. Han
CITY ENGINEER

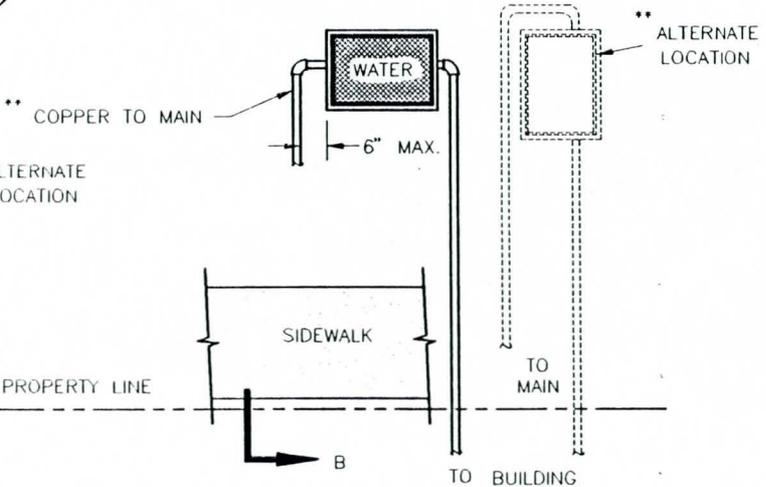
7-9-92
DATE

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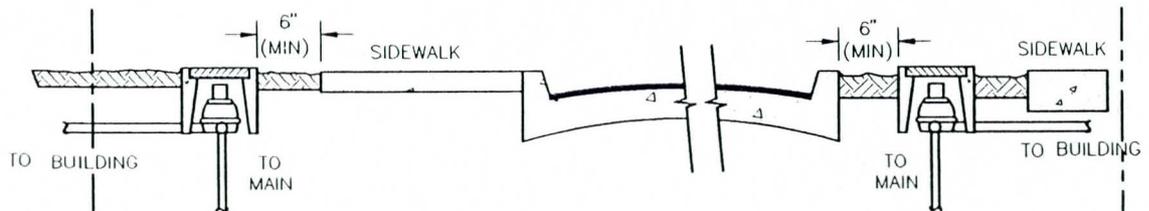
P1361



PLAN VIEW WITH SIDEWALK
ADJACENT TO CURB



PLAN VIEW WITH PARKWAY
OR NO SIDEWALK



SECTION A-A

SECTION B-B

** REV. 12/5/88
* REV. 11/1/84

DETAIL NO.
P1363

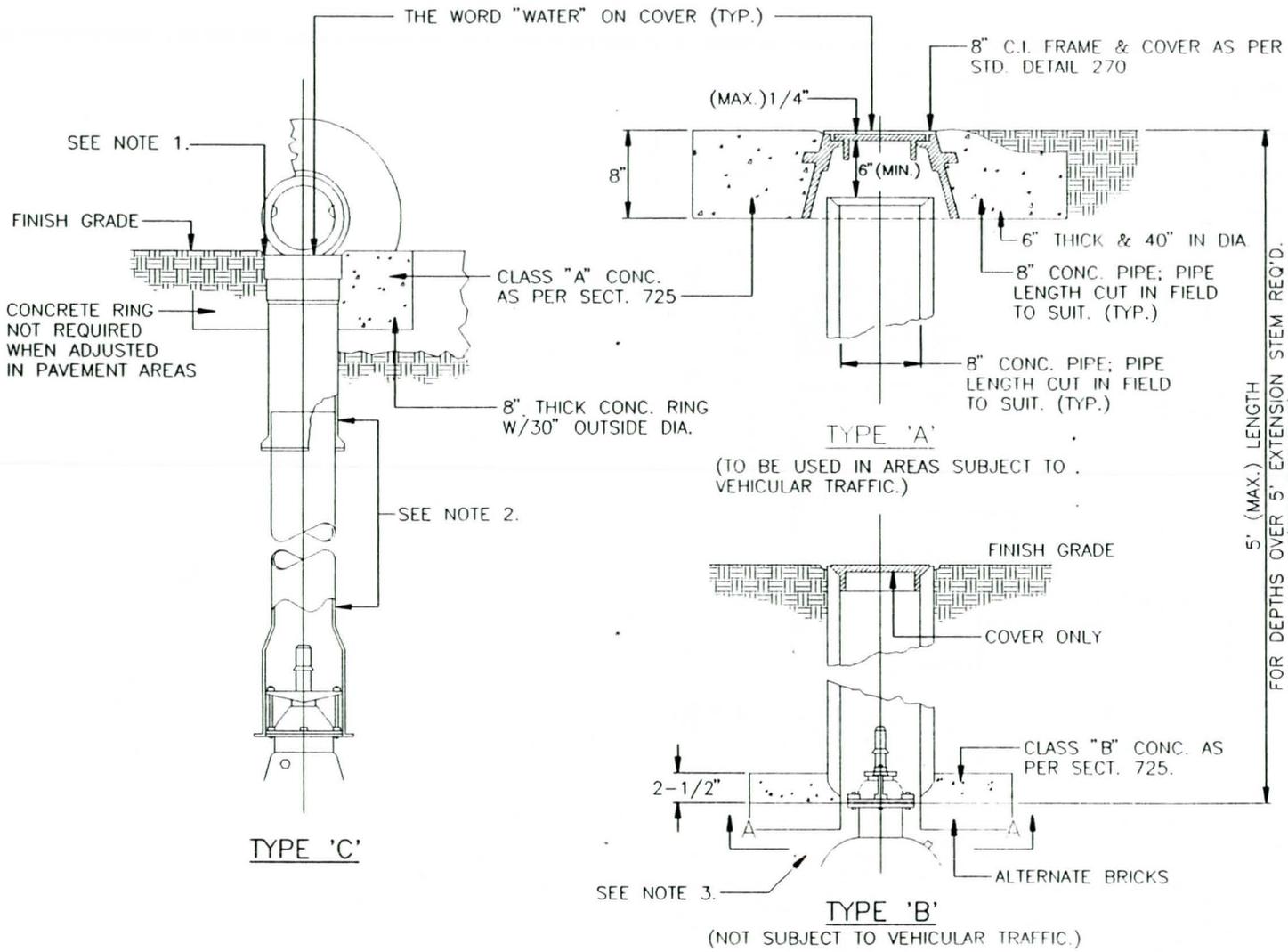
City of Phoenix
STANDARD DETAIL

WATER METER LOCATIONS

APPROVED
Kenny Whelan
CITY ENGINEER

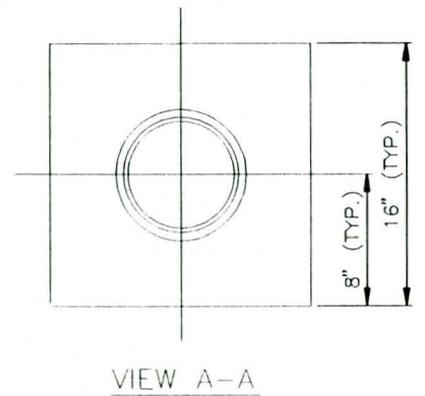
7-9-92
DATE

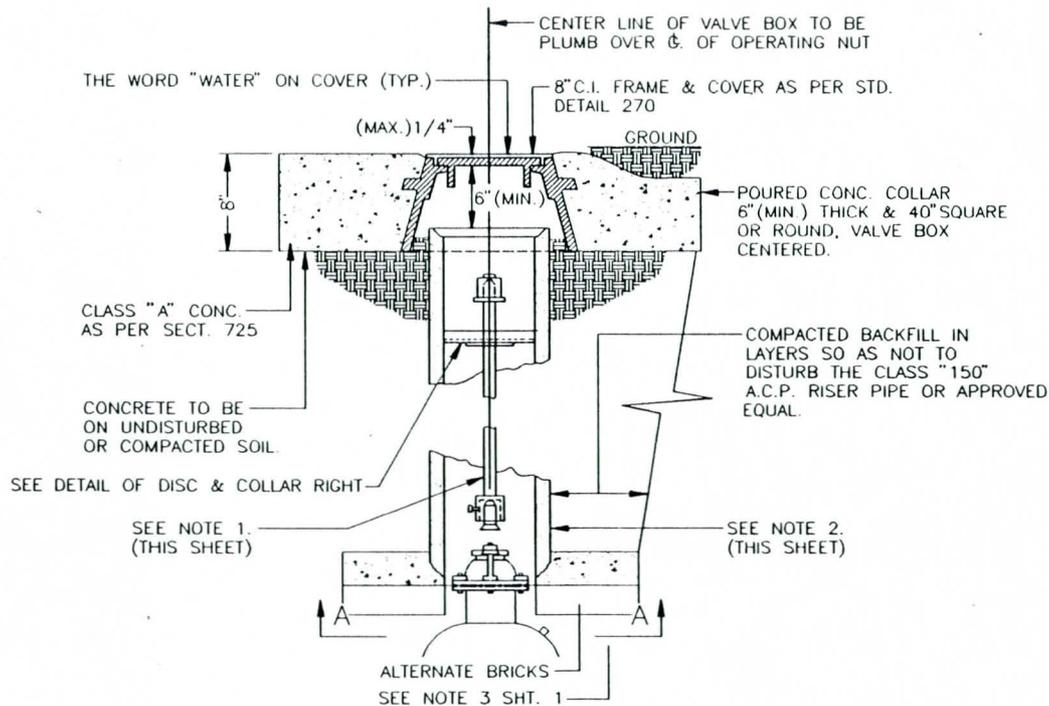
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P1363



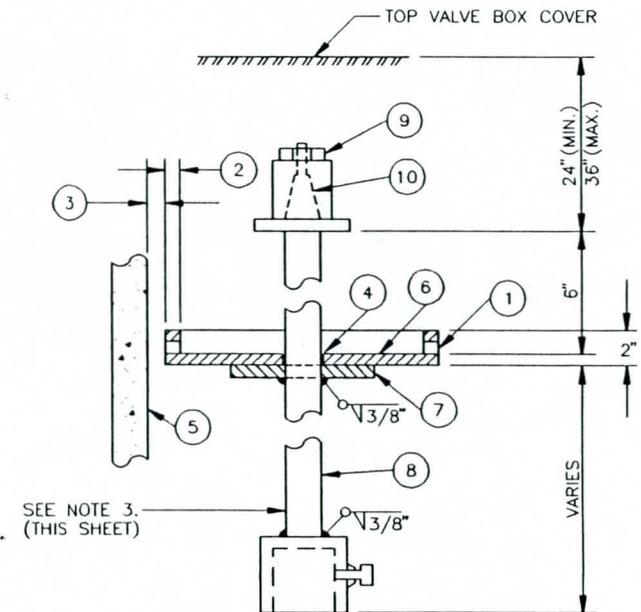
NOTES

1. VALVE BOX SHALL BE ADJUSTED TO THE FINISHED GRADE PRIOR TO PLACING OF THE ASPHALTIC CONCRETE SURFACE.
2. USE PARKSON TYLER, APCO, OR EQUAL DEEP SKIRTED LID (4" OR MORE) TYPE, SLIDING ADJUSTABLE CAST IRON VALVE BOX. C.I. MIN. T.S. 30,000 P.S.I.
3. GROUND BELOW CONCRETE PAD OR 3 BRICKS TO BE COMPACTED 95% OF MAX. DENSITY.





- ① — (2) 1/2" DIA. HOLES OPPOSITE SIDES
- ② — 3/16"
- ③ — 1/4" ALL SIDES
- ④ — 1/16" MIN. CLEARANCE
- ⑤ — A.C.P. RISER WALL
- ⑥ — 3/16" STL. PLATE
- ⑦ — 3/8" X 3" DIA. PLATE



- ① — MIN. ROD SIZE 1-1/4" DIA. STL. DESIG. A-15
- ② — 2" SQUARE OPER. NUT TO BE HELD DOWN WITH NUT ON THREADED SHAFT AS STD. VALVE STEM NUT ATTACHMENT.
- ⑤ — THIS PART OF STEM SQUARE WITH 4 SIDES TAPERED.

NOTES

1. EXTENSION STEM: WITH SQUARE SOCKET ON BOTTOM TO FIT 2" SQUARE VALVE NUT. EXTENSION TO VALVE STEMS REQUIRED ON ALL VALVES INSTALLED WHERE OPERATION NUT IS OVER 5' BELOW SURFACE. LENGTH TO FIT EACH INSTALLATION. OPERATING NUT TO BE HELD ON TOP OF EXTENSION WITH STOP NUT.
2. IF TWO OR MORE JOINTS OF A.C.P. ARE USED TO MAKE RISER, USE STANDARD A.C. PIPE RUBBER GASKET COUPLING TO JOIN PIPE. WHERE RISER LENGTH EXCEEDS 10' USE 12' A.C. PIPE
3. STEM PAINTING: ALL STEEL TO HAVE PRIME COAT OF PAINT NO.1-D AND ONE HEAVY APPLICATION (FINISH COAT) OF PAINT NO.9 AS PER SECT. 790.

SHEET 2 OF 2

DETAIL NO.
P1391-2



City of Phoenix
STANDARD DETAIL

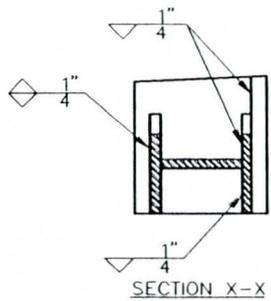
VALVE BOX INSTALLATION

APPROVED

Kenny Whelan
CITY ENGINEER

5-31-94
DATE

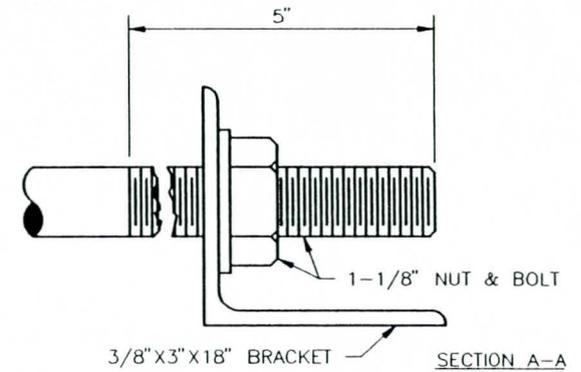
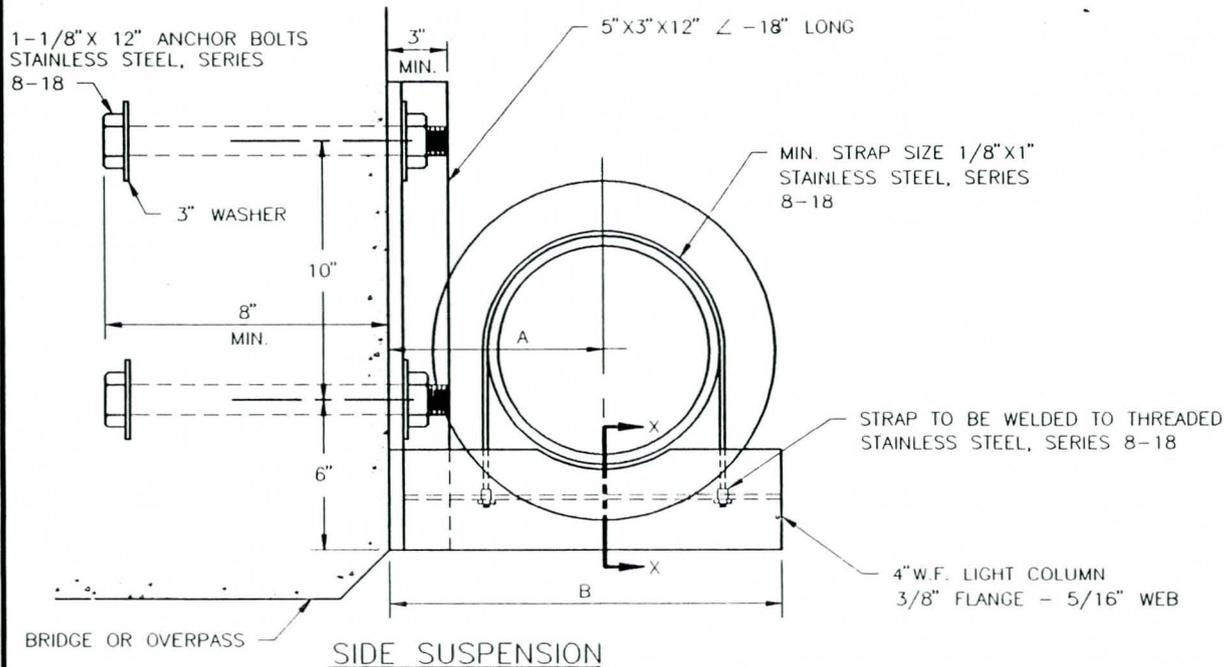
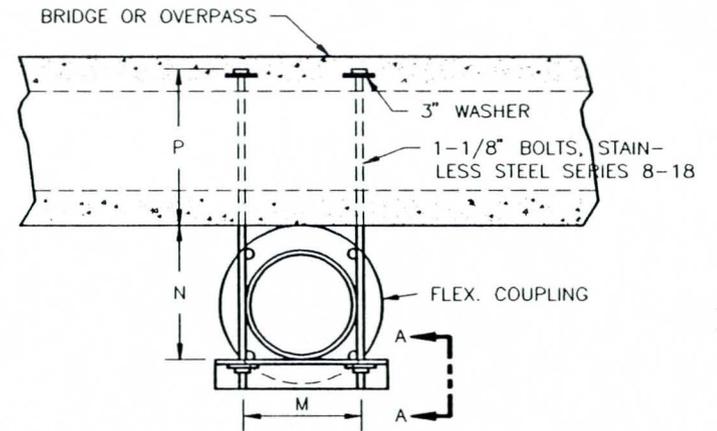
DETAIL NO.
P1391-2



| PIPE SIZE | A | B |
|-----------|-----|-----|
| 8" | 8" | 15" |
| 10" | 9" | 17" |
| 12" | 10" | 19" |

NOTES:

1. MINIMUM 2 SUPPORTS PER JOINT OF PIPE.
2. ALL NUTS SHALL BE STAINLESS STEEL SERIES 8-18.
3. ALL BOLTS SHALL HAVE A LOCK WASHER UNDER THE NUT.



| PIPE SIZE | M | N | P |
|-----------|--------|-----|----|
| 8" | 10.25" | 12" | 8" |
| 10" | 12.5" | 14" | 8" |
| 12" | 15" | 16" | 8" |

BOTTOM SUSPENSION

DETAIL NO.
P1395



City of Phoenix
STANDARD DETAIL

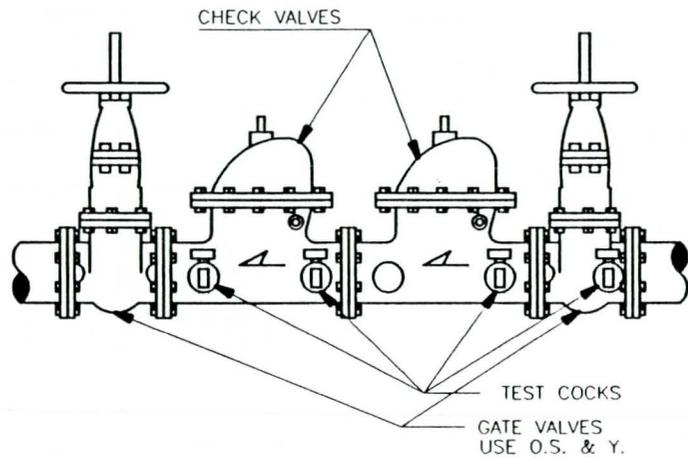
WATER LINE SUSPENSIONS

APPROVED

Kenny W. Hain
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1395



NOTES:

1. THE CHECK VALVE SHALL BE LOADED INTERNALLY SO THAT WHEN THE SUPPLY PRESSURE IS 1 P.S.I., AND THE OUTLET PRESSURE IS ATMOSPHERIC, EACH CHECK VALVE WILL BE DRIP-TIGHT IN THE NORMAL DIRECTION OF FLOW.
2. CLAPPER FACING RINGS SHALL BE MOLDED SYNTHETIC RUBBER (SHORE DUROMETER HARDNESS 35-45).
3. ASSEMBLY IS TO MEET A.W.W.A. STANDARD C 506, BACK FLOW PREVENTION DEVICES.
4. PLACEMENT & LOCATION OF DOUBLE CHECK VALVE ASSEMBLY SHALL BE APPROVED BY WATER & WASTEWATER DEPARTMENT.
5. TEST COCKS SHALL HAVE FEMALE ENDS (I.P. THREADS) ON DISCHARGE SIDE.

| NOMINAL SIZE OF ASSEMBLY | MINIMUM SIZE TEST COCK |
|--------------------------|------------------------|
| LESS THAN OR EQUAL TO 2" | 1/4" |
| 2 1/2" - 4" | 1/2" |
| 6" & OVER | 3/4" |

DETAIL NO.
P1396



City of Phoenix
STANDARD DETAIL

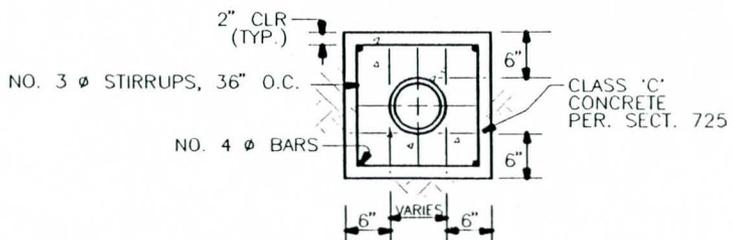
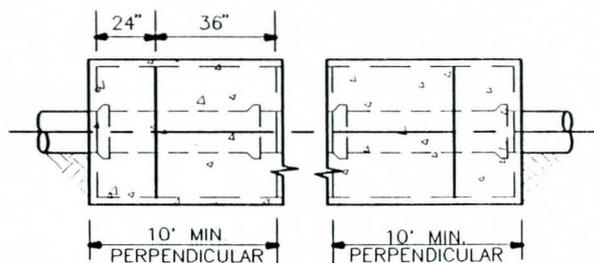
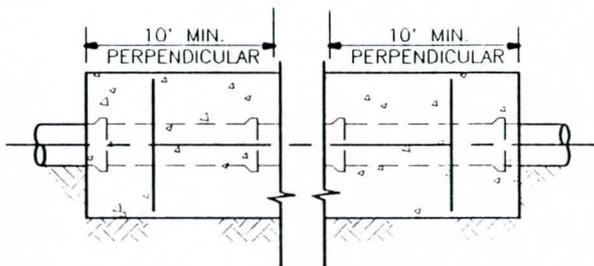
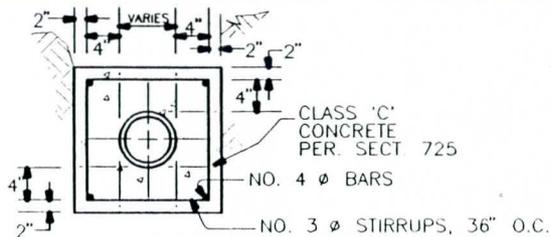
DOUBLE CHECK VALVE ASSEMBLY

APPROVED

Kenny W. Han
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1396

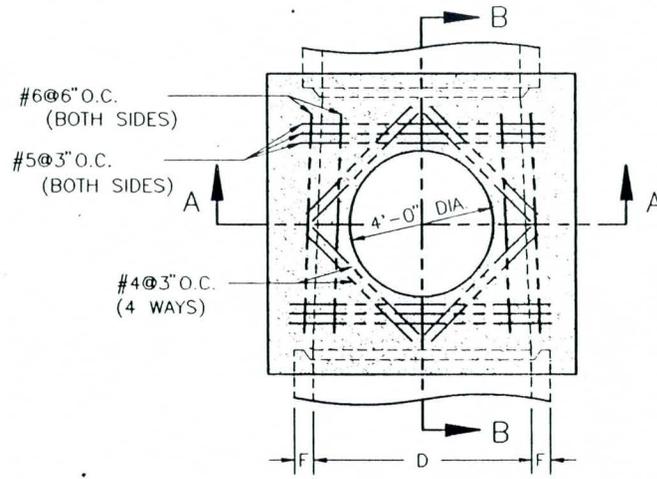


1. ALL ENCASEMENTS SHALL EXTEND AT LEAST 10' ON EACH SIDE OF THE CROSSED PIPE (BEYOND THE OUTSIDE WALL OF THE PIPE) MEASURED PERPENDICULAR TO THE CROSSING, AND MUST INCLUDE THE NEAREST JOINT.
2. PROTECTION IS REQUIRED WHEN THE DISTANCE FROM THE BOTTOM OF THE WATER TO THE TOP OF THE SEWER IS 24" OR LESS. WHEN THE SEWER IS A 4" OR 6" HOUSE CONNECTION, NO PROTECTION IS REQUIRED IF THE DISTANCE IS MORE THAN 12". MECHANICAL JOINT OR RESTRAINED JOINT DUCTILE IRON SEWER PIPE MAY BE USED AS AN ALTERNATIVE TO ANY ENCASEMENT, PROVIDED THAT NO SEWER PIPE JOINTS FALL INSIDE THE EQUIVALENT ENCASEMENT LIMITS.
3. WHEN A SANITARY SEWER LINE CROSSES ABOVE A WATER LINE:
 - a) ENCASEMENT PROTECTION IS REQUIRED FOR BOTH PIPELINES IN ALL CASES REGARDLESS OF THE VERTICAL SEPARATION BETWEEN THE LINES, OR THE SIZE OF THE LINES. IN ADDITION, THERE SHALL BE A MINIMUM OF 24" OF CLEARANCE BETWEEN THE BOTTOM OF THE SEWER AND THE TOP OF THE WATER.
 - b) AS AN ALTERNATIVE TO ENCASEMENT, BOTH THE WATER AND SEWER PIPE MAY BE REPLACED WITH RESTRAINED JOINT DUCTILE IRON PIPE. DUCTILE IRON PIPE SHALL EXTEND A MINIMUM OF 6' ON EACH SIDE OF THE CROSSED PIPE. (BEYOND THE OUTSIDE WALL OF THE PIPE), MEASURED PERPENDICULAR TO THE CROSSING (RATHER THAN 10' AS REQUIRED FOR ENCASEMENT).
 - c) A COMBINATION OF ENCASEMENT OF ONE PIPE AND REPLACEMENT OF THE OTHER PIPE WITH RESTRAINED JOINT DUCTILE IRON PIPE IS ALSO AN ACCEPTABLE PROTECTION.

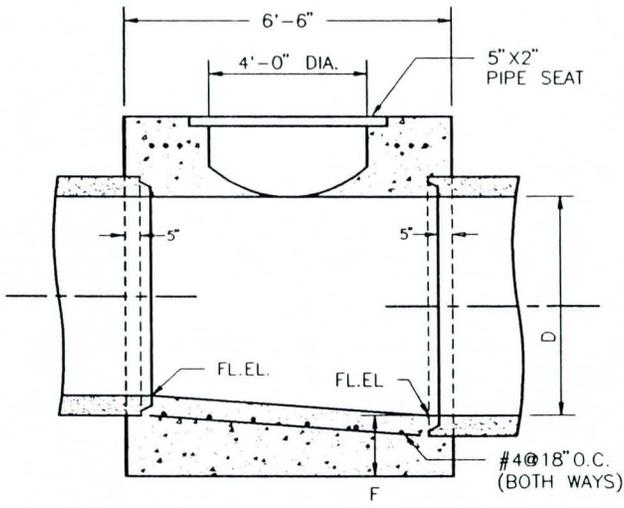
NOTE:

1. DUCTILE IRON PIPE JOINTS SHALL BE KEPT TO AN ABSOLUTE MINIMUM.
2. WHENEVER POSSIBLE, NO DUCTILE IRON PIPE JOINTS SHALL BE ALLOWED WITHIN THE AREA EXTENDING 6' BEYOND EACH SIDE OF THE OUTSIDE WALL OF THE CROSSED PIPE. IF THE CROSSING LENGTH EXCEEDS THE STANDARD LENGTH OF ONE PIPE, THE STANDARD LENGTH PIPE SHALL BE CENTERED OVER/UNDER THE CROSSED PIPE TO PROVIDE THE MAXIMUM POSSIBLE DISTANCE BETWEEN THE JOINTS AND THE CROSSED PIPE. IN THIS CASE, ADDITIONAL CONCRETE ENCASEMENT PROTECTION MAY BE REQUIRED BY THE AGENCY.

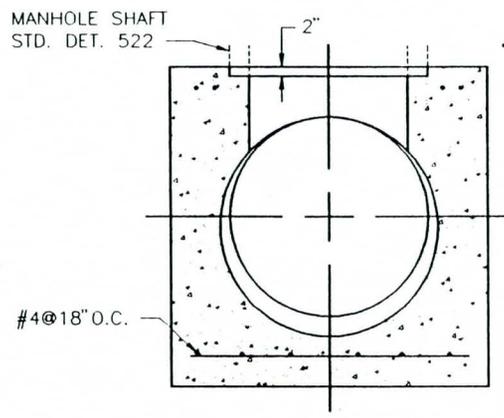




PLAN



SECTION B-B



SECTION A-A

NOTES:

1. THICKNESS OF DECK SHALL VARY WHEN NECESSARY TO PROVIDE LEVEL PIPE SEAT BUT SHALL NOT BE LESS THAN 'F'.
2. FLOOR OF MANHOLE SHALL BE STEEL TROWELLED TO SPRING LINE.
3. BODY OF MANHOLE SHALL BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT THE SPRING LINE.
4. ALL REINFORCED STEEL SHALL CLEAR FACE OF CONCRETE BY 1-1/2" UNLESS SHOWN OTHERWISE.
5. CONCRETE SHALL BE CLASS 'A'.

"F" DIMENSION TABLE

| | | | | | | |
|---|---------|---------|---------|---------|---------|---------|
| D | 51" | 54" | 57" | 60" | 63" | 66" |
| F | 13-3/4" | 14-1/2" | 15" | 15-1/2" | 16-1/4" | 16-3/4" |
| D | 69" | 72" | 78" | 84" | 90" | 96" |
| F | 17-1/2" | 18" | 19-1/4" | 20-1/2" | 21-3/4" | 23" |

DETAIL NO.
P1560



City of Phoenix
STANDARD DETAIL

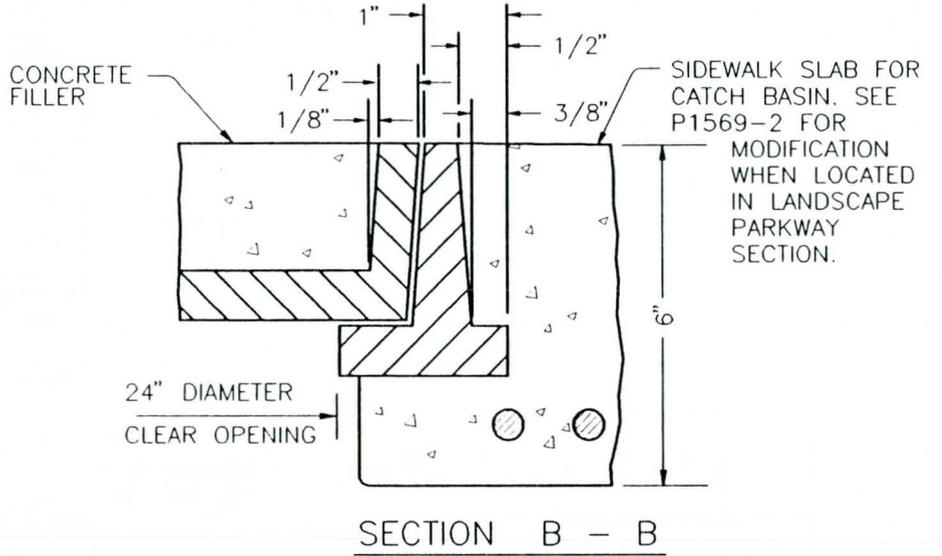
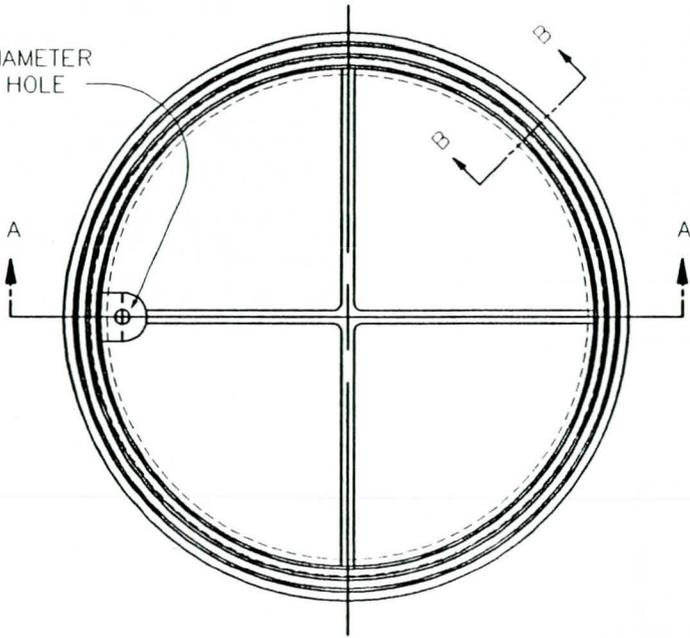
STORM SEWER MANHOLE BASE TRANSITION
51" & LARGER

APPROVED
Kenny W. Han
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1560

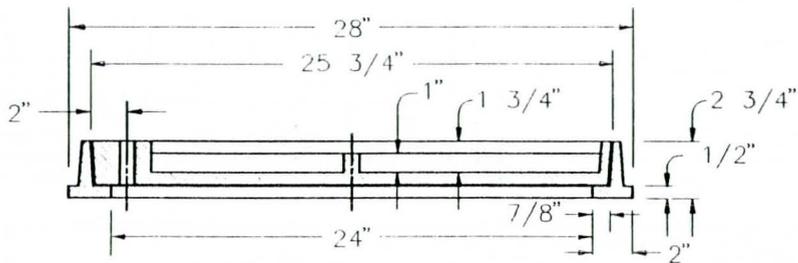
3/4" DIAMETER
LIFTING HOLE



SECTION B - B

NOTES

1. COVER SHALL BE NON-LOCKING.
2. FRAME AND COVER SHALL BE CAST IRON OR STRUCTURAL STEEL.
3. CATCH BASIN ACCESS FRAME AND COVER IS FOR USE IN SIDEWALK AREA ONLY.
4. COVER SHALL BE FILLED WITH CONCRETE AND BROOM FINISHED.
5. SMALL VARIATIONS IN DIMENSIONS OR FEATURES OF A MINOR NATURE THAT ARE PART OF THE FOUNDRY'S STANDARD CASTING ARE PERMISSIBLE.



SECTION A - A

REVISED: 03-01-92

DETAIL NO.
P1561



City of Phoenix
STANDARD DETAIL

CATCH BASIN ACCESS
FRAME AND COVER

APPROVED

Kenny Whelan
CITY ENGINEER

7-14-92
DATE

DETAIL NO.
P1561

| SIZE OF OUTFALL CONDUIT | FRAME ANGLES | SHEAR PIN CLIP ANGLES | SHEAR PINS | ANCHOR BOLTS | HINGE PINS | HINGE ANGLES | HINGE STD. PIPE | HINGE TO FRAME WELDS | ANGLE TO FRAME WELDS | BARRIER BARS PLAIN | NO. OF EQUAL BARRIER BAR SPACES (HORIZ.) | NO. OF EQUAL BARRIER BAR SPACES (VERT.) | H (OUT TO OUT FRAME ANGLES) | W (OUT TO OUT FRAME ANGLES) | A | B |
|-------------------------|--------------|-----------------------|---------------|--------------|-------------|-------------------|-----------------|----------------------|----------------------|--------------------|--|---|-----------------------------|-----------------------------|--------------------------------------|-----|
| 30" | 2X2X1/4 | 4X4X1/4 | 1-1/8 ϕ | 5/8 ϕ | 1/2" ϕ | 2X2X1/4 | 3/4" | 1/8 | 1/8 | 1/2" ϕ | 3 | 5 | 34" | 20 | SINGLE HINGE CENTERED | |
| 42" | 2X2X1/4 | 4X4X1/4 | 2-1/8 ϕ | 5/8 ϕ | 1/2" ϕ | 2X2X1/4 | 3/4" | 1/8 | 1/8 | 1/2" ϕ | 5 | 6 | 42" | 32" | 2 HINGES 0 0 | |
| 48" | 3X3X7/16 | 5X3X1/4 | 2-1/8 ϕ | 5/8 ϕ | 3/4" ϕ | 2-1/2X 2-2X1/4 | 1" | 1/8 | 1/8 | 1/2" ϕ | 5 | 7 | 47" | 38" | 3" | 1" |
| 54" | 3X3X7/16 | 5X3X1/4 | 2-1/8 ϕ | 5/8 ϕ | 3/4" ϕ | 2-1/2X 2-2X1/4 | 1" | 1/8 | 1/8 | 1/2" ϕ | 6 | 8 | 54" | 44" | 5" | 3" |
| 60" | 3X3X7/16 | 5X3X1/4 | 2-1/8 ϕ | 5/8 ϕ | 3/4" ϕ | 2-1/2X 2-2X1/4 | 1" | 1/8 | 1/8 | 1/2" ϕ | 7 | 9 | 60" | 50" | 9" | 4" |
| 66" | 3X3X7/16 | 5X3X1/4 | 2-1/8 ϕ | 5/8 ϕ | 3/4" ϕ | 2-1/2X 2-2X1/4 | 1" | 1/8 | 1/8 | 1/2" ϕ | 8 | 10 | 66" | 56" | 11" | 6" |
| 72" | 4X4X5/8 | 5X3X1/4 | 2-3/16 ϕ | 5/8 ϕ | 1" ϕ | 3X3X3/8 | 1-1/4" | 1/8 | 1/8 | 1/2" ϕ | 9 | 11 | 73" | 62" | 15" | 7" |
| 78" | 4X4X5/8 | 5X3X1/4 | 2-3/16 ϕ | 5/8 ϕ | 1" ϕ | 3X3X3/8 | 1-1/4" | 1/8 | 1/8 | 1/2" ϕ | 10 | 11 | 79" | 68" | 17" | 9" |
| 84" | 4X4X5/8 | 5X3X1/4 | 2-3/16 ϕ | 5/8 ϕ | 1" ϕ | 3X3X3/8 | 1-1/4" | 1/8 | 1/8 | 1/2" ϕ | 11 | 13 | 86" | 74" | 21" | 10" |
| 90" | 4X4X5/8 | 5X3X1/4 | 2-3/16 ϕ | 5/8 ϕ | 1" ϕ | 3X3X3/8 | 1-1/4" | 1/8 | 1/8 | 1/2" ϕ | 12 | 13 | 92" | 80" | 23" | 12" |
| 96" | 4X4X5/8 | 5X3X1/4 | 2-3/16 ϕ | 5/8 ϕ | 1" ϕ | 3X3X3/8 | 1-1/4" | 1/8 | 1/8 | 1/2" ϕ | 12 | 14 | 98" | 86" | 29" | 12" |

DETAIL NO.
P1562



City of Phoenix
STANDARD DETAIL

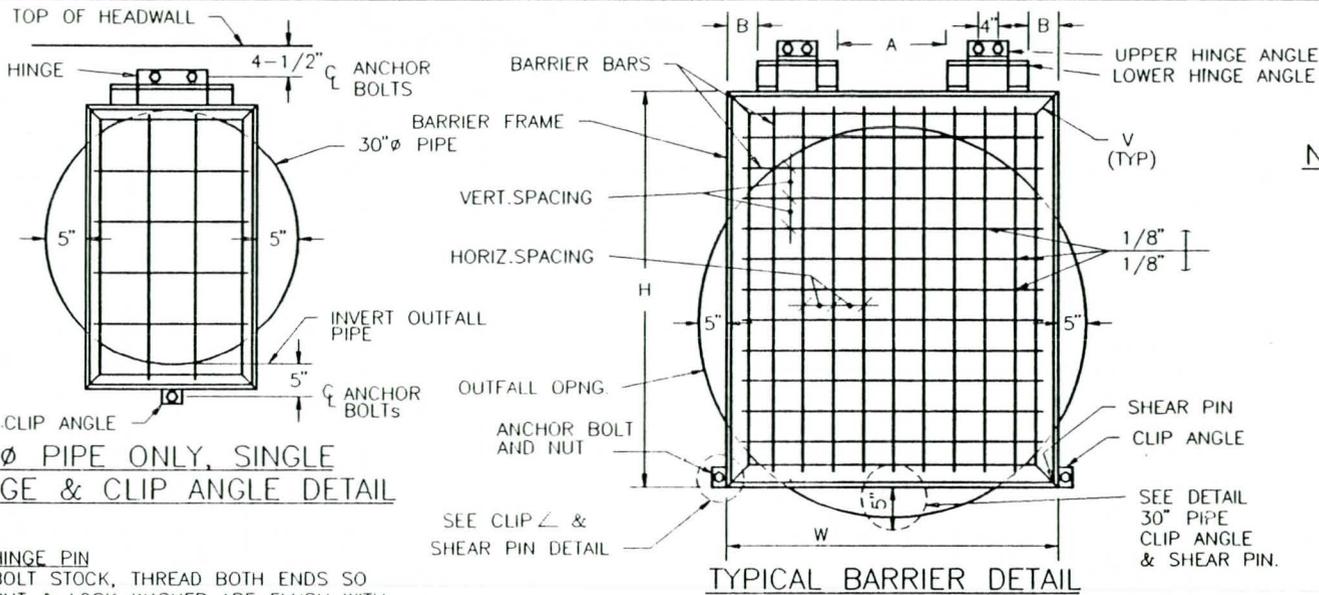
BARRIER SPECIFICATIONS SCHEDULE

APPROVED

Kenny Whitman
CITY ENGINEER

5-31-94
DATE

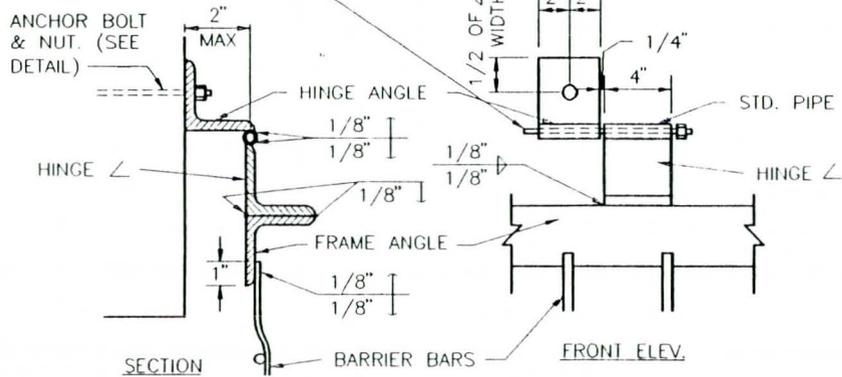
DETAIL NO.
P1562



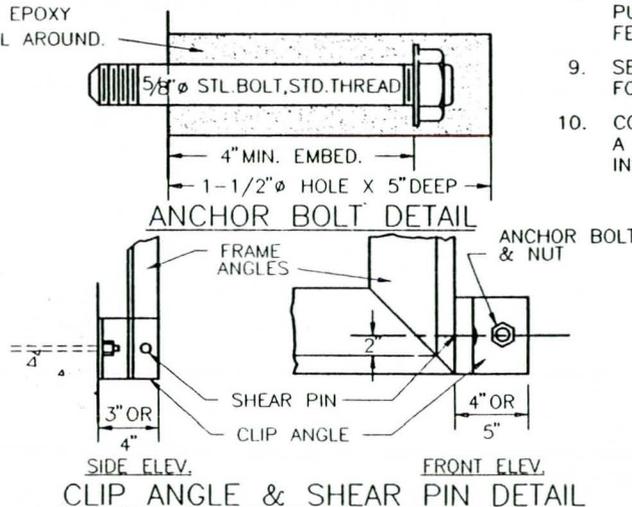
NOTES:

1. ALL SHEAR PIN ANGLES SHALL FIT SNUGLY AND TRULY FACE TO FACE. COVER WITH WATERPROOF GREASE PRIOR TO INSTALLATION OF PIN.
2. GALVANIZE ALL FERROUS PARTS AFTER FABRICATION.
3. THE SHEAR PIN HOLES IN THE ANGLE SHALL BE DRILLED FOR A TIGHT FIT OF THE SHEAR PINS.
4. THE ALUMINUM SHEAR PIN MATERIAL WILL BE FURNISHED BY THE CITY TO THE CONTRACTOR.
5. FRAME AND HINGE ANGLES SHALL HAVE THE OUTSTANDING LEGS OUT FOR OUTLETS.
6. ALL ANCHOR BOLTS SHALL BE 5/8"Ø ANCHOR BOLTS EMBEDDED 4" (MIN.) INTO EPOXY GROUT.
7. ALL SHEAR PINS ARE TO BE PEENED BOTH ENDS AFTER INSTALLATION.
8. SHEAR PIN MATERIAL SHALL BE COMMERCIALY PURE ALUMINUM WIRE, ALLOY 1100, TEMPER O, FEDERAL SPEC. QQ-A-411.
9. SEE BARRIER SHEDULE, DET. P1562 FOR VARIABLE DIMENSIONS.
10. COVER ALL MOVABLE CONTACT SURFACE WITH A COAT OF WATERPROOF GREASE PRIOR TO INSTALLATION.

HINGE PIN
BOLT STOCK, THREAD BOTH ENDS SO NUT & LOCK WASHER ARE FLUSH WITH LOWER ∠, UPSET OR DAMAGE EXPOSED THREADS. COAT PIN WITH WATERPROOF GREASE BEFORE INSTALLATION.



HINGE INSTALLATION DETAIL



ANCHOR BOLT DETAIL
CLIP ANGLE & SHEAR PIN DETAIL

DETAIL NO.
P1563



City of Phoenix
STANDARD DETAIL

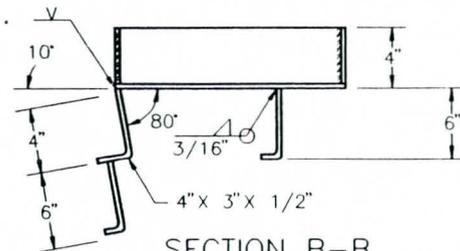
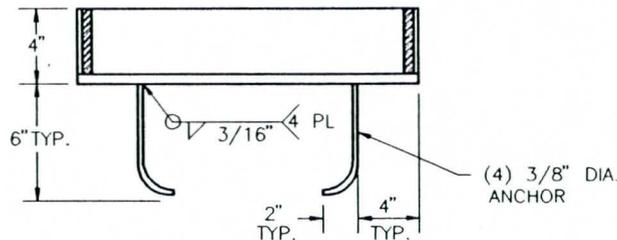
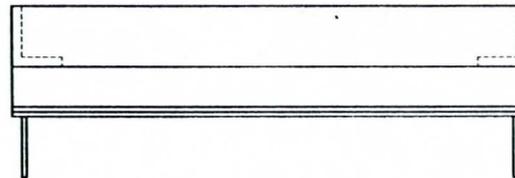
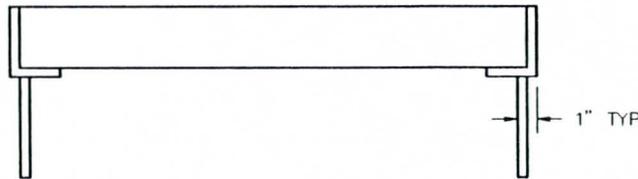
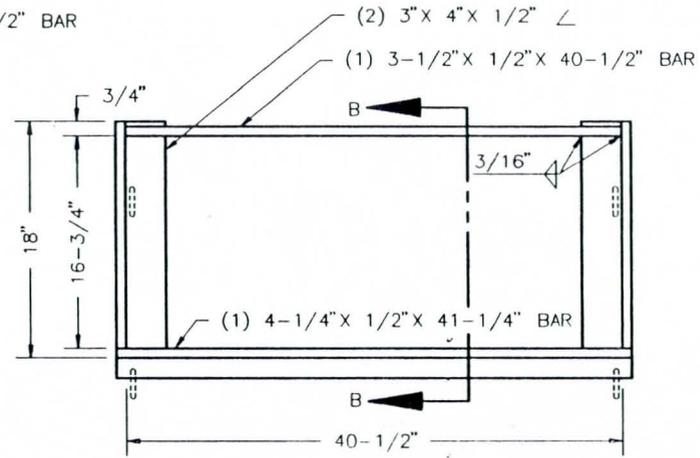
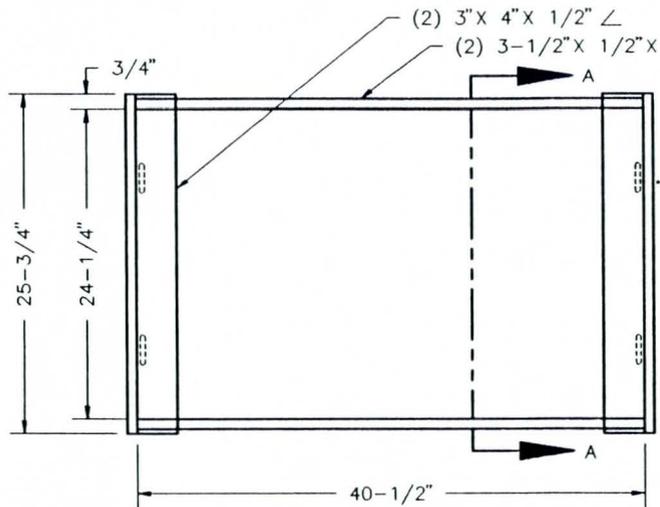
STORM SEWER OUTFALL ACCESS BARRIER

APPROVED

Kenny Whelan
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1563



SECTION A-A
TYPE I

SECTION B-B
TYPE 2

NOTES

1. FRAME & FRAME SUPPORT SHALL BE FABRICATED FROM STRUCTURAL STEEL EXCEPT AS NOTED. STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH A.S.T.M. A-36.
2. WELDING SHALL BE IN ACCORDANCE WITH M.A.G. WELDING SPECIFICATIONS.
3. FRAME AND GRATE SHALL BE TESTED FOR ACCURACY OF FIT AND SHALL BE MARKED IN SETS BEFORE DELIVERY.
4. THE COMPLETED ASSEMBLY SHALL BE GIVEN ONE SHOP COAT OF NO. 1 PAINT, AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECTION 790.
5. THE FRAME SHALL BE FABRICATED TO WITHIN $\pm 1/8"$ OF SPECIFIED DIMENSIONS.

DETAIL NO.
P1564



City of Phoenix
STANDARD DETAIL

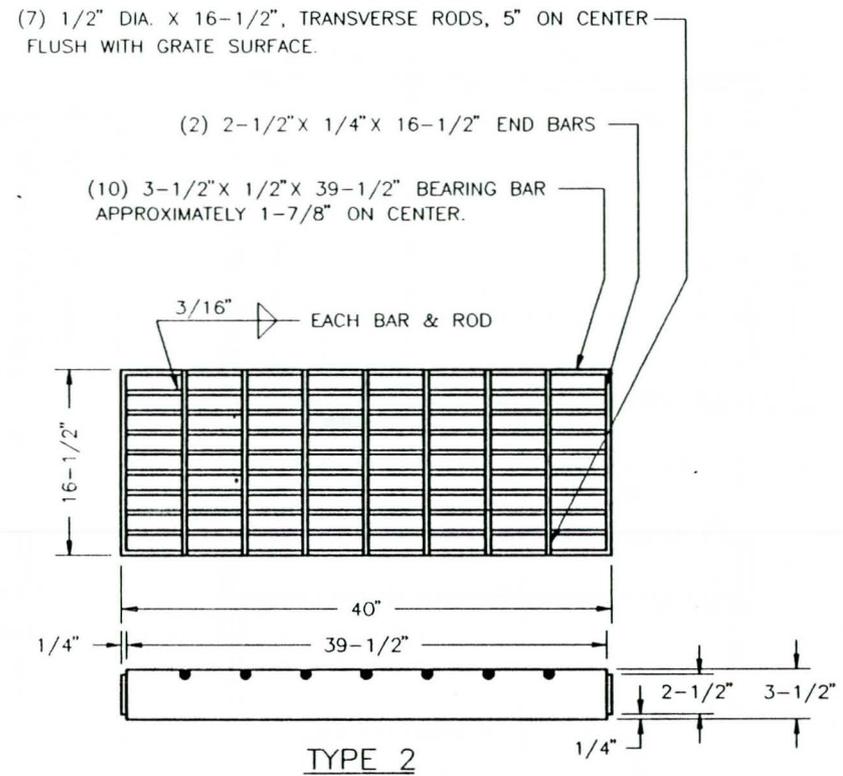
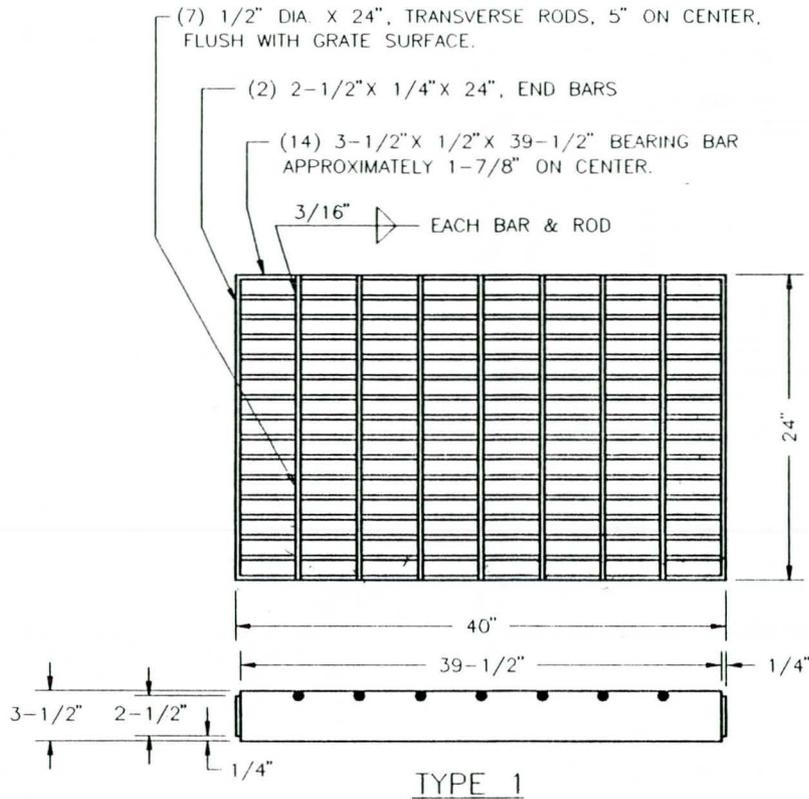
CATCH BASIN GRATE FRAMES

APPROVED

Kenny Whelan
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1564



NOTES:

1. ALL STEEL SHALL BE IN ACCORDANCE WITH A.S.T.M. A-36.
2. WELDING SHALL BE IN ACCORDANCE WITH A.W.S. SPECIFICATIONS.
3. FRAME AND GRATE SHALL BE TESTED FOR ACCURACY OF FIT AND SHALL BE MARKED IN SETS BEFORE DELIVERY.
4. THE COMPLETED ASSEMBLY SHALL BE GIVEN ONE SHOP COAT OF NO. 1 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECTION 790.
5. THE GRATE SHALL BE FABRICATED TO WITHIN 1/8" OF SPECIFIED DIMENSIONS.

DETAIL NO.
P1565



City of Phoenix
STANDARD DETAIL

CATCH BASIN GRATES

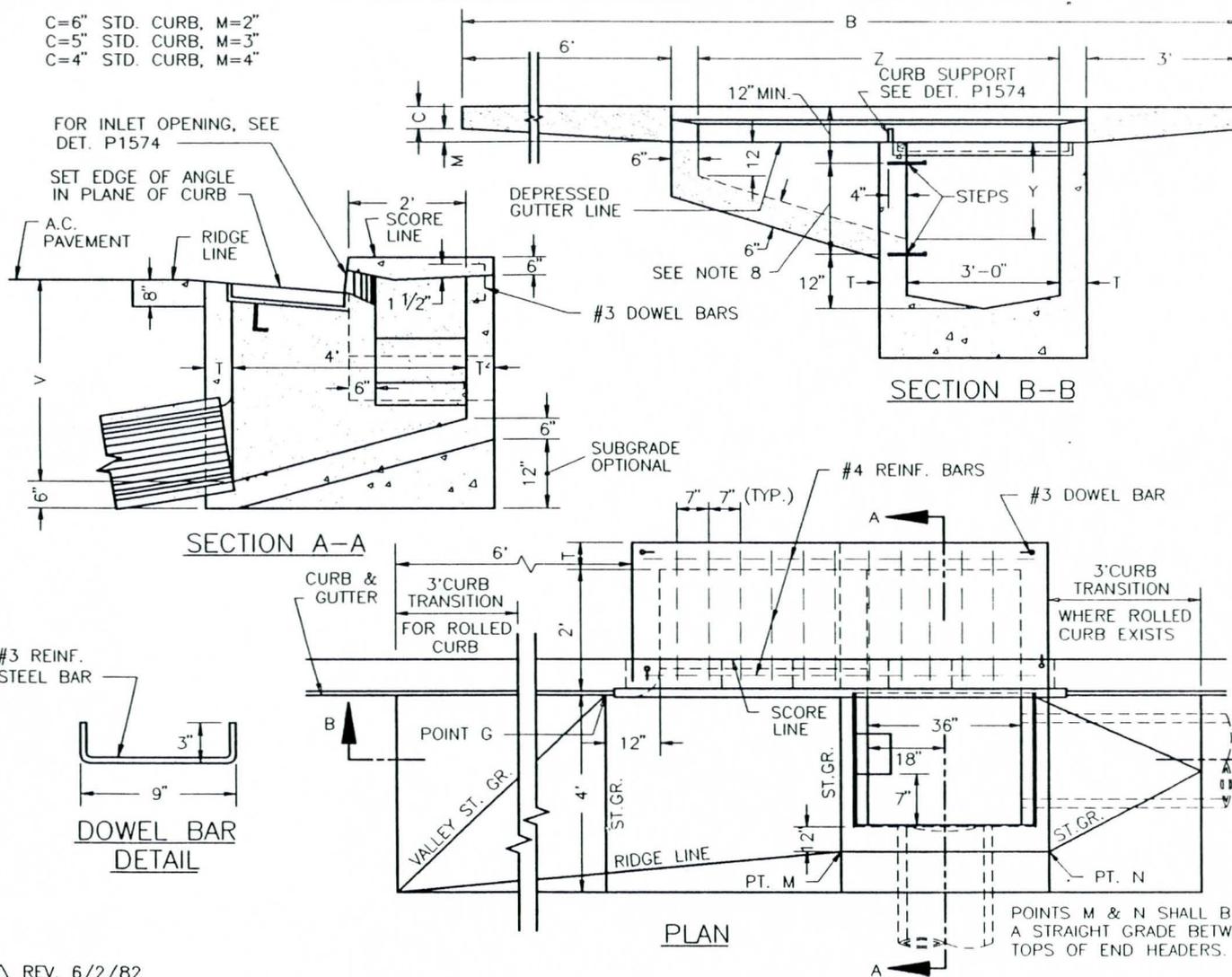
APPROVED

Kenny Whelan
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1565

C=6" STD. CURB, M=2"
 C=5" STD. CURB, M=3"
 C=4" STD. CURB, M=4"



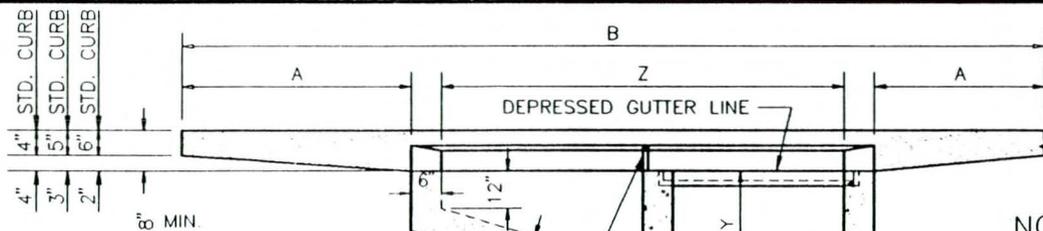
NOTES:

1. DIMENSIONS 'Z' SHALL EQUAL 7' OR 14' TYPES ARE DESIGNATED AS FOLLOWS:
 Δ TYPE J7, (Z=7', Y=24", B=17')
 Δ TYPE J14, (Z=14', Y=30", B=24')
2. ALL CONCRETE SHALL BE CLASS 'A'.
3. ALL REINFORCING STEEL SHALL BE DEFORMED BARS AND SHALL CONFORM TO A.S.T.M. SPEC. 615.
4. CONNECTOR PIPES MAY BE PLACED IN ANY WALL BENEATH THE GRATE AS PER PLANS.
5. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
6. CONSTRUCTION DRAINS SHALL BE INSTALLED IN ALL INLETS BUILT WITH PAVING PROJECTS. (SEE DET. P1575)
7. DO NOT SPECIFY THIS DETAIL FOR USE IN A MAJOR STREET.
8. STEPS (M.A.G. DET. 428 POLYPROPYLENE) -V=3' (INCL.), PLACE ONE STEP 12" ABOVE THE FLOOR OF THE BASIN. V OVER 3', PLACE STEPS AT 12" INTERVALS FROM THE FLOOR OF THE BASIN WITH THE TOP STEP AT 12" (MIN.) BELOW THE TOP OF THE GRATE.
9. THE FRAME SHALL BE DET. P1564, TYPE I AND THE GRATE SHALL BE DET. P1565, TYPE I.

CATCH BASIN WALL THICKNESS
 T=6" IF V IS 4' OR LESS
 T=8" IF V IS 4' TO 8'
 IF V EXCEEDS 8' SPECIAL DESIGN IS REQUIRED
 V=3'-6" UNLESS OTHERWISE NOTED

Δ REV. 6/2/82

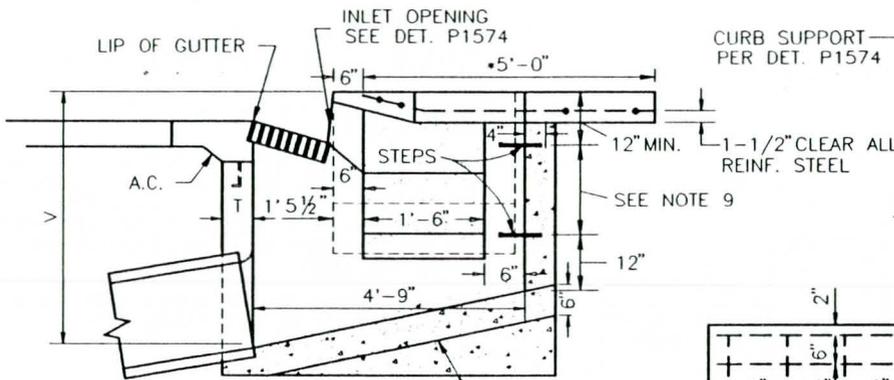
| | | | | | |
|----------------------------|---|---|-------------------------------|----------------|----------------------------|
| DETAIL NO. P1566 | City of Phoenix STANDARD DETAIL | COMBINATION CATCH BASIN TYPE 'J' WITH CONCRETE APRON | APPROVED CITY ENGINEER | 7-9-92 DATE | DETAIL NO. P1566 |
|----------------------------|---|---|-------------------------------|----------------|----------------------------|



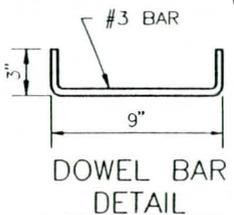
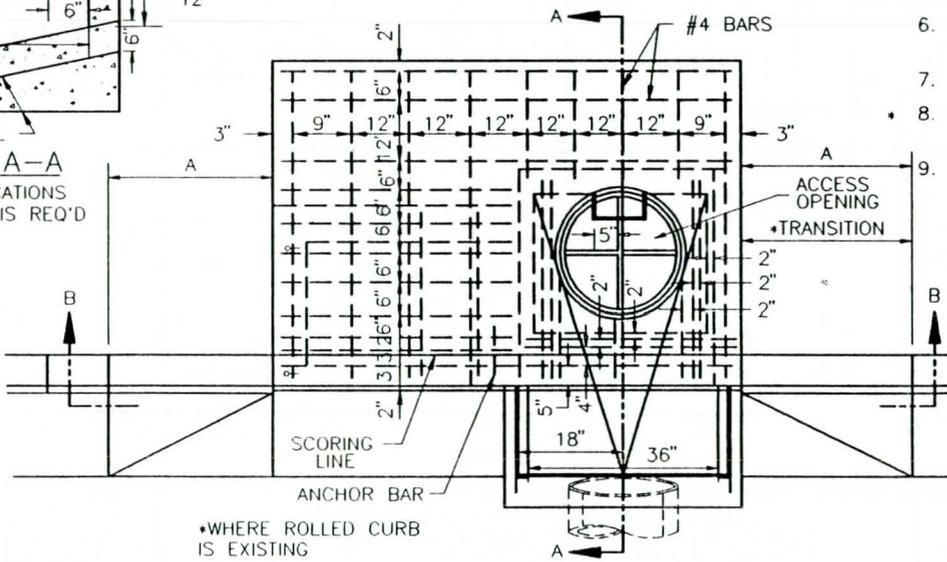
| DEPRESSED GUTTER TRANSITION | | | |
|-----------------------------|-------|--------|--------|
| CURB HEIGHT | A | B | |
| | | K7 | K14 |
| 4" | 3'-3" | 14'-6" | 21'-6" |
| 5" | 2'-6" | 13' | 20' |
| 6" | 1'-9" | 11'-6" | 18'-6" |

NOTES:

1. DIMENSION Z SHALL EQUAL 7' OR 14'. TYPES ARE DESIGNATED AS FOLLOWS:
 Δ TYPE K7 (Z=7', Y=24")
 Δ TYPE K14 (Z=14", Y=30")
2. ALL CONCRETE SHALL BE CLASS 'A'.
3. ALL REINFORCING STEEL SHALL BE DEFORMED BARS AND SHALL CONFORM TO A.S.T.M. SPECIFICATION 615.
4. CONNECTOR PIPES MAY BE PLACED IN ANY WALL BENEATH THE GRATE AS PER PLANS.
5. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
6. CONSTRUCTION DRAINS SHALL BE INSTALLED IN ALL INLETS BUILT WITH PAVING PROJECTS (SEE DET. P1575).
7. ACCESS FRAME AND COVER PER DET. P1561.
8. THE FRAME SHALL BE DET. P1564, TYPE 2 AND THE GRATE SHALL BE DET. P1565, TYPE 2.
9. STEPS (M.A.G. DET. 428 POLYPROPYLENE)-V=3' (INCL.), PLACE ONE STEP 12' ABOVE THE FLOOR OF THE BASIN. V OVER 3', PLACE STEPS AT 12" INTERVALS FROM THE FLOOR OF THE BASIN WITH THE TOP STEP AT 12"(MIN.) BELOW THE TOP OF THE GRATE.

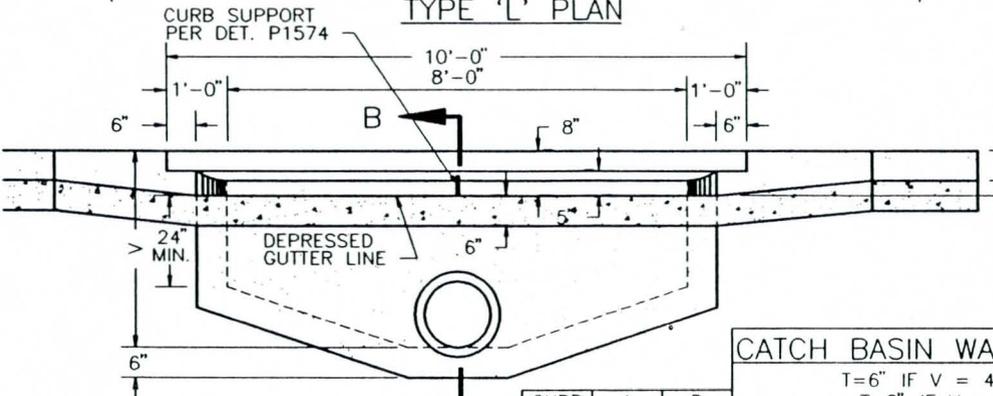
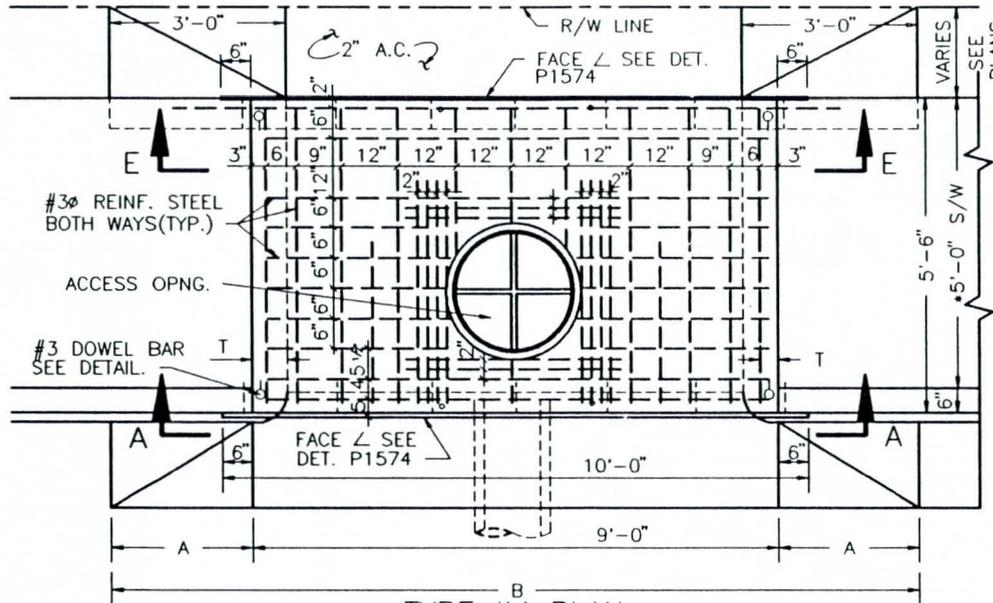


SECTION B-B



| CATCH BASIN WALL THICKNESS | |
|--|--------------------|
| T=6" | IF V IS 4' OR LESS |
| T=8" | IF V IS 4' TO 10' |
| IF V EXCEEDS 8' SPECIAL DESIGN IS REQUIRED | |
| V=4'-0" UNLESS OTHERWISE NOTED. | |

• REV. 11/1/84

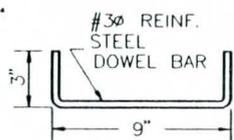
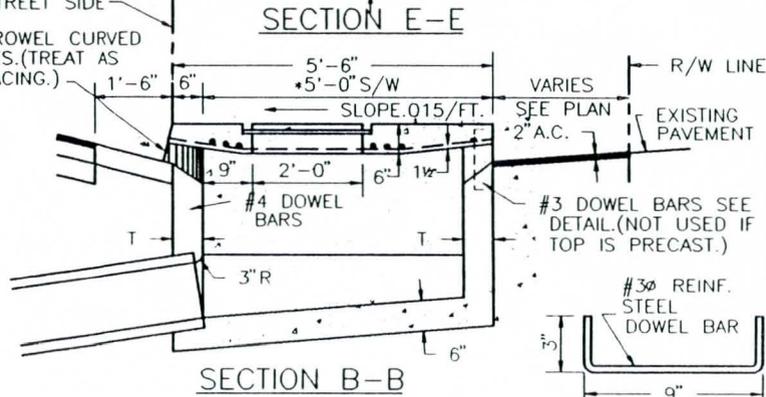
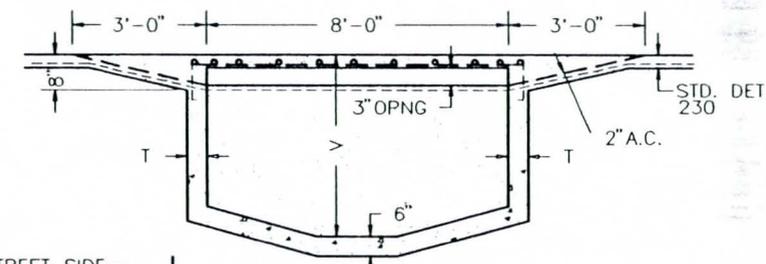


CATCH BASIN WALL THICKNESS

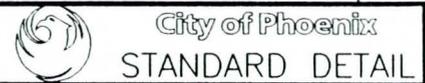
T=6" IF V = 4' OR LESS
 T=8" IF V = 4' TO 8'
 IF V EXCEEDS 8', SPECIAL DESIGN IS REQUIRED.
 V=4'-0" UNLESS OTHERWISE NOTED.

| CURB | A | B |
|------|-------|--------|
| 4" | 3'-3" | 15'-6" |
| 5" | 2'-6" | 14'-0" |
| 6" | 1'-9" | 12'-6" |

- NOTES:**
1. ALL CONCRETE SHALL BE CLASS 'A'.
 2. ALL REINFORCING STEEL SHALL BE DEFORMED BARS AND SHALL CONFORM TO A.S.T.M. SPECIFICATION 615.
 3. CONNECTOR PIPES MAY BE PLACED IN ANY WALL AS PER PLANS.
 4. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD, SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
 5. CONSTRUCTION DRAINS SHALL BE INSTALLED IN ALL INLETS BUILT WITH PAVING PROJECTS. (SEE DET. P1575.)
 6. ACCESS FRAME AND COVER PER DET. P1561.
- * TO BE 4'-0" IN LOCATIONS WHERE 4' S/W IS REQUIRED.



DETAIL NO.
P1568



CATCH BASIN-TYPE 'L'
CURB & PARKWAY OPENING INLET DETAILS

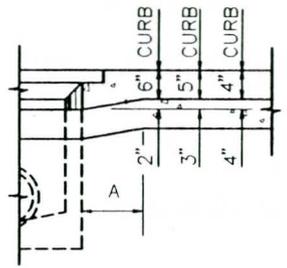
APPROVED
Kenny Whitman
CITY ENGINEER

7-9-92
DATE

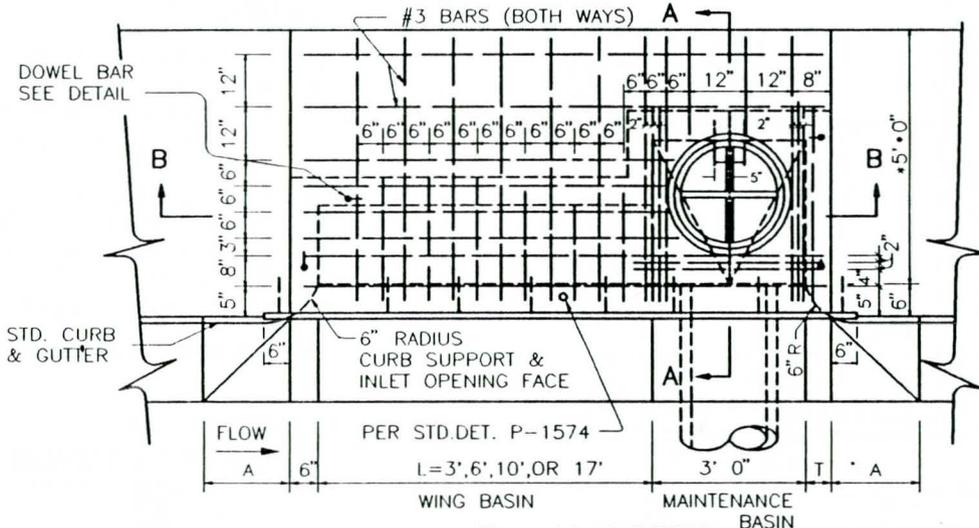
DETAIL NO.
P1568

940-0952
WESLEY

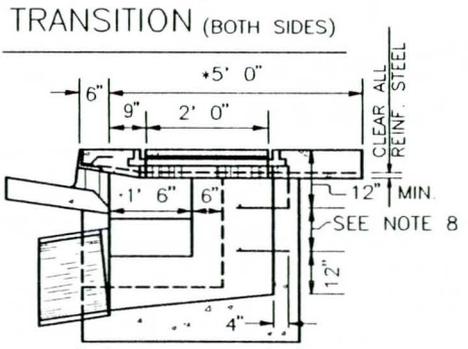
| GUTTER TRANSITION | |
|-------------------|---------|
| CURB HEIGHT | DIM 'A' |
| 4" | 3'-3" |
| 5" | 2'-6" |
| 6" | 1'-9" |



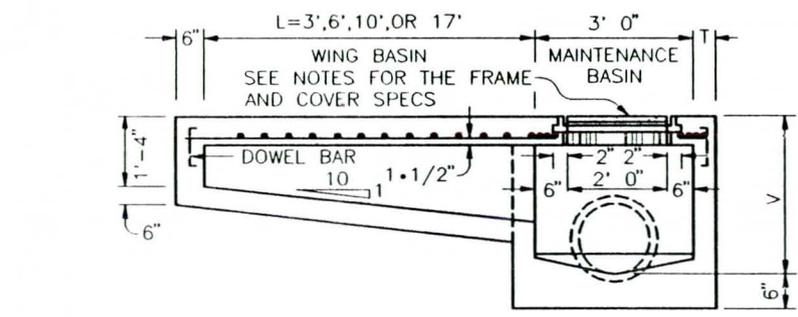
DEPRESSED GUTTER



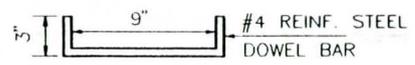
PLAN VIEW



SECTION A - A



SECTION B - B



DOWEL BAR
DETAIL

NOTES

1. TYPES ARE DESIGNATED AS FOLLOWS:
'M'.. NO WING, 'M-1'.. ONE WING,
'M-2'.. TWO WINGS.
2. ALL CONCRETE SHALL BE CLASS 'A'.
3. ALL REINFORCING STEEL SHALL BE DEFORMED BARS AND SHALL CONFORM TO A.S.T.M. SPECIFICATION 615.
4. CONNECTOR PIPES SHALL BE PLACED IN THE APPROPRIATE WALL OF THE MAINTENANCE BASIN.
5. FLOOR OF BASIN SHALL BE TROWLED TO A HARD, SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
6. CONSTRUCTION DRAINS SHALL BE INSTALLED IN ALL INLETS BUILT WITH PAVING PROJECTS. (SEE DET. P-1575.)
7. LOCATE WING BASIN ON UPSTREAM SIDE OF MAINTENANCE BASIN FOR TYPE M-1. WING BASINS FOR TYPE M-2 SHALL BE BOTH SIDES OF MAINTENANCE BASIN.
8. STEPS (M.A.G. DET. 428 POLYPROPYLENE)-V=3' (INCL.), PLACE ONE STEP 12" ABOVE THE FLOOR OF THE BASIN. V OVER 3', PLACE STEPS AT 12" INTERVALS FROM THE FLOOR OF THE BASIN WITH THE TOP STEP AT 12" (MIN.) BELOW THE TOP OF THE GRATE.
9. ACCESS FRAME AND COVER PER DET. P-1561

| CATCH BASIN WALL THICKNESS | |
|---|---------------------|
| T = 6" | IF V = 4' OR LESS |
| T = 8" | IF V = 4' TO 8' |
| (IF V EXCEEDS 8', SPECIAL DESIGN IS REQUIRED.) | |
| L = 0' UNLESS SPECIFIED ON THE PLANS | |
| V = 3'-6" MIN. | WHEN L = 0:3' OR 6' |
| V = 4'-0" MIN | WHEN L = 10' OR 17' |
| *4'-0" IN LOCATIONS WHERE 4' SIDEWALK IS REQ'D. | |

REVISED 03-01-92

DETAIL NO. P1569-1

City of Phoenix
STANDARD DETAIL

CATCH BASIN TYPE 'M'

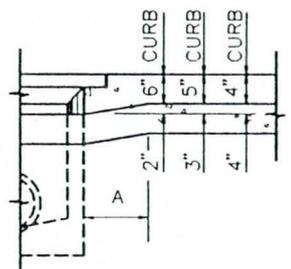
APPROVED
Kenny W. Hain
CITY ENGINEER

7-9-92
DATE

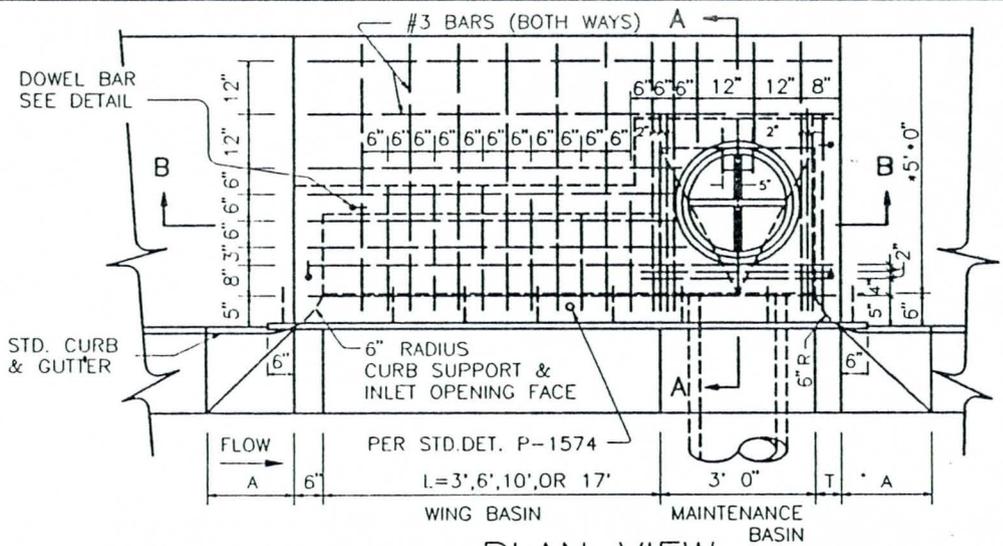
DETAIL NO. P1569-1

0140-0952
WEELEY

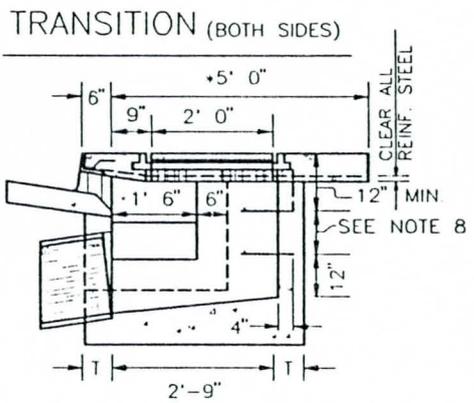
| GUTTER TRANSITION | |
|-------------------|---------|
| CURB HEIGHT | DIM 'A' |
| 4" | 3'-3" |
| 5" | 2'-6" |
| 6" | 1'-9" |



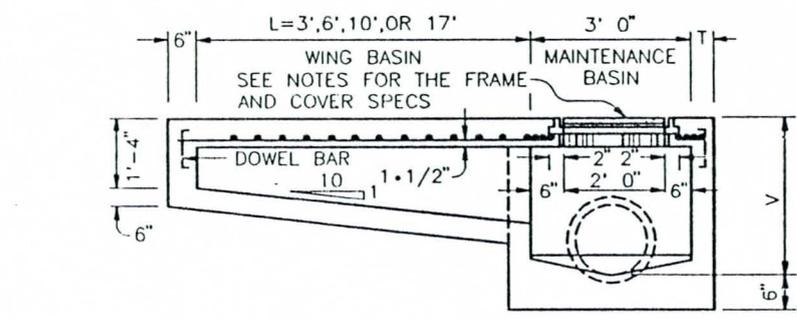
DEPRESSED GUTTER



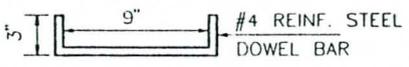
PLAN VIEW



SECTION A - A



SECTION B - B



DOWEL BAR
DETAIL

NOTES

1. TYPES ARE DESIGNATED AS FOLLOWS:
'M'.. NO WING, 'M-1'.. ONE WING,
'M-2'.. TWO WINGS.
2. ALL CONCRETE SHALL BE CLASS 'A'.
3. ALL REINFORCING STEEL SHALL BE DEFORMED BARS AND SHALL CONFORM TO A.S.T.M. SPECIFICATION 615.
4. CONNECTOR PIPES SHALL BE PLACED IN THE APPROPRIATE WALL OF THE MAINTENANCE BASIN.
5. FLOOR OF BASIN SHALL BE TROWLED TO A HARD, SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
6. CONSTRUCTION DRAINS SHALL BE INSTALLED IN ALL INLETS BUILT WITH PAVING PROJECTS. (SEE DET. P-1575.)
7. LOCATE WING BASIN ON UPSTREAM SIDE OF MAINTENANCE BASIN FOR TYPE M-1. WING BASINS FOR TYPE M-2 SHALL BE BOTH SIDES OF MAINTENANCE BASIN.
8. STEPS (M.A.G. DET. 428 POLYPROPYLENE)-
V=3' (INCL.), PLACE ONE STEP 12" ABOVE THE FLOOR OF THE BASIN. V OVER 3', PLACE STEPS AT 12" INTERVALS FROM THE FLOOR OF THE BASIN WITH THE TOP STEP AT 12" (MIN.) BELOW THE TOP OF THE GRATE.
9. ACCESS FRAME AND COVER PER DET. P-1561

| CATCH BASIN WALL THICKNESS | |
|--|-------------------------------|
| T = 6" | IF V = 4' OR LESS |
| T = 8" | IF V = 4' TO 8' |
| (IF V EXCEEDS 8', SPECIAL DESIGN IS REQUIRED.) | |
| L = 0' | UNLESS SPECIFIED ON THE PLANS |
| V = 3'-6" | MIN. WHEN L = 0:3' OR 6' |
| V = 4'-0" | MIN WHEN L = 10' OR 17' |

*4'-0" IN LOCATIONS WHERE 4' SIDEWALK IS REQ'D.

REVISED 03-01-92

DETAIL NO.
P1569-1



City of Phoenix
STANDARD DETAIL

CATCH BASIN TYPE 'M'

APPROVED
Kenny W. Hain
CITY ENGINEER

7-9-92
DATE

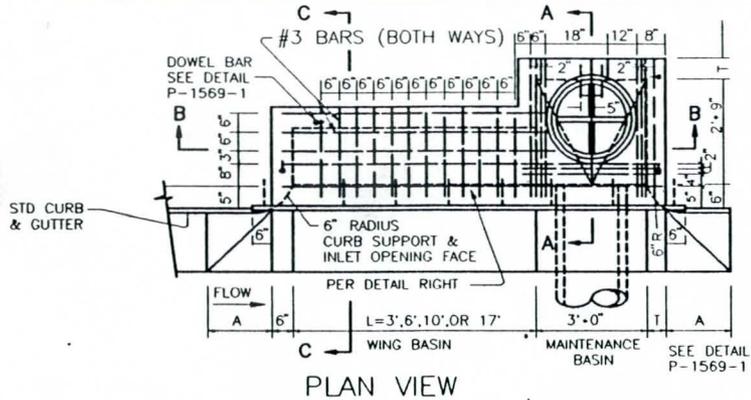
DETAIL NO.
P1569-1

MESSAGE CONFIRMATION

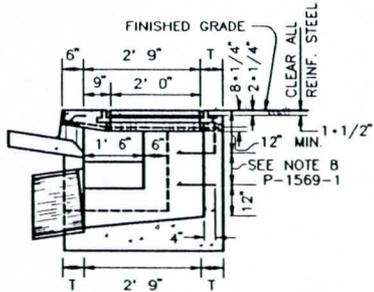
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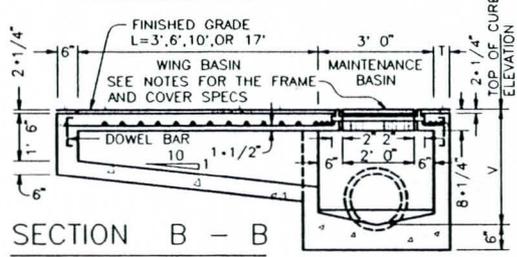
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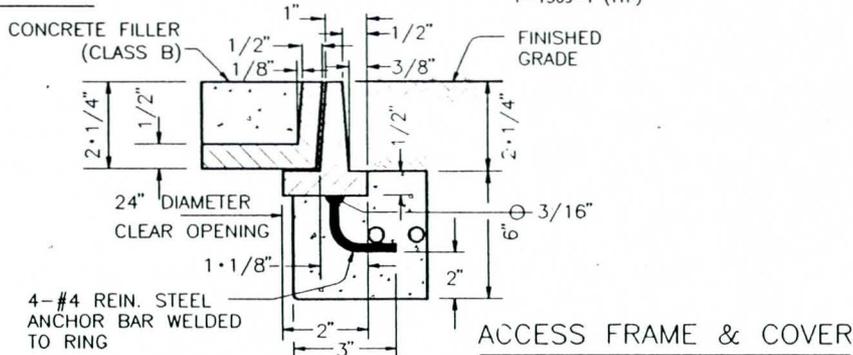
PLAN VIEW



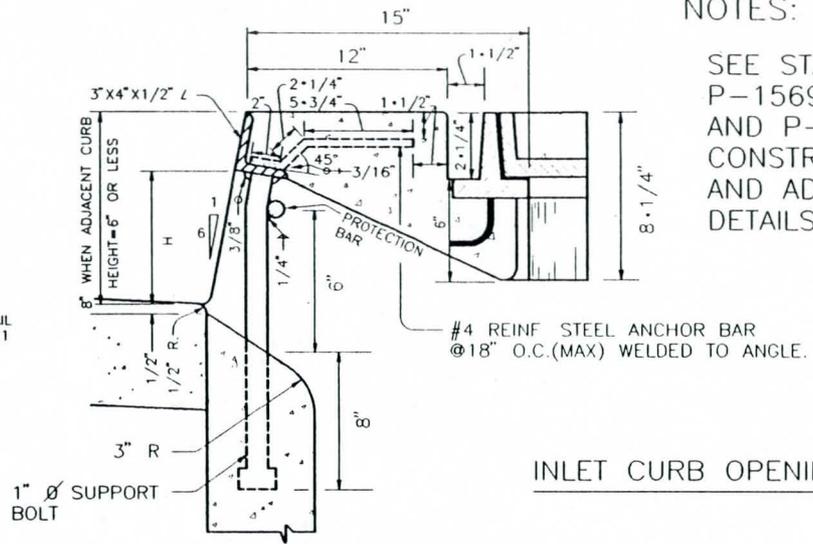
SECTION A - A



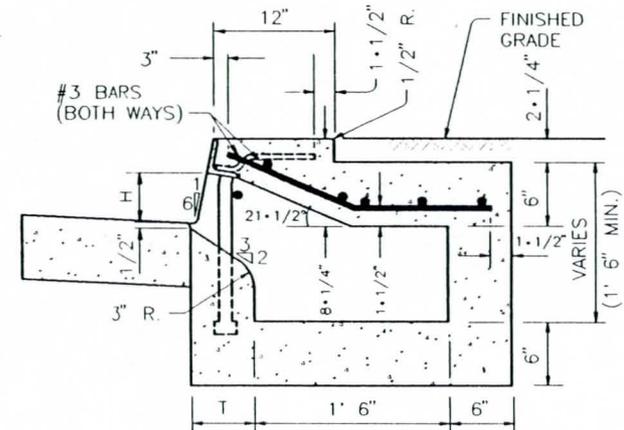
SECTION B - B



ACCESS FRAME & COVER



INLET CURB OPENING



SECTION C - C

NOTES:

SEE STANDARD DETAILS P-1569-1, P-1561, AND P-1574 FOR CONSTRUCTION NOTES AND ADDITIONAL DETAILS.

#4 REIN. STEEL ANCHOR BAR @18" O.C.(MAX) WELDED TO ANGLE.

DETAIL NO.
P1569-2



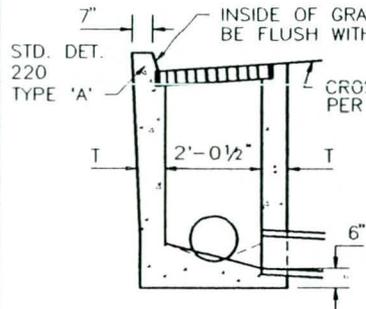
City of Phoenix
STANDARD DETAIL

"M" BASIN TOP MODIFICATION IN
LANDSCAPE PARKWAY

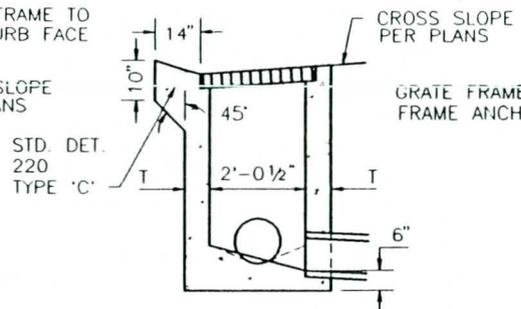
APPROVED
Kenny Whitman
CITY ENGINEER

7-9-92
DATE

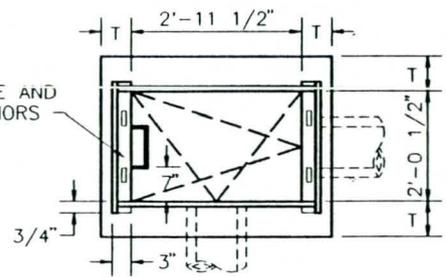
DETAIL NO.
P1569-2



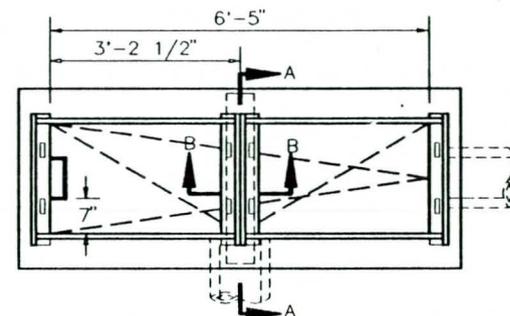
'N' CATCH BASIN IN VERTICAL CURB & GUTTER



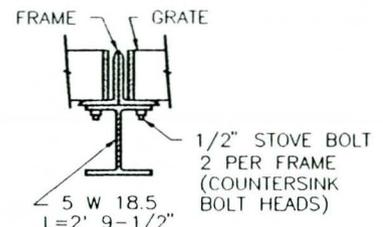
'N' CATCH BASIN IN ROLL CURB & GUTTER



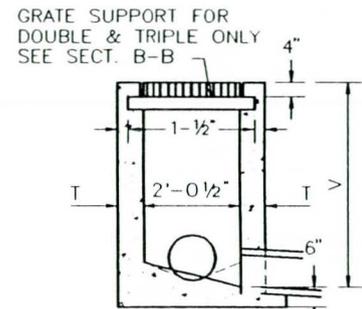
SINGLE CATCH BASIN PLAN



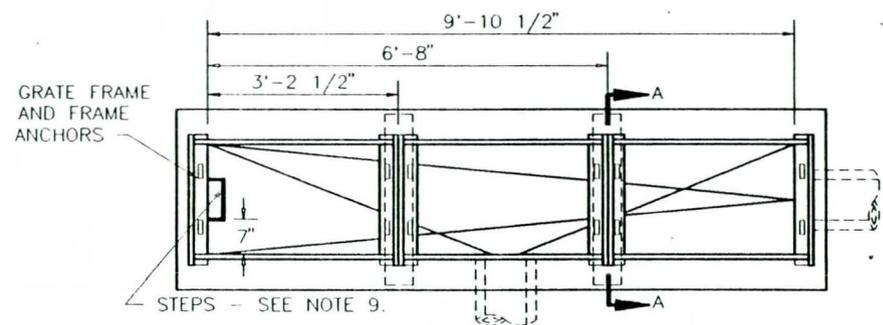
DOUBLE CATCH BASIN PLAN



SECTION B-B



SECTION A-A



TRIPLE CATCH BASIN PLAN

NOTES:

1. ALL CONCRETE SHALL BE CLASS 'A'.
2. CONNECTOR PIPES MAY BE PLACED IN ANY WALL AS PER PLAN.
3. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD, SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
4. THE CONSTRUCTION DRAINS SHALL BE INSTALLED IN ALL INLETS BUILT WITH PAVING PROJECTS. (SEE DET. P1575).
5. CONNECTOR PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
6. PLANS SHOULD SPECIFY ELEVATION AND INVERT ELEVATION.
7. THE TYPE 'N' CATCH BASIN MAY BE PREFABRICATED PROVIDING A SHOP DRAWING IS APPROVED BY THE ENGINEER PRIOR TO FABRICATION.
8. THE FRAME SHALL BE DET. P1564, TYPE 1 AND THE GRATE SHALL BE DET. P1565, TYPE 1.
9. STEPS (M.A.G. DET. 428 POLYPROPYLENE)-V=3' (INCL), PLACE ONE STEP 12" ABOVE THE FLOOR OF THE BASIN. V OVER 3', PLACE STEPS AT 12" INTERVALS FROM THE FLOOR OF THE BASIN WITH THE TOP STEP AT 12" (MIN) BELOW THE TOP OF THE GRATE.

CATCH BASIN WALL THICKNESS

T=6" IF V = 4' OR LESS
 T=8" IF V = 4' TO 8'
 (IF V EXCEEDS 8' SPECIAL DESIGN IS REQUIRED)
 V=3'-0" UNLESS OTHERWISE NOTED.

DETAIL NO.
P1570

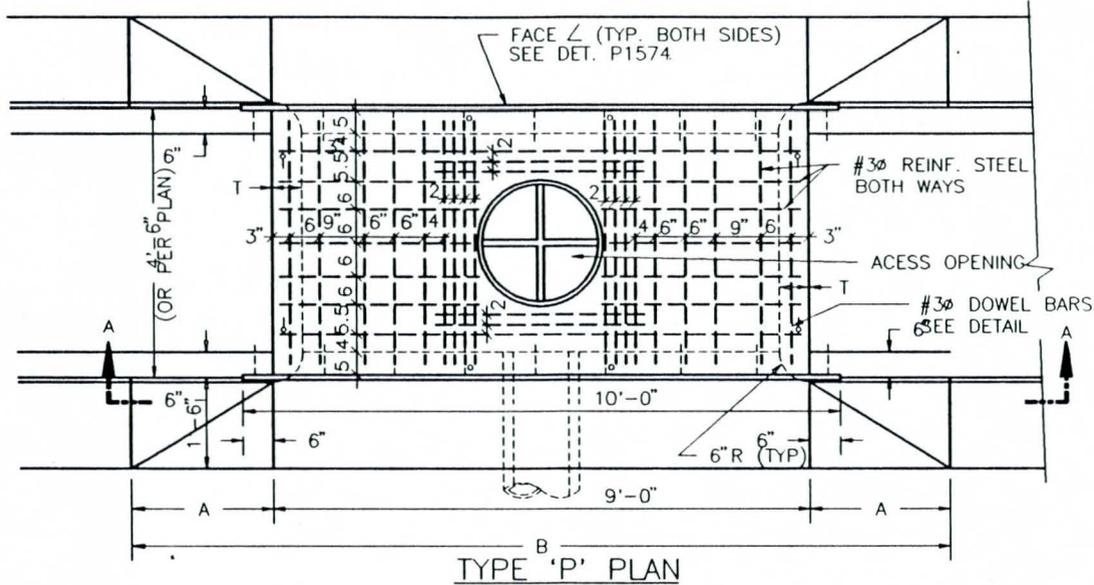
City of Phoenix
STANDARD DETAIL

CATCH BASIN-TYPE 'N'

APPROVED
Kenny Whitman
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1570

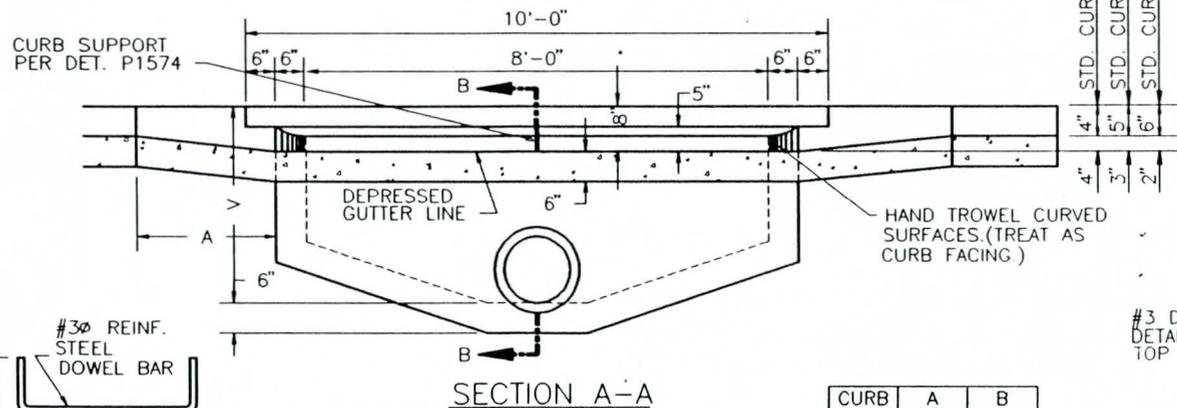


TYPE 'P' PLAN

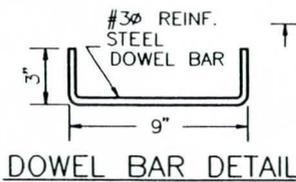
NOTES:

1. ALL CONCRETE SHALL BE CLASS 'A'.
2. ALL REINFORCING STEEL SHALL BE DEFORMED BARS AND SHALL CONFORM TO A.S.T.M. SPECIFICATION 615.
3. CONNECTOR PIPES MAY BE PLACED IN ANY WALL AS PER PLANS.
4. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD, SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
5. CONSTRUCTION DRAINS SHALL BE INSTALLED IN ALL INLETS BUILT WITH PAVING PROJECTS. (SEE DET. P1575.)
6. ACCESS FRAME AND COVER PER DET. P1561.

CATCH BASIN WALL THICKNESS
 T=6" IF V = 4' OR LESS
 T=8" IF V = 4' TO 8'
 IF V EXCEEDS 8', SPECIAL DESIGN IS REQUIRED.
 V=4'-0" UNLESS UNLESS OTHERWISE SPECIFIED.

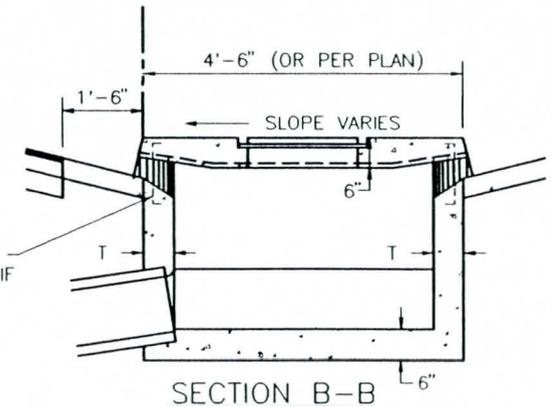
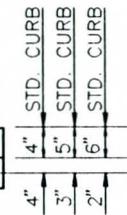


SECTION A-A



DOWEL BAR DETAIL

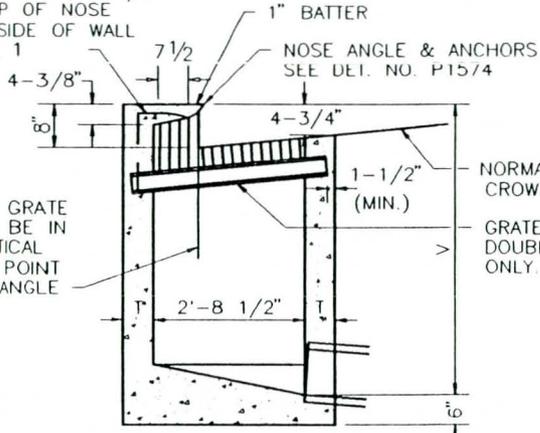
| CURB | A | B |
|------|-------|--------|
| 4" | 3'-3" | 15'-6" |
| 5" | 2'-6" | 14'-0" |
| 6" | 1'-9" | 12'-6" |



SECTION B-B

| | | | | | |
|----------------------------|---|--|-------------------------------|----------------|----------------------------|
| DETAIL NO. P1571 | City of Phoenix STANDARD DETAIL | CATCH BASIN-TYPE 'P' DOUBLE CURB OPENING FOR FRONTAGE ROAD ISLANDS | APPROVED CITY ENGINEER | 7-9-92 DATE | DETAIL NO. P1571 |
|----------------------------|---|--|-------------------------------|----------------|----------------------------|

#3 BARS @ 6" O.C. 1-1/2"
CLEAR TO TOP OF NOSE
SECTION & INSIDE OF WALL
SEE DET. NO. 1



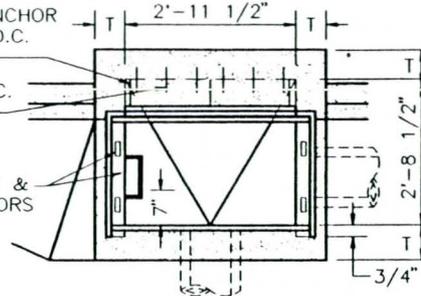
SECTION A-A

#4 REINF. STEEL ANCHOR
BARS @ 18" (MAX) O.C.
WELDED TO ANGLE

#3 BARS @ 6" O.C.
SEE DET. NO. 1

GRATE FRAME &
FRAME ANCHORS

GRATE SUPPORT FOR
DOUBLE & TRIPLE
ONLY. SEE SECT. B-B

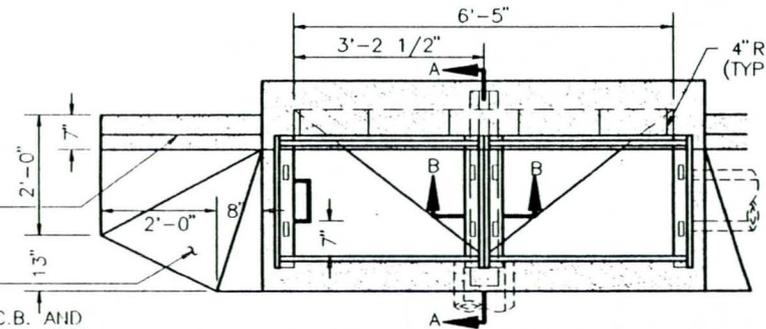


SINGLE CATCH BASIN PLAN

CURB OR
COMB. CURB
& GUTTER

CONC. GUTTER
TRANSITION
BOTH ENDS (TYP.)

SEE SINGLE C.B. AND
SECT. A-A FOR STEEL
REINFORCING DETAILS



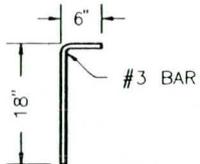
DOUBLE CATCH BASIN PLAN

FRAME GRATE

1/2" STOVE BOLT
2 PER FRAME
(COUNTERSINK
BOLT HEADS)

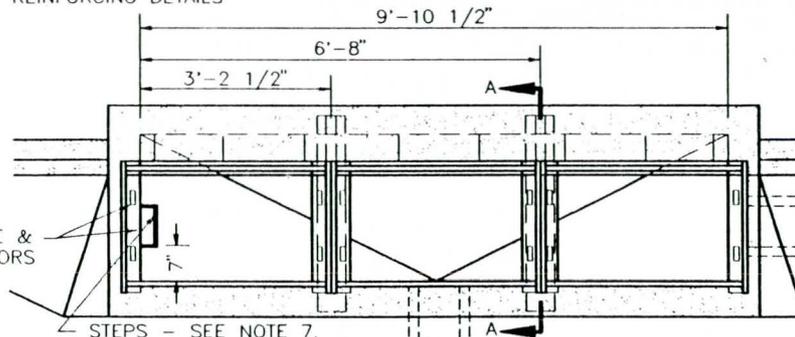
5 W 18.5
3'-5 1/2"

SECTION B-B



DETAIL 1

GRATE FRAME &
FRAME ANCHORS



TRIPLE CATCH BASIN PLAN

NOTES:

1. ALL CONCRETE SHALL BE CLASS 'A'.
2. CONNECTOR PIPES MAY BE PLACED IN ANY WALL AS PER PLAN.
3. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD, SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
4. THE CONSTRUCTION DRAINS SHALL BE INSTALLED IN ALL INLETS BUILT WITH PAVING PROJECTS. (SEE DET. P1575).
5. CONNECTOR PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
6. THE FRAME SHALL BE DET. P1564, TYPE 1 AND THE GRATE SHALL BE DET. P1565, TYPE 1.
7. STEPS (M.A.G. DET. 428 POLYPROPYLENE) - V=3' (INCL). PLACE ONE STEP 12" ABOVE THE FLOOR OF THE BASIN. V OVER 3', PLACE STEPS AT 12" INTERVALS FROM THE FLOOR OF THE BASIN WITH THE TOP STEP AT 12" (MIN) BELOW THE TOP OF THE GRATE.

CATCH BASIN WALL THICKNESS

T=6" IF V = 4' OR LESS
T=8" IF V = 4' TO 8'
IF V EXCEEDS 8' SPECIAL DESIGN IS REQUIRED
V=3'-6' UNLESS OTHERWISE NOTED.

DETAIL NO.
P1572



City of Phoenix
STANDARD DETAIL

CATCH BASIN-TYPE 'Q'

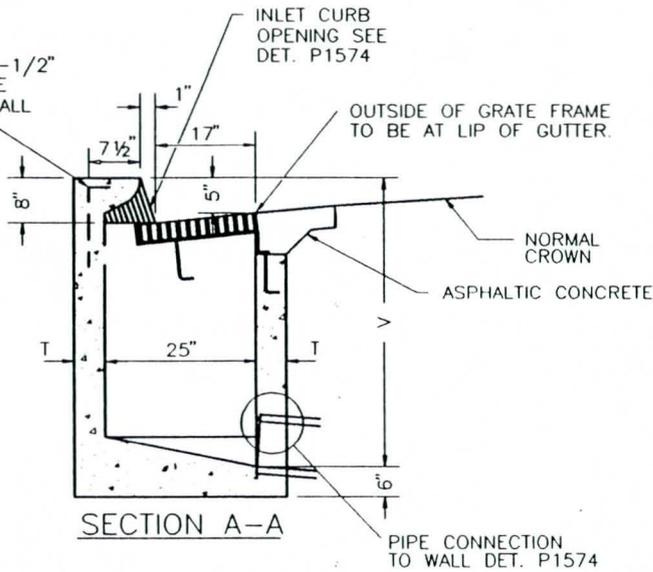
APPROVED

Kenny W. Hain
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1572

#3 BARS @ 6" O.C., 1-1/2"
CLEAR TO TOP OF NOSE
SECTION & INSIDE OF WALL
SEE DET. NO. 1



SECTION A-A

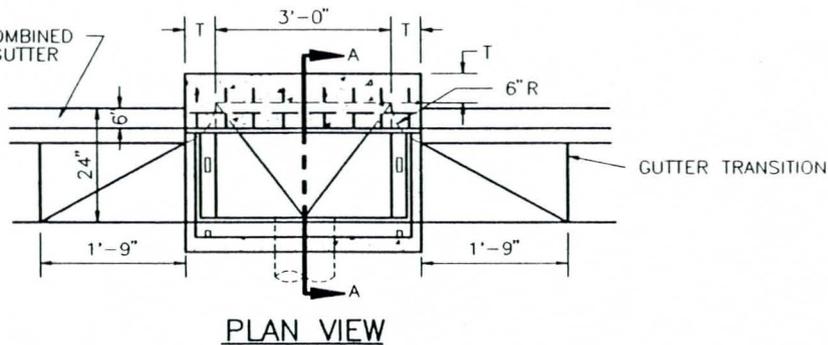
NOTES:

1. ALL CONCRETE SHALL BE CLASS 'A'.
2. CONNECTOR PIPES MAY BE PLACED IN ANY WALL AS PER PLAN.
3. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD, SMOOTH SURFACE AND SHALL SLOP FROM ALL DIRECTIONS TO OUTLET.
4. THE CONSTRUCTION DRAINS SHALL BE INSTALLED IN ALL INLETS BUILT WITH PAVING PROJECTS (SEE DET. P1575).
5. CONNECTOR PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
6. LOCATION OF THE TYPE 'R' CATCH BASIN SHALL BE RESTRICTED TO AREAS WHERE 6" VERTICAL CURB & GUTTER IS EXISTING.
7. ALL REINFORCING STEEL SHALL BE DEFORMED BARS AND SHALL CONFORM TO A.S.T.M. SPECIFICATION 615.
8. THE FRAME SHALL BE DET. P1564, TYPE 2 AND THE GRATE SHALL BE DET. P1565, TYPE 2.

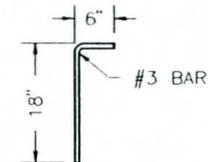
CATCH BASIN WALL THICKNESS

T=6" IF V = 4' OR LESS
T=8" IF V = 4' TO 8'
IF V EXCEEDS 8' SPECIAL DESIGN IS REQUIRED
V=3'-6' UNLESS OTHERWISE NOTED.

CURB OR COMBINED
CURB AND GUTTER



PLAN VIEW



DETAIL 1

DETAIL NO.
P1573



City of Phoenix
STANDARD DETAIL

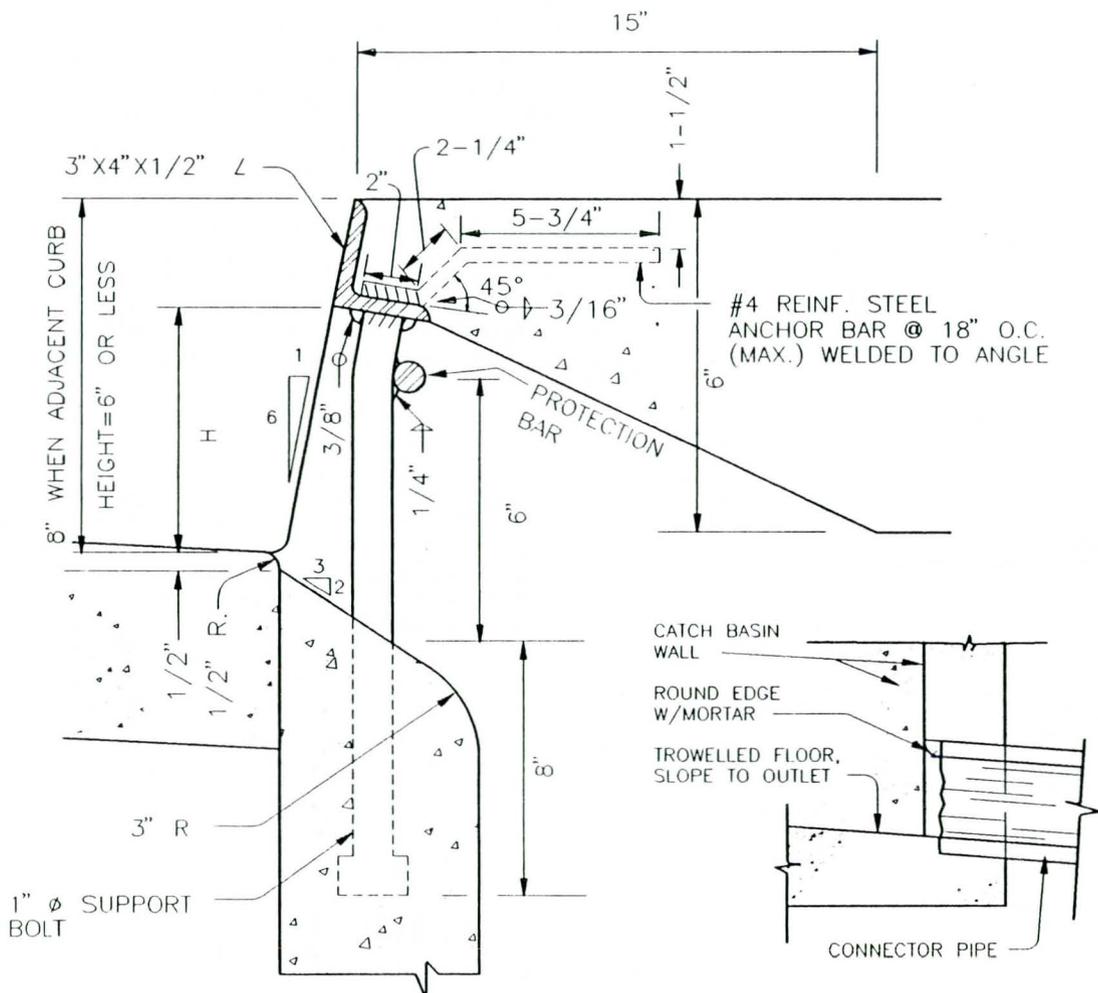
CATCH BASIN - TYPE 'R'

APPROVED

Kenny W. Han
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1573



INLET CURB OPENING

PIPE ENTRY DETAIL

NOTES

1. CURB OPENING HEIGHT 'H' SHALL BE 5" (MINIMUM) UNLESS OTHERWISE SPECIFIED.
2. WHEN CURB OPENING HEIGHT 'H' EXCEEDS 6", INSTALL 1" Ø STEEL PROTECTION BARS. THE PROTECTION BARS SHALL EXTEND THE FULL LENGTH OF THE CURB OPENINGS AND SHALL BE EMBEDDED 3" (MIN.) AT EACH END.
3. INSTALL ADDITIONAL BARS AT 3 1/2" CLEAR SPACING ABOVE FIRST BAR WHEN OPENING EXCEEDS 13".
4. WHEN CURB OPENING LENGTH EXCEEDS 6', INSTALL 1" Ø STEEL SUPPORT BOLTS, SPACED AT NO MORE THAN 5' O.C.
5. ALL EXPOSED METAL HARDWARE SHALL BE GIVEN ONE SHOP COAT OF NO.1 PAINT AND 2 FIELD COATS OF NO.10 PAINT AS PER SECTION 790.
6. ALL METAL UNITS SHALL BE FABRICATED FROM STRUCTURAL STEEL EXCEPT AS NOTED. STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH A.S.T.M. A-36.
7. WELDING SHALL BE IN ACCORDANCE WITH M.A.G. WELDING SPECIFICATIONS.
8. CONNECTOR PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
9. WHEN CATCH BASIN IS LOCATED WITHIN A LANDSCAPE PARKWAY SECTION, SEE DETAIL P1569-2 FOR INLET MODIFICATIONS.

REVISED: 3-1-92

DETAIL NO.
P1574



City of Phoenix
STANDARD DETAIL

INLET CURB OPENING & PIPE ENTRY DETAIL

APPROVED

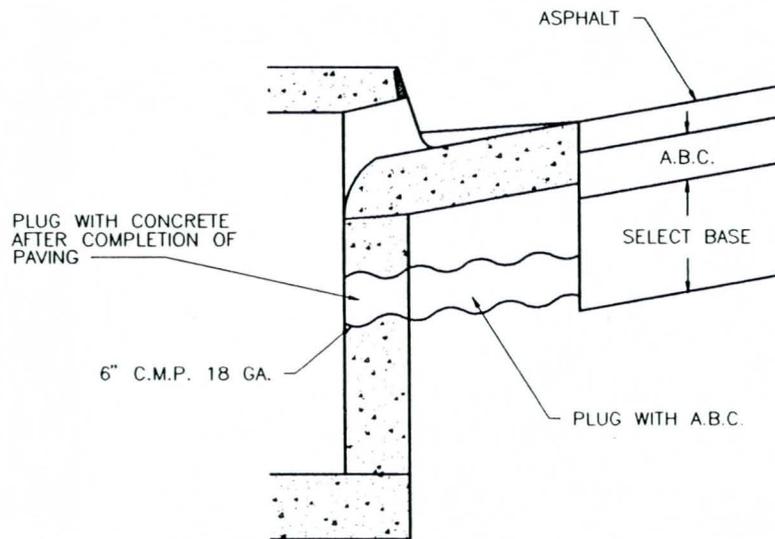
Kenny Whelan
CITY ENGINEER

7-9-92
DATE

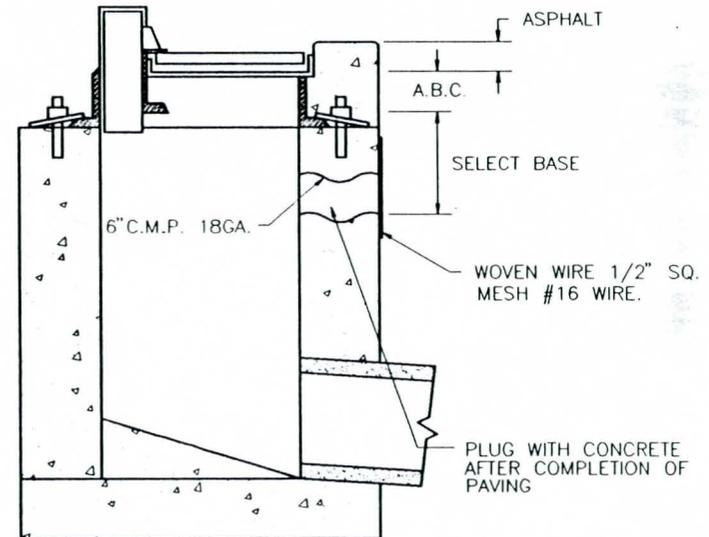
DETAIL NO.
P1574

NOTES:

1. CONSTRUCTION DRAINS TO BE INSTALLED IN ALL INLETS BUILT WITH PAVING PROJECTS.
2. SEE PROJECT PLANS FOR INLET DETAILS AND DEPTH OF PAVING.



CURB OPENING INLET



GRATE OPENING INLET

DETAIL NO.
P1575



City of Phoenix
STANDARD DETAIL

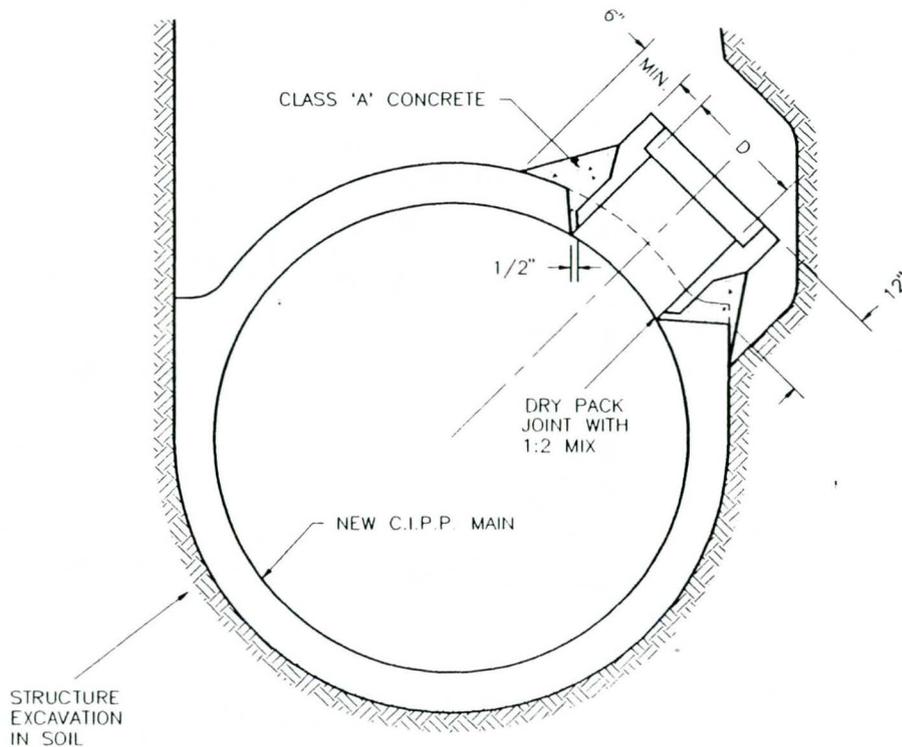
CONSTRUCTION SUB-GRADE DRAIN

APPROVED

Kenny W. Han
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1575



NOTES:

1. "D" SHALL BE 24" OR LESS.
2. PRECAST TEE SHALL BE INSTALLED WHERE THE MAINLINE PIPE IS SMALLER THAN THE MINIMUM OR THE CONNECTING PIPE IS LARGER THAN 24".
3. THE BELL END OF THE PRECAST CONCRETE PIPE SHALL BE INSTALLED AS SHOWN WHILE CONCRETE OF MAINLINE PIPE IS WET.
4. TRENCH WALL TO BE EXCAVATED AS NECESSARY PRIOR TO POURING MAINLINE PIPE TO ACCOMMODATE LATERAL STUB.
5. AXIS OF LATERAL STUB SHALL BE AS PER PLAN AND CROSS-SECTION.
6. THE LATERAL STUB SHALL SATISFY STRENGTH REQUIREMENTS AS SPECIFIED FOR THE LATERAL PIPE.

| CONNECTING PIPE SIZE | MINIMUM SIZE MAIN |
|----------------------|-------------------|
| 15" | 24" |
| 18" | 36" |
| 21" | 42" |
| 24" | 48" |

DETAIL NO.
P1576



City of Phoenix
STANDARD DETAIL

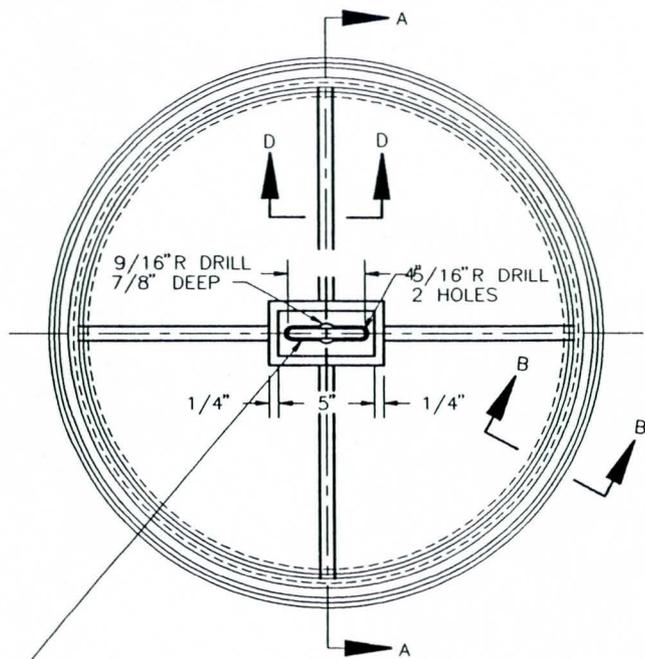
CAST-IN-PLACE PIPE LATERAL PIPE CONNECTION

APPROVED

Kenny W. Hain
CITY ENGINEER

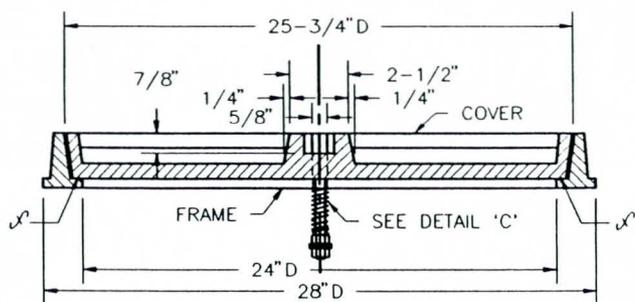
7-9-92
DATE

DETAIL NO.
P1576

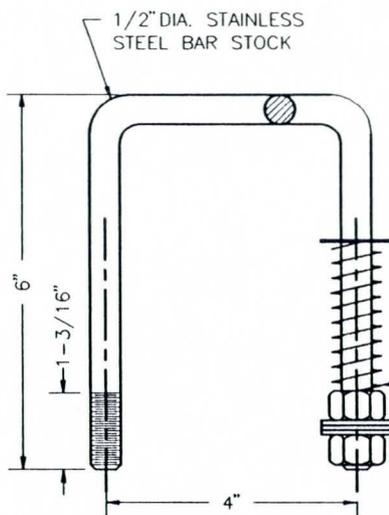


DROP HANDLE, SEE DETAIL 'C'

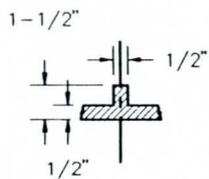
PLAN VIEW



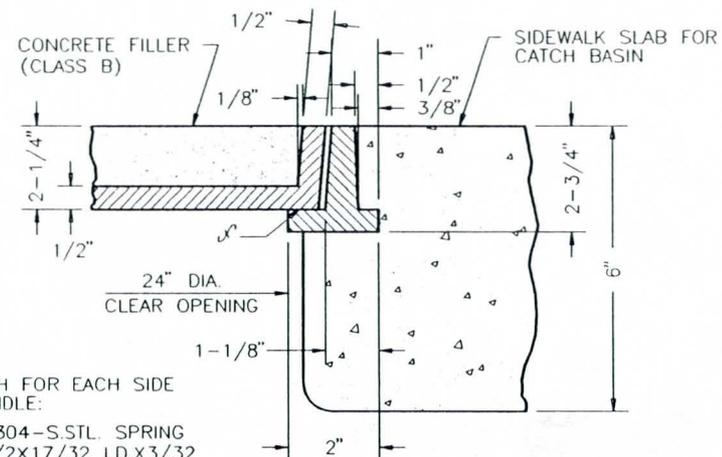
SECTION A-A



DETAIL 'C'
DROP HANDLE



SECTION D-D



SECTION B-B

- FURNISH FOR EACH SIDE OF HANDLE:
- 1 EA. 304-S-STL. SPRING
 - 2 1/2X17/32 I.D.X3/32
 - 2 EA. 1/2" HEX NUT
 - 3 EA. 1/2" FLAT WASHER
 - 1 EA. 1/2" LOCK WASHER

NOTES:

1. COVER SHALL BE NON-LOCKING.
2. FRAME AND COVER SHALL BE CAST IRON OR A.S.T.M. A-36 STRUCTURAL STEEL. HORIZONTAL SURFACE OF COVER IN CONTACT WITH FRAME SHALL BE MACHINED A.S.A. G-46 ROUGHNESS SHALL NOT EXCEED 1/32".
3. CATCH BASIN ACCESS FRAME AND COVER IS FOR USE IN SIDEWALK AREA ONLY.
4. COVER SHALL BE FILLED WITH CONCRETE AND BROOM FINISHED.
5. SMALL VARIATIONS IN DIMENSIONS OR FEATURES OF A MINOR NATURE THAT ARE PART OF THE FOUNDRY'S STANDARD CASTING ARE PERMISSIBLE.

DETAIL NO.
P1577



City of Phoenix
STANDARD DETAIL

CATCH BASIN ACCESS
FRAME AND COVER

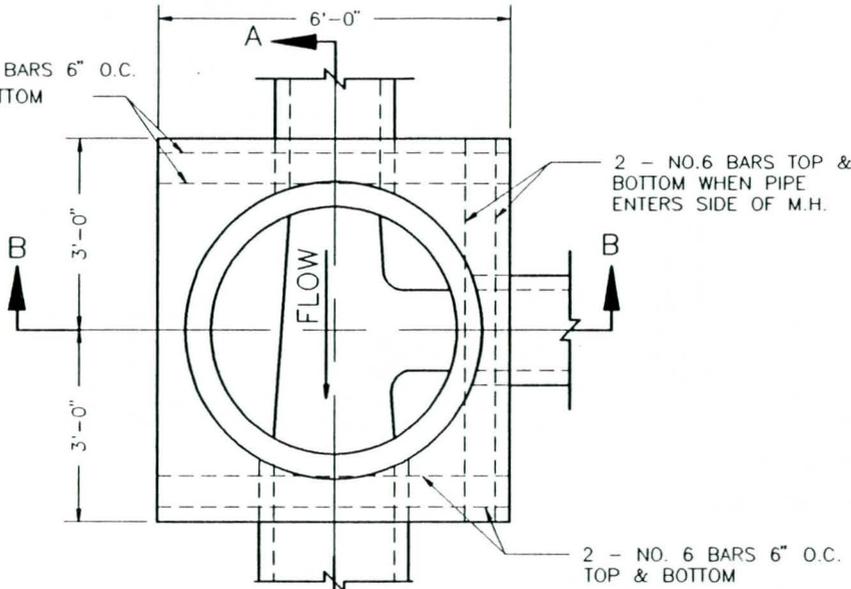
APPROVED

Kenny W. Han
CITY ENGINEER

7-9-92
DATE

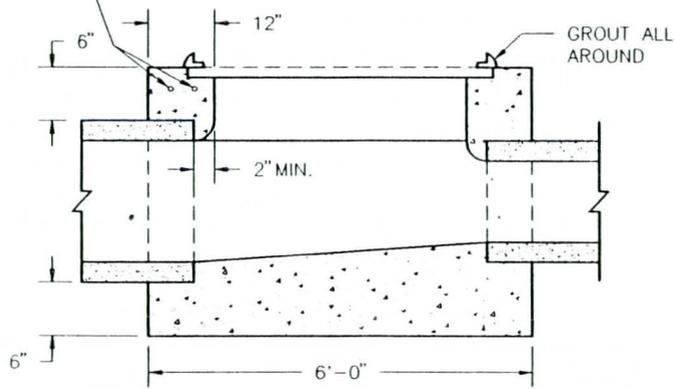
DETAIL NO.
P1577

2 - NO.6 BARS 6" O.C.
TOP & BOTTOM



PLAN

2 - NO.6 BARS 6" O.C.

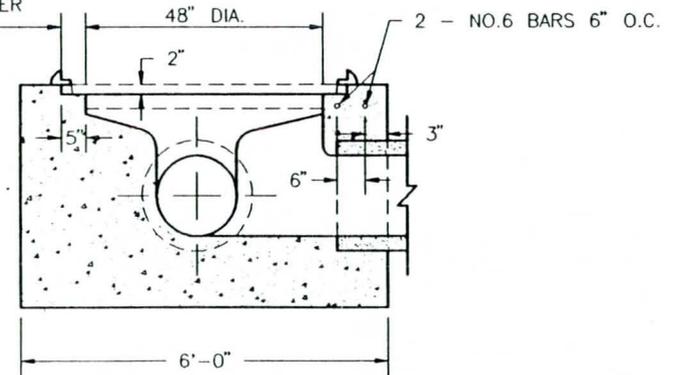


SECTION A-A

NOTES

1. ALL CONCRETE TO BE CLASS "A" PER SECTION 725.
2. MATCH SPRING LINES OF PIPES ENTERING M.H. UNLESS OTHERWISE NOTED.
3. CUT PIPED TO ALLOW SETTING OF 4' DIA. CYLINDRICAL FORM FROM 6" ABOVE MAIN LINE PIPE TO SPRING LINE. CUT PIPE 2" LARGER THAN FORM TO ALLOW 2" CONC. OVER ENDS OF ALL CUT PIPE.
4. INVERT AND BASE OF M.H. TO BE POURED AND INVERT TO BE SHAPED BY HAND TO MAKE SMOOTH TRANSITION FINISH WITH RUBBER FLOAT.
5. CENTER M.H. ON PIPE JOINT WHERE PIPE CHANGES SIZES.
6. BENCH M.H. BASE TO TOP OF LARGEST PIPE.

MANHOLE SHAFT PER
STD. DETAIL 522



SECTION B-B

DETAIL NO.
P1520



City of Phoenix
STANDARD DETAIL

STORM DRAIN MANHOLE BASE
48" & SMALLER

APPROVED

Kenny W. Hain
CITY ENGINEER

7-9-92
DATE

DETAIL NO.
P1520