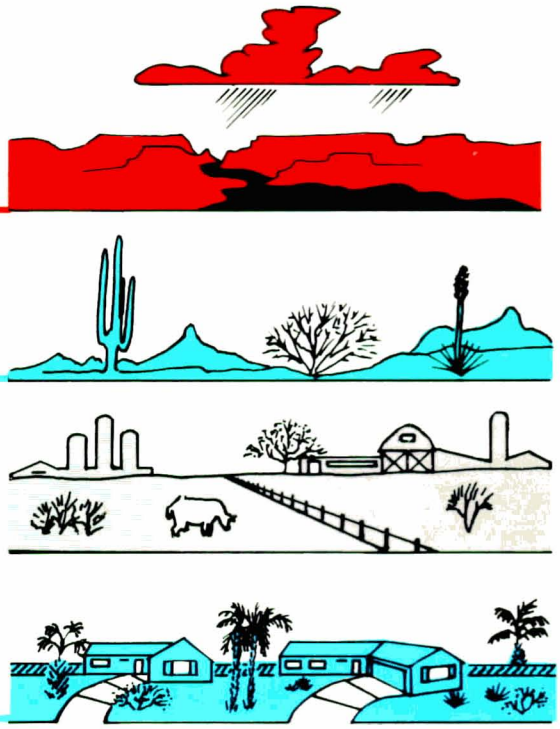


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

43rd Avenue Detention Basin

Design Report

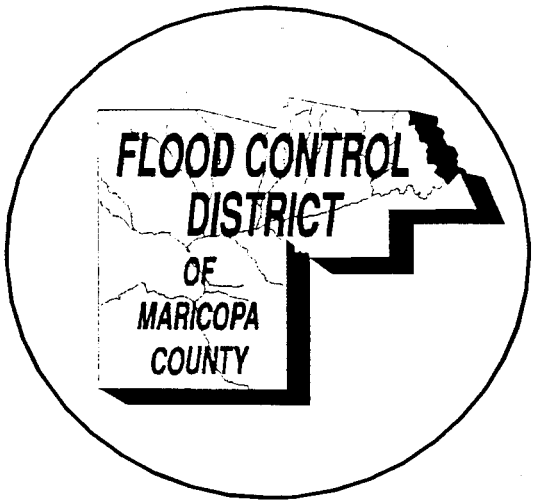
100% Submittal

March, 1999

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

43rd AVENUE DETENTION BASIN

DESIGN REPORT



March, 1999

Prepared For:
Flood Control District of Maricopa County
Chief Engineer & General Manager

Prepared by:
Engineering Division
Flood Control District of Maricopa County

FCD Project No. 117023

43rd AVENUE DETENTION BASIN
FCD PROJECT NO. 1170203
DESIGN REPORT

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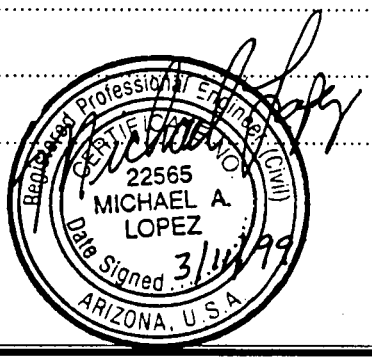


43rd AVENUE DETENTION BASIN
FCD PROJECT NO. 117013
DRAFT DESIGN REPORT

LIST OF FIGURES

LIST OF TABLES

APPENDIX

1.0 PROJECT DESCRIPTION

1.1 Purpose

The purpose of this project is to develop final construction drawings, construction special provisions, and an engineer's estimate for the construction of the 43rd Avenue Detention Basin. The 43rd Avenue Detention Basin will eliminate and/or significantly reduce the damage from flooding caused by events less than or equal to the future 100-year event. The South Phoenix/Laveen Drainage Improvement Project (Project), dated July 1997 and developed by HDR Engineering, Inc. proposed a drainage solution for the area which consisted of a number of detention basins and storm drains to capture, collect, attenuate, and convey storm water runoff to the Salt River (Fig 1.). 43rd Avenue Detention Basin is one component of the system and is one of the basins of the Project.

The District entered into an Intergovernmental Agreement (IGA FCD – 97012) with the City of Phoenix, and agreed to fund the design of this basin while the City will assume the operation and maintenance responsibilities of this facility once it is constructed. The 43rd Avenue Basin is being designed in-house to help expedite the construction of the Project's outfall. This phase of the Project consists of providing construction drawings for the most downstream detention basin located on 43rd Avenue. The District is also preparing a design in-house for the storm drain from Baseline Road to the Salt River that this basin will utilize as an outfall.

1.2 Location

The project is located in an area known as Laveen. The area has been incorporated into the limits of the City of Phoenix since the South Phoenix/Laveen Drainage Improvement Project began. The drainage area is bounded on the south by the South Mountains, on the east by the 7th Avenue, on the north by the Salt River, and on the west by 43rd Avenue (Fig 2.). The drainage area encompasses 26 square miles of the southwest portion of the City of Phoenix.

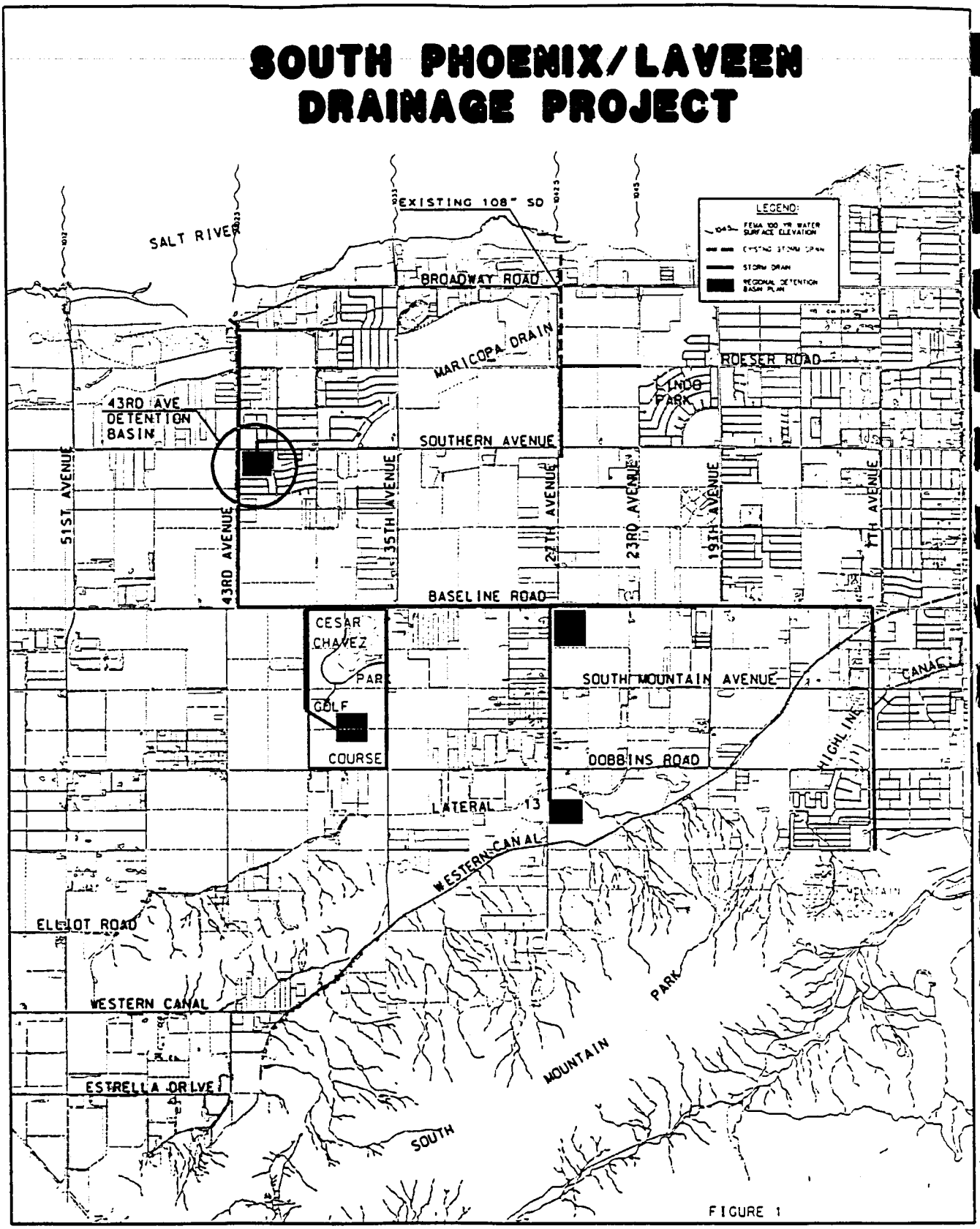

SOUTH PHOENIX/LAVEEN
DRAINAGE PROJECT
EXISTING 108" SD
SALT RIVER
BROADWAY ROAD
MARICOPA DRAIN
ROESER ROAD
LINDO PARK
43RD AVE DETENTION BASIN
SOUTHERN AVENUE
51ST AVENUE
43RD AVENUE
35TH AVENUE
27TH AVENUE
23RD AVENUE
19TH AVENUE
7TH AVENUE
BASELINE ROAD
CESAR CHAVEZ PARK
GOLF COURSE
SOUTH MOUNTAIN AVENUE
CANAL
HIGHLINE
DOBBINS ROAD
LATERAL 13
WESTERN CANAL
ELLIOT ROAD
WESTERN CANAL
PARK
MOUNTAIN
ESTRELLA DRIVE
SOUTH
LEGEND:
FEMA 100 YR WATER SURFACE ELEVATION
EXISTING STORM DRAIN
STORM DRAIN
REGIONAL DETENTION BASIN PLAN
FIGURE 1

Figure 1

SOUTH PHOENIX-LAVEEN DRAINAGE IMPROVEMENT PROJECT DRAINAGE AREAS

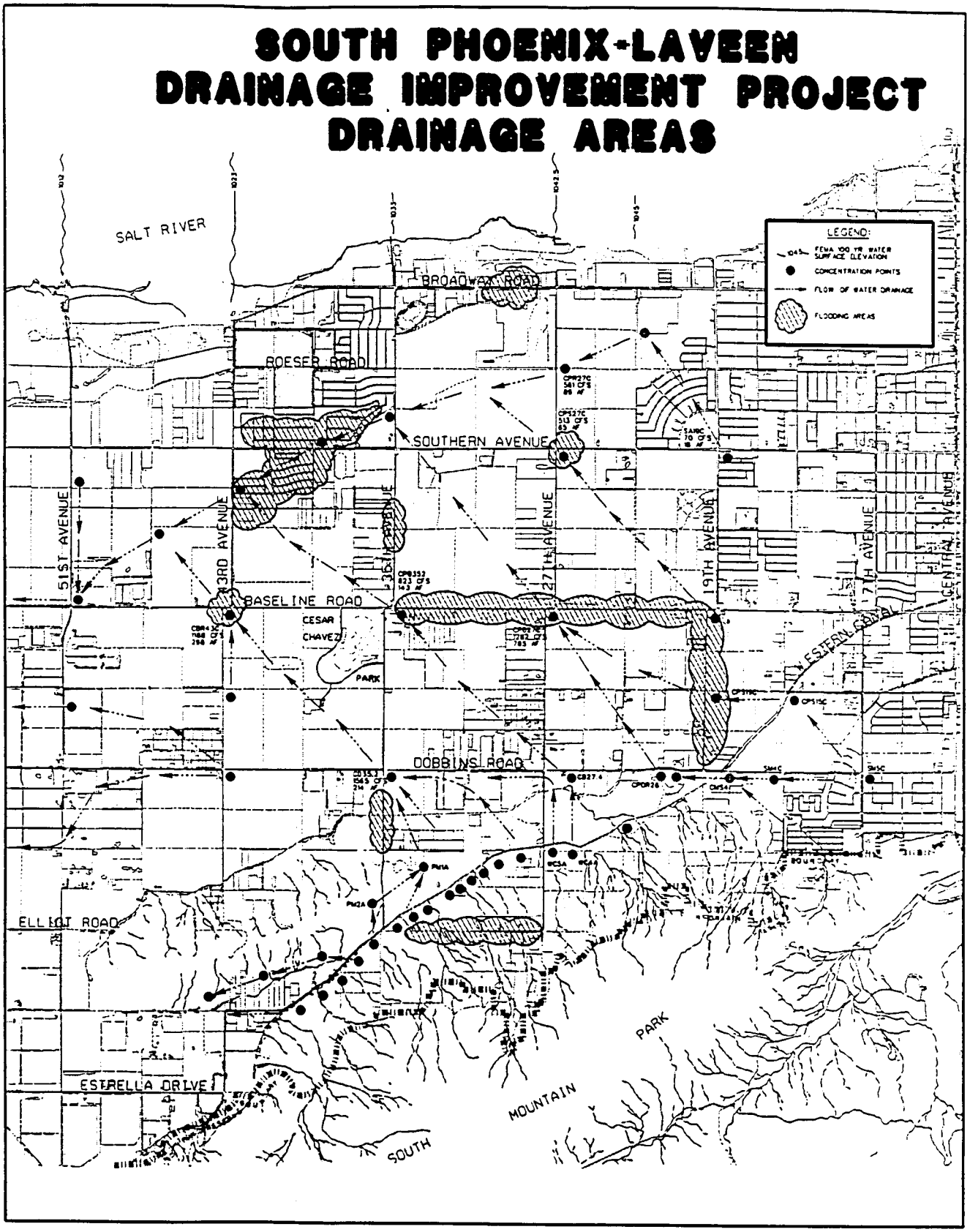


Figure 2

The 43rd Avenue Detention Basin will be located on the southeast corner of the intersection of 43rd and Southern Avenues (Fig 3.). This site was selected partly because it was undeveloped and mainly because it was in the flow path of the storm runoff to the area; the site is also near the end of the Maricopa Drain. There is a drainage easement that begins at 39th Avenue and heads west to the basin site. The drainage easement contains a swale that directs runoff to the basin site.

The area immediately south and east of the basin site is residential property. The area north of Southern Avenue is partially undeveloped and partially residential property, and the area east of 43rd Avenue is agricultural land. The site is bounded on the north and west by the rights-of-way of Southern Avenue and 43rd Avenue respectively.

1.3 Rights-of-Way

No additional rights-of-way are necessary for the construction of the basin. The District acquired this 20+ acre site previously which included the rights-of-way of 41st Drive from Lynn Lane to Southern Avenue and the rights-of-way of Lynn Lane from 43rd Avenue to 41st Drive, and 68 undeveloped residential lots (Fig 4). Two of the requirements that were imposed upon the District as part of the abandonment of the rights-of-ways, Hearing V95033A FN44582 dated July 25, 1995, are as follows: 1) relocate all affected sewer utilities in an alternate easement, and 2) close off 41st Drive with a radius with curb and gutter.

Item No. 1 is discussed in Section 1.5 Utilities. Item No. 2, closing off 41st Drive with a radius with curb and gutter requires that part of the abandonment be relinquished in order to provide rights-of-way for the radius. Because there is a lot north of Nancy Lane at the new terminus of 41st Drive that requires trash pickup a cul-de-sac is required. The cul-de-sac will allow trash trucks to service this residence without having to back up. The cul-de-sac also provides ancillary benefits such as providing a place that law enforcement vehicles will have access to view park activities from the park's southern boundaries and provide neighborhood pedestrian access into the park.

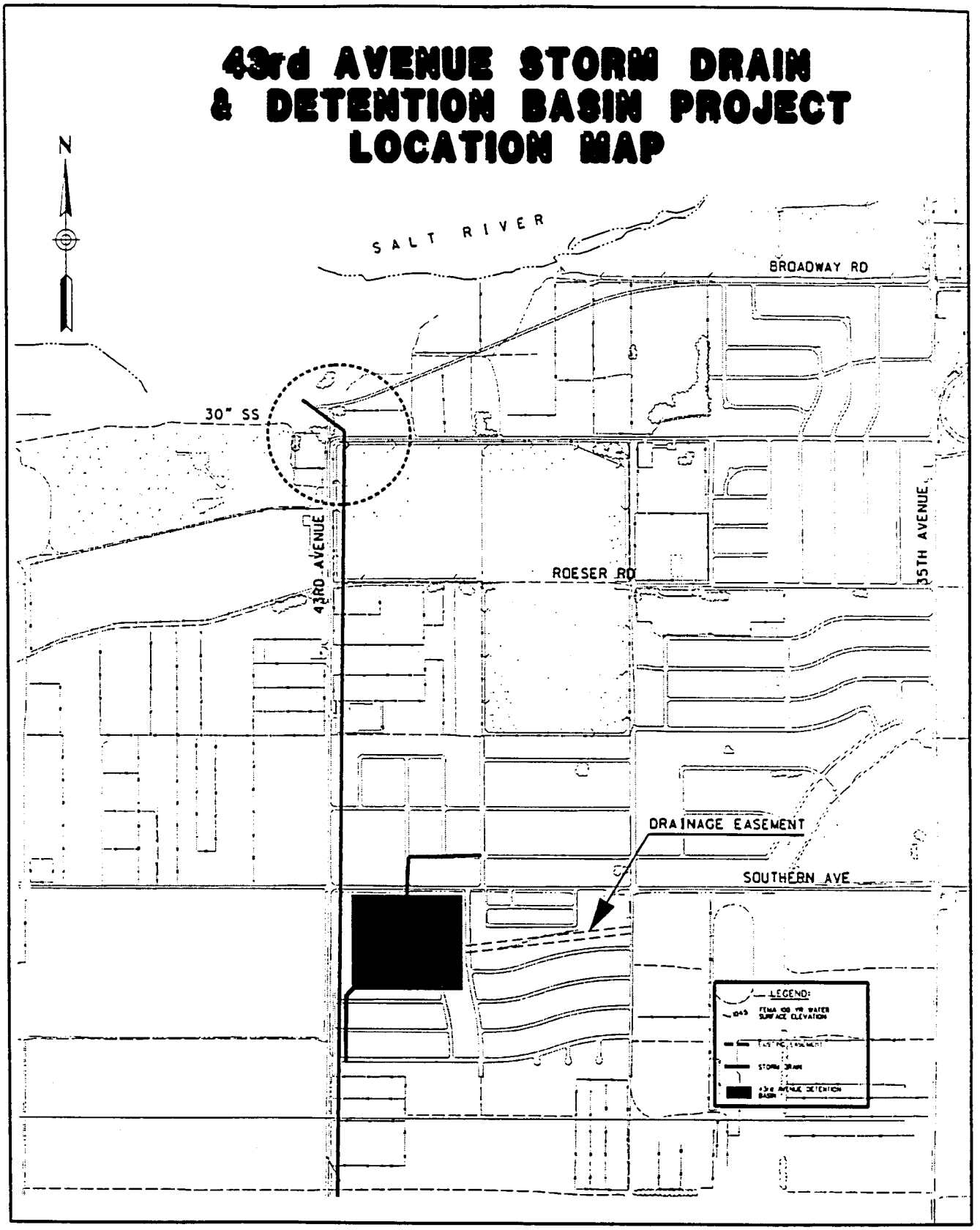

43rd AVENUE STORM DRAIN
& DETENTION BASIN PROJECT
LOCATION MAP
N
SALT RIVER
BROADWAY RD
30" SS
43RD AVENUE
ROESER RD
35TH AVENUE
DRAINAGE EASEMENT
SOUTHERN AVE
LEGEND:

Figure 3

PROPERTY ACQUISITION

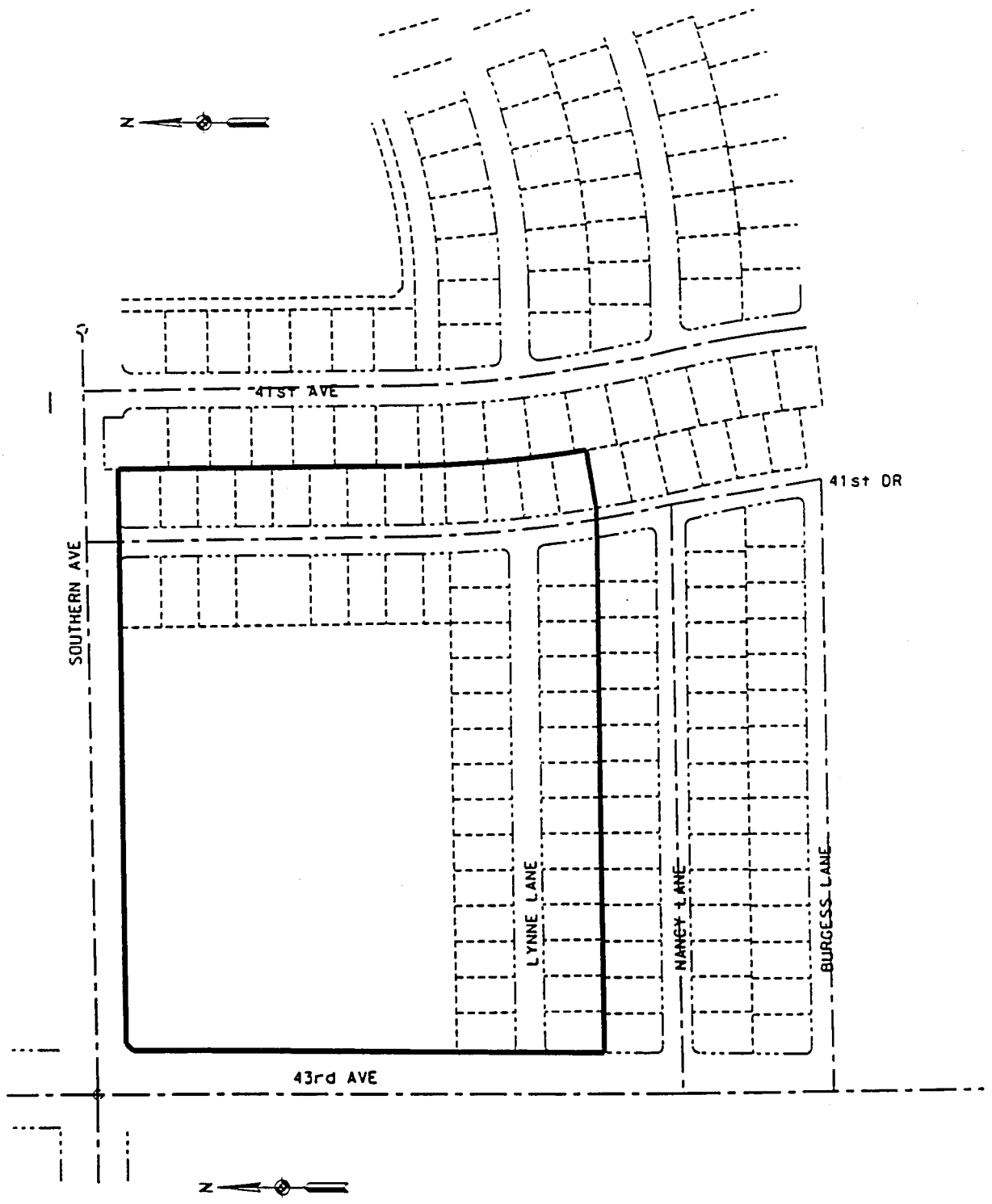


Figure 4

An additional 20` of the eastern 75` rights-of-way of 43rd Avenue must also be abandoned. This portion of rights-of-way was necessary before the abandonment of the residential lots to provide an area for a frontage road. Now that Lynne Lane has been abandoned, a frontage road north of Nancy Lane is not needed.

1.4 Utilities

The abandoned rights-of-way for 41st Drive has an existing 8" sanitary sewer in it that must be relocated. 41st Drive passed through the basin site near the eastern boundary of the property. The sewer line cannot be abandoned because it services homes along Nancy Lane between 41st Drive and 43rd Avenue and homes along 41st Drive from midway between Burgess Lane and Nancy Drive to the detention basin site. The sanitary sewer flows to the north and discharges into a 66" sanitary sewer located in Southern Avenue. Prior to discharging into the 66" sewer, the 8" sewer line turns to the west and follows along the southern rights-of-way of Southern Avenue for a few hundred feet before changing directions to the north again to connect into a manhole in Southern Avenue (Fig 5).

The existing sewer is relatively flat and has a sag in its alignment before reaching Southern Avenue. One option investigated was to relocate the sewerline along the eastern boundary of the detention basin site underneath the planned O&M road and underneath the inlet spillway. As proposed, this alignment would not eliminate the sag and would increase the number of 90degree bends from two bends to three bends. Another alternative investigated was to relocate the sewer line as described above, but add a new tap into the 66" sanitary sewer line immediately north of the O&M road rather than connect into the existing 8" line that runs along the north boundary of the basin site. This alternative would eliminate one of the bends. Although, the City of Phoenix will not allow any connections into the 66" sewer line other than at manholes; constructing a new manhole at this location was deemed unfeasible because the 66" sewer line normally flows at 2/3 to 3/4 full at all times.

SEWER RELOCATION PLAN
LEGEND
EXISTING SEWER
PROPOSED RELOCATION
FUTURE SEWER BY CITY OF PHX
41st DR
BURGESS LANE
NANCY LANE
8 INCH VCP
43rd AVE
LYNNE LANE
41st AVE
18 INCH
PROPOSED
8 INCH VCP
TO BE
RELOCATED
SOUTHERN AVE
66 INCH RCP
N

Figure 5

Another alternative investigated and also recommended is to tap into a new sewer line that is being planned to go into 43rd Avenue between Baseline Road and Southern Avenue. This sewer line is being designed by Cella Bar & Associates to sewer a new school that is planned for the area. The plan is to relocate the line along the southern boundary of the detention basin site underneath the planned O&M road. As proposed, this alignment will eliminate the existing sag, reduce the number of 90degree bends from two to one, and also reduce the length of the new sewer line from its point of relocation to its outfall.

2.0 EVALUATION OF BASIN ALTERNATIVES

All basin alternatives were developed to meet the 25-year existing and 100-year future volume requirements and meet the City of Phoenix detention basin/park design criteria as allowed by the District's Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects, dated Dec 16, 1992. According to IGA 97012, the basin will be turned over to the City of Phoenix for day-to-day operation and maintenance. The City's design criteria is as follows:

1. The detention basin site shall provide an area above the 100-year storm event to accommodate court games, playground(s), parking lot(s), park structures, etc.
2. The configuration and size of the area needed for the recreational elements identified above shall range between 3-5 acres.
3. Side slopes of the basin shall not exceed 5:1 (20%) and shall be planted in turf or seeded. The basin bottom shall also be planted in turf.
4. The basin should be shaped such that off-site storm water does not sheet flow into the basin.
5. Exposed aggregate shall be used as feasible in place of grouted riprap at locations requiring erosion protection.

2.1 Basin Alternative 1

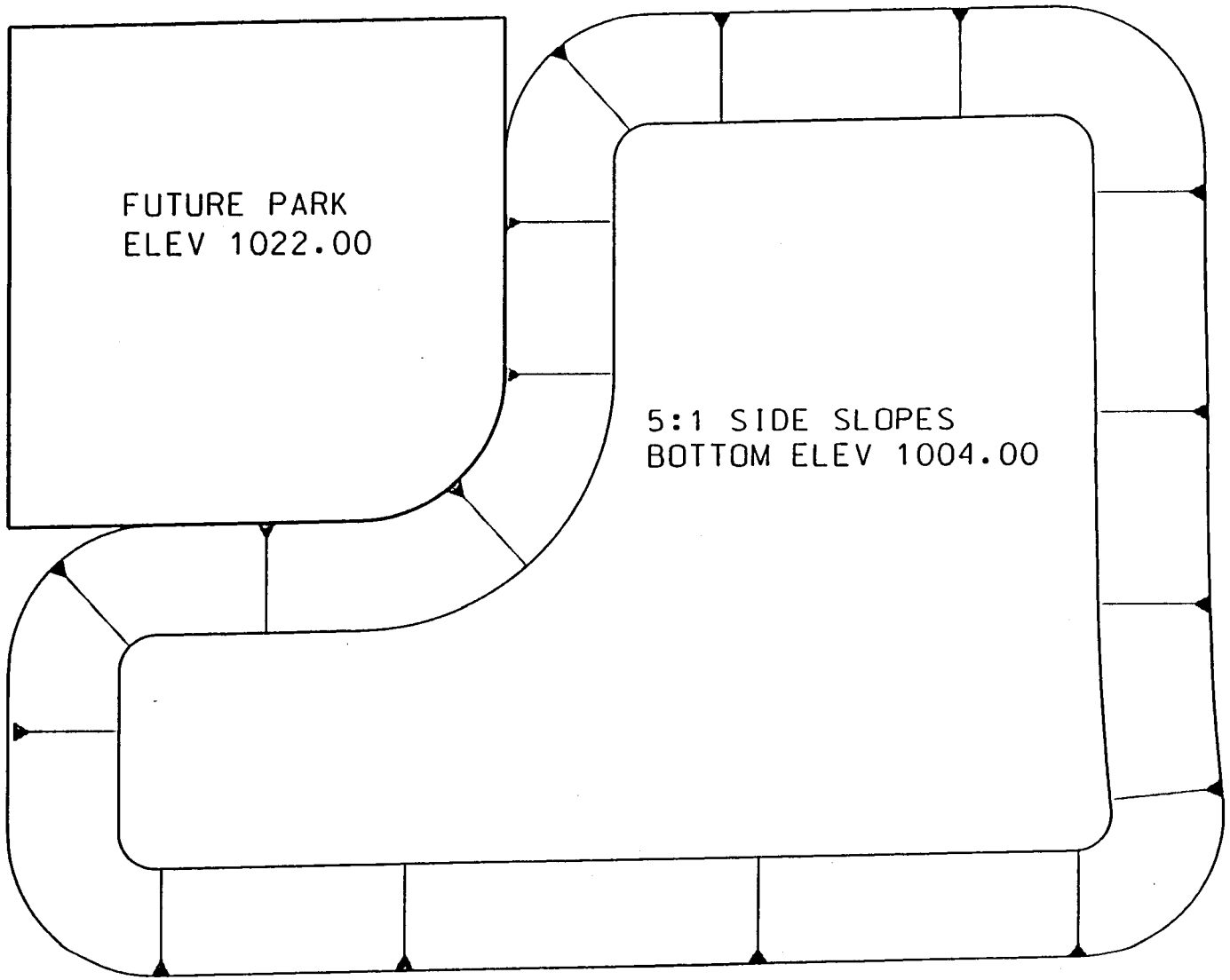
Basin Alternative 1 (Fig 6.) meets the above criteria by providing 3.7 Acres of open space above the future 100-year storm event stage. The open space is located in the NW quadrant of the basin site near the intersection of 43rd and Southern Avenues. All of the side slopes are 5:1. The basin is a single level basin with a bottom elevation of 1004, an 18' deep basin. The design provides for a 15' maintenance road around the perimeter of the basin.

2.2 Basin Alternative 2

Basin Alternative 2 (Fig 7.) meets the above criteria by providing 3.7 Acres of open space above the future 100-year storm event stage. The open space is located in the NW quadrant of the basin site near the intersection of 43rd and Southern Avenues. All of the side slopes are 5:1. The basin is a single level basin but provides a 10' bench midway between the floor and top of the basin to be used as a running/jogging path. The bottom elevation of the basin is 1006, a 16' deep basin. This alternative also provides for a 15' maintenance road around the perimeter of the basin.

2.3 Basin Alternative 3

Basin Alternative 3 (Fig 8.) also meets the above criteria by providing 3.7 Acres of open space above the future 100-year storm event stage. The open space is located in the NW quadrant of the basin site near the intersection of 43rd and Southern Avenues. All of the side slopes are 5:1. The basin is a dual level basin that provides a level area for recreational use approximately 8' above the bottom of the basin. This alternative also includes a 10' bench at the same elevation as the raised portion to be used as a running/jogging path. The bottom elevation of the basin is 1002, a 20' deep basin. This alternative also provides for a 15' maintenance road around the perimeter of the basin.



BASIN ALTERNATIVE 1

Figure 6

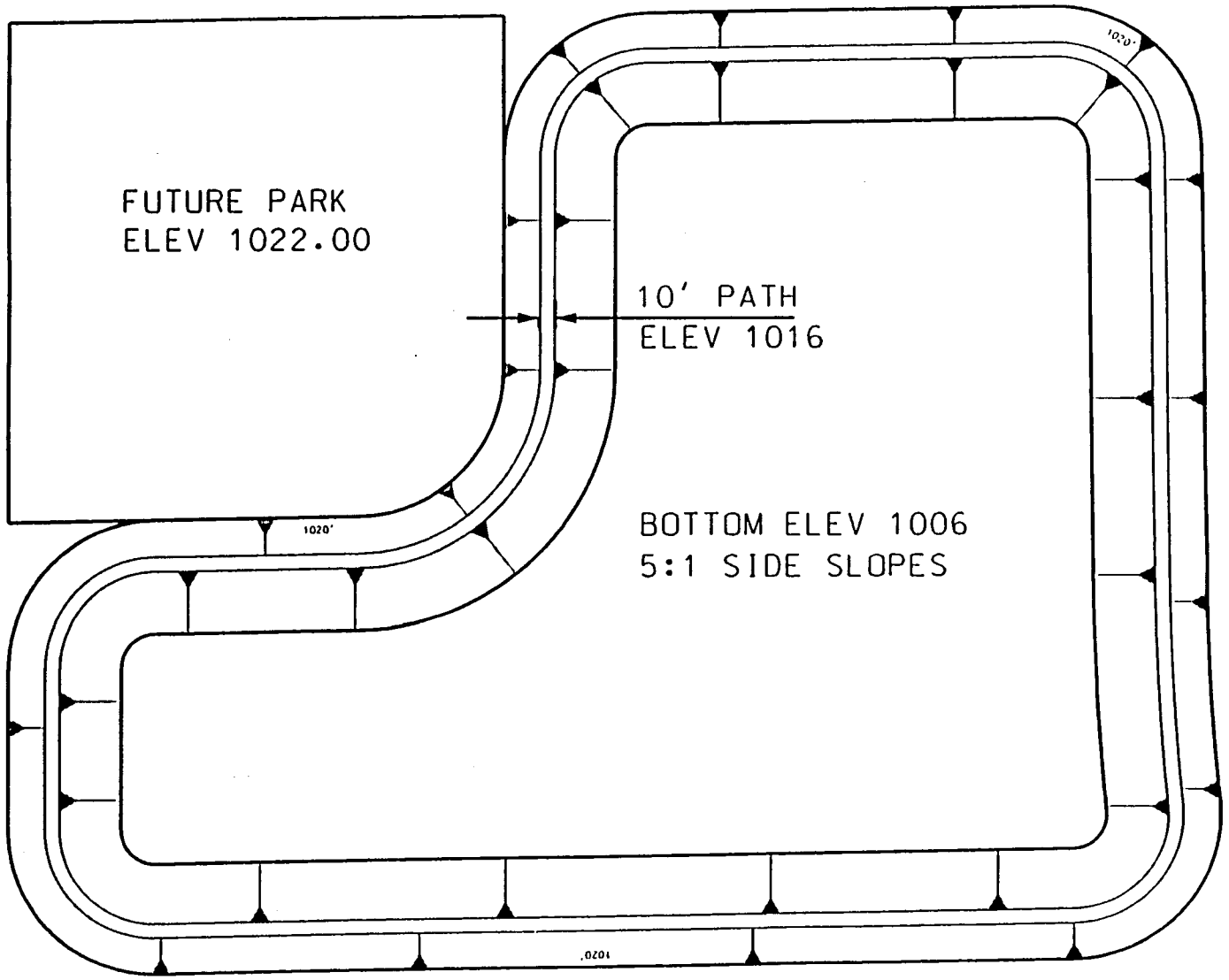
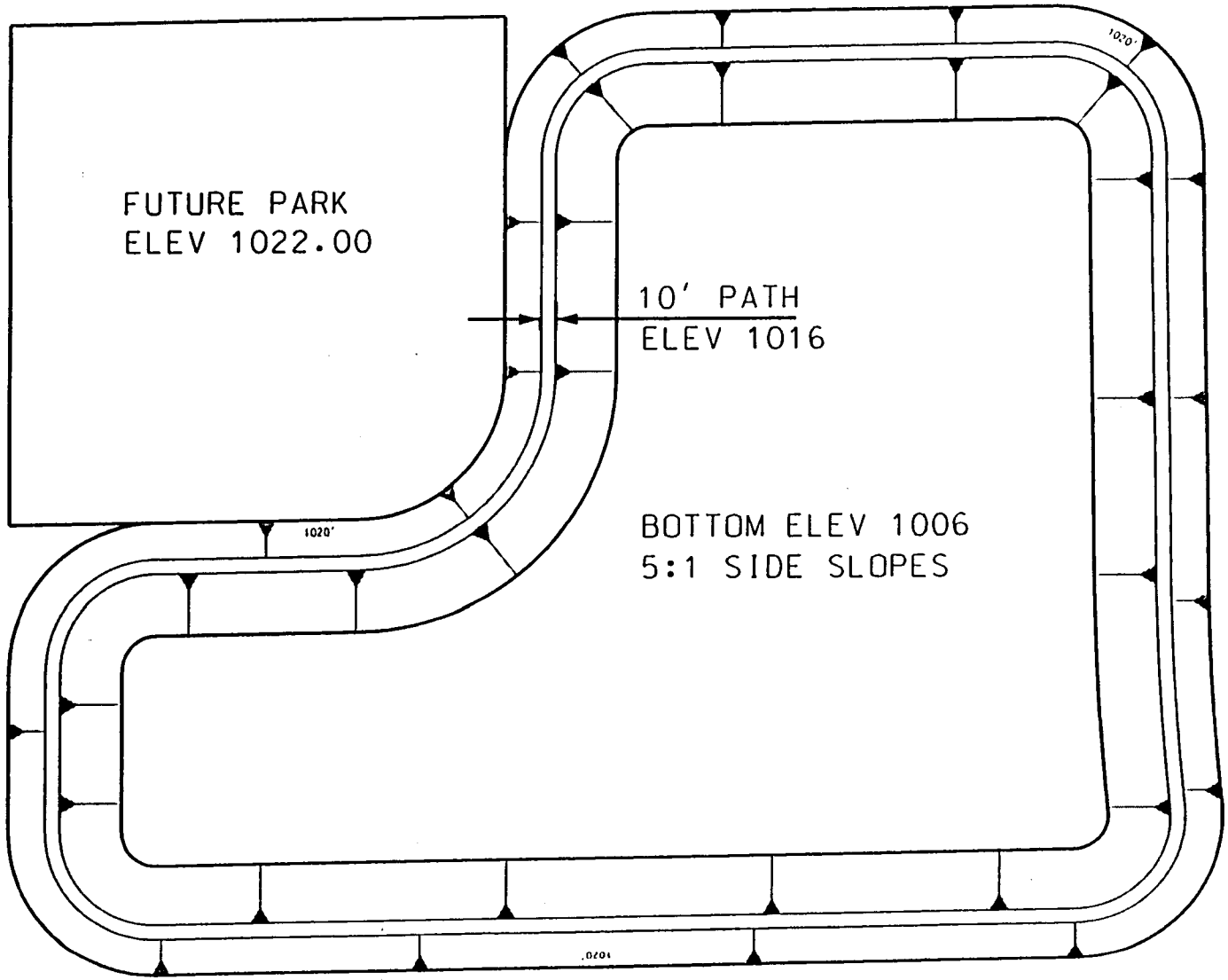


Figure 7

BASIN ALTERNATIVE 2



BASIN ALTERNATIVE 3

Figure 8

2.4 Selected Alternative

Basin Alternative No. 3 is the selected alternative. All basins were discussed with a representative from the City of Phoenix and the District to determine the configuration that provided the most benefits to each party. In addition to the items mentioned in the description of Alternative 3, two pedestrian access ramps were added to allow pedestrians to access the benched track from the south and east maintenance road. In conjunction with the pedestrian ramp, a dual-purpose pedestrian/maintenance access ramp was added adjacent to the elevated portion of the basin site to the benched level area.

The pedestrian ramps provide continuity around the basin and over the inlet spillway that would otherwise be discontinuous during all runoff events. They are also located where near the terminus of 41st Drive to provide a gateway into the park.

3.0 HYDROLOGIC ANALYSIS

The hydrology developed for the South Phoenix/Laveen Drainage Improvement Project was used. No new hydrology was performed as part the basin design except that the input regarding the geometry of the detention basin was modified. The basin design must be able to handle the existing 25-year and the future 100-year storm events. Table 1 shows the results for each of the return events listed.

Table 1 – Hydrologic Design Parameters

43rd Avenue Basin	Existing	Future
Return Event	25-Year	100-Year
Peak Inflow (cfs)	851	* 1022
Peak Storage (Ac-Ft)	*142	124

* Controls the design

The basin inlet will be designed to accommodate 1022 cfs and the storage capacity below the top of the basin will be no less than 142 Ac-Ft.

3.1 Basin Modeling Parameters

The original concept was to have a pump acting as the sole discharge for the basin. Another option has been developed which will allow the basin to gravity drain into the 43rd Avenue storm drain. The Figure below shows the stage-discharge relationship for a gravity outfall. The reason for the zero discharge for the free outfall up to elevation 1014 is to account for the sag in the storm drain. Any water below elevation 1014.0 will have to be drained by the pump station at the Salt River. The free discharge is what is modeled in the HEC-1 output.

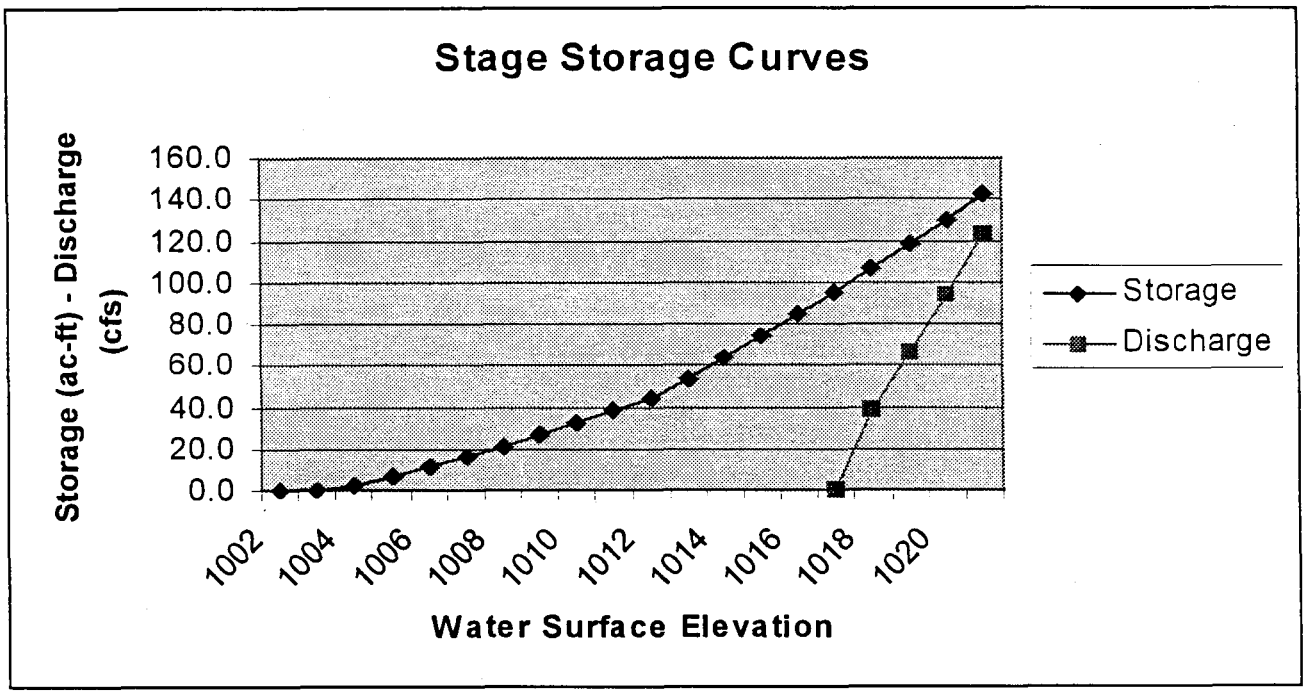


Figure 9 STAGE – STORAGE/DISCHARGE RELATIONSHIP

Tailwater condition of 1014 at outlet

4.0 HYDRAULIC ANALYSIS

4.1 Inlet Description

Flows are conveyed to the basin via a swale that begins at 39th Avenue approximately 400' feet south of Southern Avenue. The flows will be directed into the detention basin via a large inlet structure that consists of a concrete rectangular section, a triple barrel 10' x 5' concrete box section, a concrete sloped spillway section with chute blocks, and a riprap stilling basin. The spillway inlet improvements will be designed to accommodate the 100-year future runoff event that is estimated to be 1022 cfs (Table 1).

The flows from the swale cross over 41st Avenue on a concrete apron and continue in the natural swale until they reach the basin inlet works. The inlet works will begin approximately 100 feet west of 41st Avenue where the flows will drop over a 4' +/-wall into a concrete rectangular section. From this drop, the flows enter the basin via a triple barrel 10' x 5' concrete box section that supports the perimeter maintenance road then outlets into a concrete spillway that includes chute blocks to dissipate the energy. At the end of the spillway buried beneath the surface will be large diameter dumped riprap to protect the end of the spillway and the floor of the basin. In conjunction with the inlet works, there will be a trapezoidal channel from the stilling basin to the outlet structure to convey nuisance flows. The low-flow channel section is proposed to be grassed lined along with the entire floor of the basin and will be sized to convey 100 cfs.

The 43rd Avenue Detention Basin Project will not be making any improvements to the drainage swale east of the inlet works; this will be part of another project. Currently, the swale does not have the capacity to convey the 25-yr existing or the 100-yr future flows. The concept report prepared by HDR Inc. states that future improvements will include a triple barrel 10' x 4'

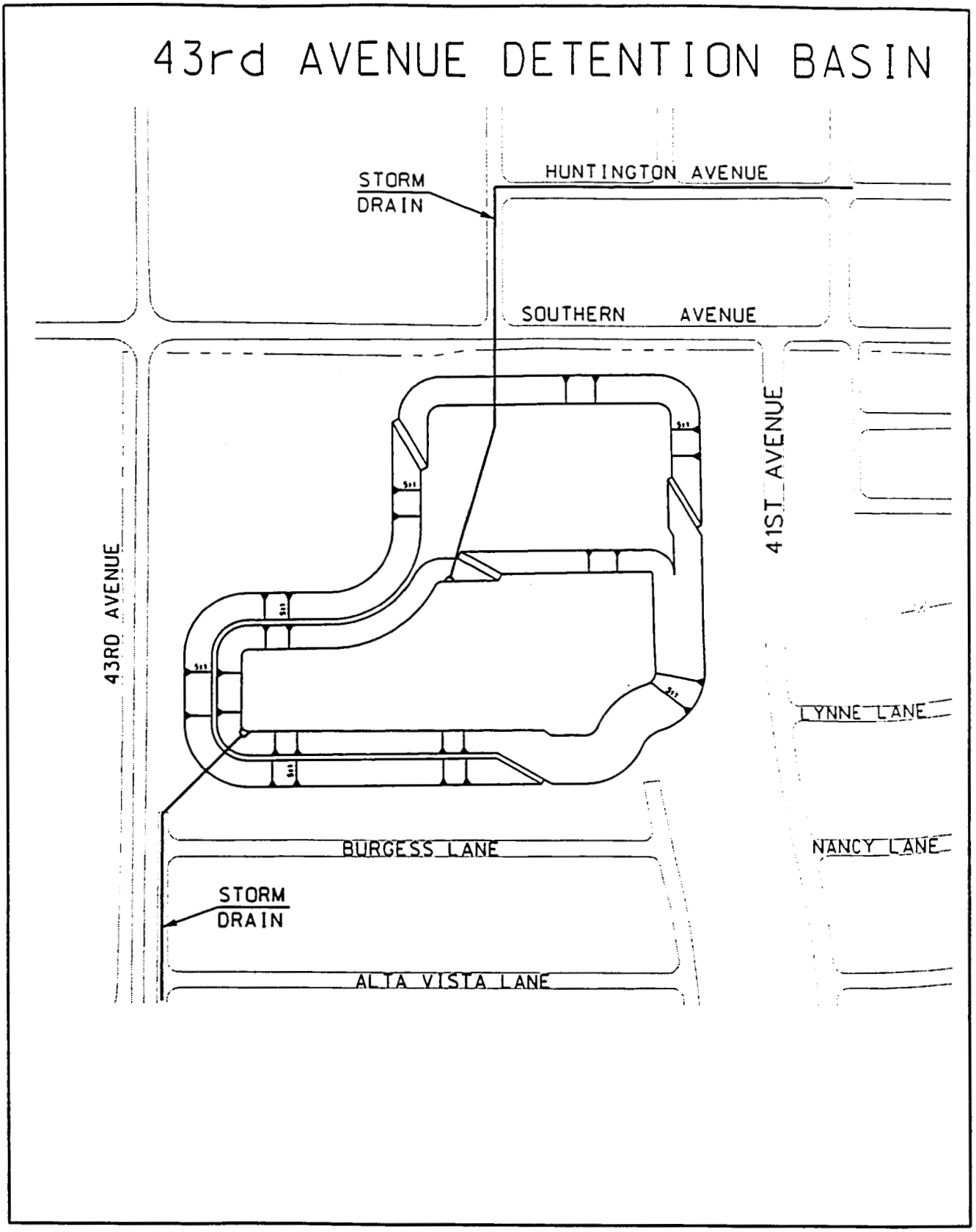

43rd AVENUE DETENTION BASIN
STORM
DRAIN
HUNTINGTON AVENUE
SOUTHERN AVENUE
43RD AVENUE
41ST AVENUE
LYNNE LANE
BURGESS LANE
NANCY LANE
STORM
DRAIN
ALTA VISTA LANE

Figure 10

CBC at 41ST Avenue. Until the time that the swale is modified, the design discharges will not likely make it to the basin.

Two other storm drain inlets will be constructed with the basin. These inlets will receive flows from storm drains from the neighborhoods to the north and south of the basin site (Fig 10). The storm drain collection system capturing runoff from the neighborhood to the north of Southern Avenue is designed to handle the 10-yr event and the storm drain collection system capturing runoff from the neighborhood to the south of the basin is designed to handle the 100-yr event.

Prior to constructing the detention basin, the two collection systems mentioned above will be constructed with the 43rd Avenue Storm Drain and discharge directly into the storm drain. At some future date when the detention basin is constructed, the collection systems will be rerouted so that they discharge into the basin. The reason for this is so that the flows will be attenuated before discharging into the 43rd Avenue Storm Drain; this increases the level of protection provided by the entire drainage system.

The storm drain constructed in Southern Avenue to convey the runoff captured in the neighborhood north of Southern Avenue will remain in the ultimate system when the basin is constructed. The storm drain will need to be extended by others, and it should capture only rainfall that falls within the Southern Avenue rights-of-way; all other runoff should be diverted to the detention basin.

4.2 Outlet Description

The original concept for an outlet was to be a pump station because the proposed invert of the storm drain in the concept study was above the floor of the basin. The pump station

was to drain the basin with pumps capable of discharging 100cfs. Now the design invert of the storm drain in 43rd Avenue is below the basin floor because it is being lowered to avoid a conflict with a 66" sanitary sewer in Southern Avenue. The pump station that was proposed in the conceptual study to drain the basin will still be required, but at the outlet of the storm drain near the Salt River. The capacity of the pump(s) has now been reduced from a 100-cfs to 12-cfs.

The proposed method to drain the basin is through an outlet structure located on the west side of the basin. The structure will be a rectangular structure with two circular openings and one rectangular opening along the east vertical face and a grated opening on the top to allow flows to discharge from the basin. The top of the outlet structure is set at elevation 1020.0 that is the same as the emergency spillway. Should the circular openings be clogged, flows will have another route to the storm drain. (Elevation 1020.0 is also above the estimated water surface elevation of the Salt River during a 10-yr event.)

The openings along the face of the outlet structure will be covered with trash racks on the front side for trash and safety concerns and flapgates on the backside to keep flows from the storm drain and/or flows from the Salt River from entering the basin. The outlet structure will be connected to the 43rd Avenue storm drain with a 72" diameter concrete pipe.

Now that the pump has been relocated to near the outlet of the storm drain between Weir Avenue and Broadway Road it is considered part of the storm drain design. Carrollo Engineers, Inc. who is acting as a subconsultant to the District's in-house design-team will design the pump station. The pump(s) will be sized such that it will be capable of draining the basin within 36 hours from the end of the each storm event or from when flows in the Salt River cease.

4.3 Emergency Spillway

In addition to the outlet structure, the basin includes an emergency spillway that will be located along the west-side of the basin where the water naturally flowed in the property's existing condition. The emergency spillway consists of a 66-foot wide unlined depression in the top of the bank set at elevation 1020.0. Flows exiting the emergency spillway have a chance of entering the storm drain in 43rd Avenue through catch basins that will ultimately be constructed along the roadway when 43rd Avenue is fully developed with curb & gutter.

BIDDING SCHEDULE

Engineer's Estimate

PROJECT: 43rd Avenue Detention Basin

CONTRACT: FCD 9x-xx

ITEM NO.	DESCRIPTION	UNIT	APPROX QTY.	UNIT COST NUMBERS	EXTENDED AMOUNT
105 - 1	Partnering	LS	1	$4,000.00	$4,000.00
107 - 1	NPDES SWPPP Permits	LS	1	$5,000.00	$5,000.00
107 - 2	Project Sign Allowance	LS	1	$3,000.00	$3,000.00
107 - 3	Public Information and Notification Allowance	LS	1	$25,000.00	$25,000.00
201 - 1	Clearing and Grubbing	LS	1	$8,000.00	$8,000.00
202 - 1	Mobilization	LS	1	$7,900.00	$7,900.00
215 - 1	Detention Basin Excavation	CY	223,279	$3.50	$781,476.50
220 - 1	Plain Riprap	CY	174	$35.00	$6,090.00
225 - 1	Watering	100Cu-Ft	7,500	$1.19	$8,925.00
310 - 1	Aggregate Base Course	Ton	223	$15.00	$3,345.00
321 - 1	Asphalt Pavement (C 3 4, 4" thick)	SY	707	$56.00	$39,592.00
336 - 1	Pavement Replacement , 8" (Southern Avenue)	SY	0	$50.00	$0.00
336 - 2	Pavement Replacement , 4 1 2" (local streets)	SY	542	$22.00	$11,924.00
340 - 1	Concrete Curb & Gutter (MAG Det 220 Type A)	LF	278	$8.00	$2,224.00
340 - 2	Concrete Header	LF	3,225	$4.50	$14,512.50
340 - 3	Concrete Sidewalk (MAG Det 230)	SF	1,165		
350 - 1	Remove Concrete Curb & Gutter	SF	14	$2.50	$35.00
350 - 2	Remove Sanitary Sewer Pipe	LF	1,071	$6.50	$6,961.50
350 - 3	Remove Existing Manhole	EA	5	$1,500.00	$7,500.00
350 - 4	Remove Storm Drain Pipe	LF	12	$12.00	$144.00
401 - 1	Traffic Control	LS	1	$5,000.00	$5,000.00
401 - 2	Off-Duty Uniformed Officer	HR	400	$25.00	$10,000.00
405 - 1	Survey Monuments (MAG Det 120-1- B)	EA	2	$150.00	$300.00
425 - 1	Topsoil	CY	17,100	$12.00	$205,200.00
430 - 1	Landscaping (15 gallon tree)	EA	200	$110.00	$22,000.00
430 - 2	Bermuda Grass (seed)	Acre	16	$6,100.00	$97,600.00
430 - 3	Native Seed	Acre	4	$2,200.00	$8,800.00
430 - 4	Stabilized Decomposed Granite	SF	38,700	$0.90	$34,830.00
430 - 5	Decomposed Granite	SF	19,070	$0.40	$7,628.00
440 - 1	Drip Irrigation Sytem (complete)	LS	1	$8,000.00	$8,000.00
440 - 2	Turf Irrigation System (complete)	LS	1	$245,000.00	$245,000.00
505 - 1	North Inlet Structure	CY	26	$450.00	$11,700.00
505 - 2	Inlet Spillway Structure	CY	322	$375.00	$120,750.00
505 - 3	Outlet Structure	CY	60	$450.00	$27,000.00
505 - 4	South Inlet Structure	CY	18	$450.00	$8,100.00
510 - 1	Concrete Block Masonry Wall	LF	1,647	$38.00	$62,586.00
515 - 1	Flap Gate (36")	EA	2	$1,400.00	$2,800.00
520 - 1	Steel Handrails	LF	457	$32.00	$14,624.00
615 - 1	8" Sanitary Sewer Pipe (VCP)	LF	928	$65.00	$60,320.00
618 - 1	30 Inch RGRCP Bore & Jack	LF	240	$1,000.00	$240,000.00
618 - 2	36" RGRCP, Class III	LF	10	$75.00	$750.00
618 - 3	48" RGRCP, Class III	LF	902	$85.00	$76,670.00
618 - 4	66" RGRCP, Class IV	LF	713	$120.00	$85,560.00
618 - 5	72" RGRCP, Class IV	LF	81	$200.00	$16,200.00
618 - 6	15" Catch Basin Connector Pipe	LF	2	$119.00	$238.00
618 - 7	18" Catch Basin Connector Pipe	LF	2	$120.00	$240.00
618 - 8	24" Catch Basin Connector Pipe	LF	8	$130.00	$1,040.00
618 - 9	30" Catch Basin Connector Pipe	LF	3	$140.00	$420.00
618 - 10	48" x 48" x 15" Prefabricated Tee	EA	1	$250.00	$250.00
618 - 11	48" x 48" x 18" Prefabricated Tee	EA	1	$250.00	$250.00
618 - 12	48" x 48" x 24" Prefabricated Tee	EA	3	$300.00	$900.00
618 - 13	48" x 48" x 30" Prefabricated Tee	EA	1	$400.00	$400.00
618 - 14	Pipe Plug, MAG Det 427	EA	2	$400.00	$800.00
618 - 15	66 Inch Prefabricated Bend w/Mag Det 522	EA	1	$3,000.00	$3,000.00
625 - 1	Sanitary Sewer Manhole (MAG 420)	EA	2	$3,000.00	$6,000.00
625 - 2	Storm Drain Manhole MAG DET 520 & 522	EA	4	$2,500.00	$10,000.00
625 - 3	Special Junction Structure with Manhole (DET 1)	EA	1	$15,000.00	$15,000.00
625 - 4	Special Junction Structure with Manhole (DET 2)	EA	1	$10,000.00	$10,000.00
625 - 5	Modify Sanitary Sewer Manhole	EA	1	$2,500.00	$2,500.00
650 - 1	2" Dia Instrument Conduit	LF	116	$18.00	$2,088.00
	Contingency	%	10		$232,058.55
				TOTAL	$2,592,232.05

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
43RD AVENUE DETENTION BASIN,
SOUTHERN AVENUE TO SALT RIVER
CONTRACT NO. FCD 99-xx
PROJECT CONTROL NO. 1170203

DRAFT SPECIAL PROVISIONS – 100%

SECTION 201 - CLEARING AND GRUBBING

Clearing and grubbing shall conform to Section 201 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 201.1 - Description
Add the following to this subsection:
The Contractor shall protect-in-place all of the perimeter walls and footers during this operation.

Subsection 201.5 - Payment
Replace this subsection with the following:
The project construction limits shall be cleared of all trees, vegetation, trash and debris. Such material as collected shall be disposed of at an approved landfill site and shall be subject to landfill fees so assessed, which will be included in the unit price bid for this item. Weigh tickets from all landfill disposals must be furnished to the Engineer.

Payment for clearing and grubbing as such will be paid for at the lump sump price bid for, and shall be full compensation for all labor, equipment, disposing of refuse and all other items that are incidental or appurtenant.
ITEM 201-1 - CLEARING AND GRUBBING

Subsection 201.6 - Measurement, Removal, and Disposal of Trees:
Replace this subsection with the following:
No measurement shall be made for the removal and disposal of trees.

Subsection 201.7 - Payment, Removal, and Disposal of Trees:
Replace this subsection with the following:
No payment shall be made for the removal and disposal of trees as such; the cost thereof shall be included in the price of clearing and grubbing.

SECTION 202 - MOBILIZATION

Add this section to the MAG Uniform Standard Specifications

Subsection 202.1 - Description
The work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, supplies and incidentals to the project site; the establishment of all offices, buildings and other facilities necessary for work on the project, and for all other work and operations that must be performed and costs incurred prior to beginning work on various items on the project site.

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

The office shall be a building or mobile trailer erected at a location convenient to the project. The office may be in the same building or mobile trailer as office space of the Contractor, provided that such office is separated from the area used by the Contractor by a wall or door with an adequate locking device and has at

least two doors to the outside.

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

The field office shall be an approved and weatherproof building or mobile trailer providing a minimum of 500 square feet of clear floor space, not including the toilet area. The structure shall have a minimum ceiling height of seven (7) feet and shall be provided with weatherproof doors equipped with adequate locking devices. Windows shall also be provided with adequate locking devices. The Contractor shall also provide the following:

a. Lighting - Electric light, non-glare type luminaries to provide a minimum illumination level at desk height level.

b. Heating & Cooling - Adequate electrically powered equipment to maintain an ambient air temperature of 72 degrees F plus or minus 8 degrees.

c. Telephone, answering, and FAX machine - A telephone with an outside line for the exclusive use of the Engineer. The Contractor will pay for the cost of the line and local calling charges. The District will pay for long distance charges made on this line.

d. Toilet - A commode and wash sink in a separately enclosed room within the building or mobile trailer, properly ventilated and complying with applicable sanitary codes. Contractor shall provide water service.

e. Maintenance - The contractor shall maintain all facilities and furnished equipment in good working condition.

f. Fire Extinguisher - Two non-toxic, dry chemical, fire extinguishers meeting Underwriters Laboratories, Inc. approval for Class A, Class B, and Class C fires with a minimum rating of 2A: 2B: 10C.

g. Electricity - Contractor shall provide electric power and pay for all electric services.

h. Furnishings - Two office desks with drawers, two office chairs (padded, swivel type), one drafting table (adjustable height 3 feet by 6 feet), one conference table, eight folding chairs, one draftsman's stool, and a four drawer legal file cabinet.

I. Copier - Copier for 8 ½ inch by 11 inch and 11 inch by 17 inch paper with minimum 10 copy capacity.

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

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

Subsection 202.1 - Payment

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

SECTION 206 - STRUCTURE EXCAVATION AND BACKFILL

Structure excavation and backfill shall conform to Section 206 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 206.2 - Foundation Material Treatment

Add the following:

Foundation bearing surfaces shall be free of debris and water softened materials prior to placing concrete and reinforcing steel. Any loose or disturbed zones should be removed and replaced with compacted fill or lean concrete.

Subsection 206.4 - Structure Backfill

Add the following:

Compaction of structure backfill soils against embedded footings, walls, and headwall structures shall be accomplished to a minimum 95 percent of the maximum ASTM D698 density.

Compaction against wing walls, or channel lining within 3 feet of the walls or lining shall be accomplished using non-wheeled, hand operated compaction equipment only.

Backfill behind subsurface walls designed to support utilities, pavement, channels, or other facilities should be compacted to density criteria from Section 211. Backfill shall consist of free draining granular soils that exhibit low expansive potentials. The material shall be free of vegetation, debris, organic contaminants, and fragments larger than 6 inches in size.

Compaction operations shall be accomplished by mechanical methods. Water settling or jetting shall not be permitted.

On-site soils may be used in structural fills or backfill except for high plasticity on-site soils (P.I. > 12) which may not be used in structure fills or backfill. Imported soil used for fills under pavements, or channels, backfill around structures should be granular soils conforming to the following requirements:

Sieve Size	Percent Passing
3"	100
3/4"	60-80
#8	35-80
#200	0-12

(Arizona Test Method 201)

Note: Maximum size may be reduced at the Engineer's direction to satisfy trenching and landscape requirements, etc.

Subsection 206.5 - Payment

Replace this subsection with the following:

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

SECTION 211 - FILL CONSTRUCTION

Fill construction shall conform to Section 211 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 211.1 - Description

Add the following:

Work under this item shall consist of filling to raise the grade for the maintenance access road around the perimeter of the detention basin.

Subsection 211.3 - Compacting

Add the following:

Compaction of exposed site soil, backfill, fill, and base course materials shall be accomplished to the following density criteria:

Material	Minimum Percent Compaction (ASTM D698)
Subgrade Soil:	
Below structural elements	95
Below Pavement	95
Within three (3) feet of existing perimeter walls	85
Backfill:	
Restoration of channel bank	95
Against structures	95

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

Subsection 211.5 - Measurement

Replace this Subsection with the following:

No measurement will be made for fill construction. The estimated quantity for fill is approximately 5,392 cubic yards.

Subsection 211.6 - Payment

Replace this Subsection with the following:

No payment will be made for fill construction, the cost thereof shall be included in the price bid for the Detention Basin Excavation to which such fill construction is considered incidental or appurtenant.

SECTION 215 - EARTHWORK FOR OPEN CHANNELS

Earthwork for open channels shall conform to Section 215 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 215.1 - Description

Replace this subsection with the following:

Open channels for the purpose of this section shall mean the detention basin. The work in this section consists of excavation, fill, grading, and disposal of excavated and removed material for the construction of the detention basin and associated items.

Subsection 215.3 - Excavation

Add the following:

The Contractor is encouraged to review the soil boring logs included in Appendix A of these Special Provisions, and the geotechnical report as discussed in Subsection 102.4.

Subsection 215.7 - Measurement
Replace this subsection with the following:
Measurement for excavation material on site for the detention basin and the inlet channel will be made according to the quantity of material excavated from natural ground to the finished grades shown on the plans. No measurement will be made for fill construction, imported material, or disposal of excess material. The Engineer will verify the quantities of excavation by a method that in his opinion is best suited to obtain an accurate determination.

Subsection 215.8 - Payment
Replace this subsection with the following:
Payment for excavation of material for the detention basin and associated inlet channel will be made on the basis of the price bid per cubic yard of excavation.
ITEM 215-1 - DETENTION BASIN EXCAVATION

220 - RIPRAP CONSTRUCTION

Riprap construction shall conform to Section 220 of the MAG Uniform Standard Specifications except as modified herein:

Subsection 220.1 - Description
Replace this subsection with the following:
The construction of riprap shall consist of furnishing and placing stone adjacent to the inlet spillway structure walls and at the base of the inlet spillway structure as shown on the plans and specified in the special provisions. Sacked concrete riprap will not be allowed.

Subsection 220.4 - Plain Riprap
Replace this subsection with the following:
The construction of plain riprap shall consist of furnishing and placing the stones as shown in the plans and as specified in these special provisions.

Riprap Gradation Table (D_{50} = 18")	
Stone Size (in)	Percent Passing
1.5 d_{50}	100
1.2 d_{50}	85
1.0 d_{50}	50
0.4 d_{50}	15

Subsection 220.7- Measurement
Replace this subsection with the following:
Riprap shall be measured by the cubic yard of the rock placed to the depth and neat lines as shown on the plans. No measurement will be made for riprap placed beyond the neat line as shown on the plan unless directed by the Engineer.

Subsection 220.8 - Payment
Replace this subsection with the following:
Payment for plain riprap shall be made on the basis of the price bid per cubic yard in place; within the limits of dimensions shown on the plans for bid items 220-1. Payment shall include labor, preparation of ground surfaces, excavation, riprap, replacement of damaged areas, samples provided for the Engineer's approval and all other miscellaneous items required for riprap construction.
ITEM 220-1 - PLAIN RIPRAP

SECTION 225 - WATERING

Water for compacting and dust control shall conform to Section 225 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 225.1 - Description

Replace this subsection with the following:

The project site is located adjacent to a developed residential area. Therefore, pre-soaking prior to excavation, and continuous dust control efforts during construction will be required for this project. The Contractor will maintain adequate pre-soak conditions during excavation, and adequate dust control during loading and transport operations to minimize dust.

Subsection 225.2 - Water Supply

Replace this subsection with the following:

The Contractor is to use City of Phoenix water. The Contractor shall use only those hydrants designated by the City of Phoenix Water Services Department and in strict accordance with its requirements for hydrant use.

The Contractor shall contact the Water Services Department, Technical Support Group at 495-5601 to obtain a "Permit to Use Water from Fire Hydrant" and pay the required fees, which include both monthly services charges, plus the cost of the water per 100 cu. Ft units used.

Subsection 225.4 - Measurement

Replace this subsection with the following:

The Contractor must obtain a hydrant meter from the City of Phoenix to measurement the amount of water used. Measurement will be made based upon meter readings rounded to the nearest 100 cubic feet.

The Contractor shall furnish all connections, wrenches, valves and small tools that may be necessary to meet the requirements pertaining to the hydrant use.

Subsection 225.5 - Payment

Replace this subsection with the following:

Payment will be made on the basis of the price charged by the City of Phoenix per 100 cubic feet of water including taxes. Payment shall be for the cost of the water only: the cost of renting the meter, connecting and disconnecting the meter, applying the water including but not limited to the equipment, hauling, and labor, shall be considered incidental to the items for which watering is incidental.

ITEM 225-1 - WATERING

SECTION 301 - SUBGRADE PREPARATION

Subgrade preparation shall conform to Section 301 of the MAG uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 301.1 - Description

Replace this subsection with the following:

Subgrade preparation is for the detention basin maintenance access roads that are located along the east and south sides of the detention basin and for the construction of the cul-de-sac on 41st Dr.

Subsection 301.8 - Payment

Replace this subsection with the following:

No separate payment for subgrade preparation will be made as such; the cost thereof shall be included in the item for which subgrade preparation is incidental.

SECTION 310 - UNTREATED BASE

Replace Section 310 of the Standard Specifications with the following:

Subsection 310.1- Description:
Aggregate base course, also referred to as ABC, shall be placed in a 4-inch layer for the maintenance roads, where shown on the design plans.

Subsection 310.2 -Materials:
Materials for use as ABC shall be in accordance with Section 702 - Base Materials of the Standard Specifications, Table 702.

Subsection 310.3 - Placement:
The ABC may be placed and compacted in a single layer. After distributing, the base material shall first be watered and then immediately bladed to a uniform layer that will net, after rolling, the required thickness If the materials deposited are not uniformly blended together, the blading operation shall be continued to such extent as may be necessary to eliminate segregation. The quantity of water applied shall be that amount which will assure proper compaction resulting in a relative density of not less than 100 percent as determined under Section 301 of the Standard Specifications. Care shall be exercised in connection with watering operations to avoid wetting the subgrade or any lower base course to detrimental extent.

Upon completion, the base surface shall be true, even and uniform, conforming to the grade and cross-section shown on the design plans.

ABC may vary not more than 1/2 inch above or below required grade and cross-section.

Subsection 310.4 - Measurement:
Quantities of ABC shown on the design plans are measured by the cubic yard, based upon the actual dimensions shown. No allowance is made for spalling or waste beyond those limits. Stabilized decomposed granite will be measured in-place by the square foot and include stabilizer agent.

Subsection 310.5 - Payment:
No separate payment will be made for aggregate base course used for pavement replacement as such, the cost thereof shall be included in the cost of pavement replacement.

Payment for aggregate base course used for the maintenance road shall be by the cubic yard in place, to the dimensions shown on the design plans for Item 310-1 of the Bid Schedule. Such payment shall be compensation in full for materials, transportation, miscellaneous earthwork, labor, equipment, placement, watering, and roller compaction.
ITEM 310-1 – AGGREGATE BASE COURSE

SECTION 321 – ASPHALT CONCRETE PAVEMENT

Asphalt concrete pavement shall conform to Section 321 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 321.1 – Description
Add the following to this subsection.
This item is for the construction of the cul-de-sac of 41st Drive.

Subsection 321.8 – Measurement
Replace this subsection with the following:
Asphalt concrete pavement will be measured by the square yard, computed to the nearest .50 square yard for the pavement actually placed.

No measurement will be made for the Preservative seal coat.

Subsection 321.9 – Payment
Replace this subsection with the following:
The asphalt concrete measured as provided above, will be paid for at the contract price per square yard, which

price shall be full compensation for the item complete including all materials, aggregate base course, transportation, labor, equipment, placement, roller, and application of the preservative seal and tack coats

ITEM 320-1 – ASPHALT CONCRETE PAVEMENT

SECTION 336 - PAVEMENT MATCHING AND SURFACING REPLACEMENT

Pavement matching and surfacing replacement shall conform to Section 336 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 336.2.2 -Pavement to be Removed

Add the following to this subsection.

All pavement to be removed shall first be sawcut.

Subsection 336.3 - Types and Locations of Pavement and Surfacing Replacement

Add the following to this subsection.

The pavement replacement shall be MAG Type A and shall consist of at least two layers of asphalt pavement over 12" of aggregate base course.

Local Street

The base course of the A.C. will be 2 ½" of C-3/4 and the surface course shall be 2" of D-1/2 and shall match the grades of the existing pavement.

Southern Avenue

The pavement replacement shall be 8" compacted thickness. The base courses of the A.C. will be lifts not exceeding 3"when compacted of C-3/4 and the surface course shall be 2" of D-1/2 and shall match the grades of the existing pavement.

The materials shall conform to MAG Sections 702 and 710, and the following:

Asphaltic Concrete Type	C-3/4, D-1/2
Mineral Filler	Portland Cement (1-1/2% by weight)
Asphalt Cement	AC-20

Subsection 336.4 - Measurement

Replace this subsection with the following:

Measurement for payment will be by the square yard. In computing the pay quantities for replacements, the pay width will be measured to the outside of the trench not to exceed the maximum trench widths as listed as listed in Table 601-1 of the MAG Standard Specifications and along the longitudinal length of the pipe including through junction structures and/or manholes or as directed by the Engineer. Any pavement replacement in excess of this amount shall be considered and included in the bid item for such that the work is incidental or appurtenant.

Subsection 336.5 - Payment

Replace this subsection with the following:

Payment for pavement matching and surfacing replacement shall be made on the basis of the price bid per square yard, including all materials, transportation, labor, equipment, placement, roller, and application of the tack and preservative seal coats, sawcuts and subgrade preparation.

ITEM 336-1 - PAVEMENT REPLACEMENT , 8" (Southern Avenue)

ITEM 336-2 - PAVEMENT REPLACEMENT, 4 1/2" (local streets)

SECTION 340 - CONCRETE CURB, GUTTER, SIDEWALK, DRIVEWAY AND ALLEY ENTRANCE

Concrete curb, gutter, sidewalk, and driveways shall conform to Section 340 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 340.1 - Description

Add the following.

The work shall include the construction of concrete curb and gutter sections to match existing curb, gutter, and sidewalk for the construction of the cul-de-sac termination of 41st Drive as identified in the plans and construction of the concrete mow strip delineating the edge of turf as shown on the plans.

Subsection 340.6 - Payment

Replace this subsection with the following:

Payment for concrete curb and gutter shall be made on the basis of the price bid per linear foot. Payment shall be considered full compensation for all construction equipment, labor, materials, pavement removal and replacement if necessary, and all incidentals items necessary to accomplish the work in conformance to the plans including construction of the curb transitions.

ITEM 340-1 - CONCRETE CURB AND GUTTER (MAG Det. 220 Type 'A')

Payment for concrete header shall be made on the basis of the price bid per linear foot and shall be full compensation for all construction equipment, labor, materials, and all incidentals necessary to accomplish the work in conformance to the plans. .

ITEM 340-2 - CONCRETE HEADER

Payment for concrete sidewalk shall be made on the basis of the price bid per square foot. Payment shall be considered full compensation for all construction equipment, labor, materials, pavement removal and replacement if necessary, and all incidentals items necessary to accomplish the work in conformance to the plans.

ITEM 340-3 - CONCRETE SIDEWALK (MAG Det. 230)

SECTION 350 - REMOVAL OF EXISTING IMPROVEMENTS

Removal of existing improvements shall conform to Section 350 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 350.1 - Description

Add the following:

The work includes the removal and disposal of an existing traffic barricade, concrete curb & gutter, sanitary sewer pipe, and other obstacles to construction, unless it is specifically called out on the plans to be removed and salvaged or protected in place. Holes, cavities and trenches resulting from the removal of structures shall be backfilled if necessary in accordance with Sections 206 and 211. The disposal of all waste material removed under this item shall be the responsibility of the Contractor. The disposal site shall be approved by the Engineer prior to disposal.

If a Maricopa County landfill is selected for the disposal of waste materials and/or debris, a Maricopa County Landfill Use Permit will be required. Application for permit can be made at the Maricopa County Landfill Office, located at 2801 West Durango Street, Phoenix, Arizona 85009 (telephone (602) 269-2661). Charges will be levied on a volume basis for each load delivered to the landfill in accordance with the current fee schedule.

Subsection 350.4 - Payment

Replace this subsection with the following.
Payment for the removal and disposal of existing concrete sidewalk shall be made on the basis of the price bid per linear foot of removal and shall be considered full compensation for all construction equipment, labor, materials, pavement removal and disposal, and all incidentals necessary to accomplish the work in conformance to the plans.

ITEM 350-1 – REMOVE CONCRETE CURB AND GUTTER

Payment for the removal and disposal of existing sanitary sewer pipe shall be made on the basis of the price bid per linear foot. Payment shall be considered full compensation for all construction equipment, labor, materials, removal and disposal, and all incidentals necessary to accomplish the work in conformance to the plans including installing/constructing sewer plugs in the lines to remain.

ITEM 350-2 – REMOVE SANITARY SEWER PIPE

Payment for the removal and disposal of existing manholes shall be made on the basis of the price bid per each and shall be considered full compensation for all construction equipment, labor, materials, removal and disposal, and all incidentals necessary to accomplish the work in conformance to the plans.

ITEM 350-3 – REMOVE EXISTING MANHOLES

Payment for the removal and disposal of storm drain pipe shall be made on the basis of the price bid per linear foot. Payment shall be considered full compensation for all construction equipment, labor, materials, removal and disposal, and all incidentals necessary to accomplish the work in conformance to the plans.

ITEM 350-4 – REMOVE STORM DRAIN PIPE

No payment shall be made for the removal of the traffic barricade or other obstacles to construction; the cost thereof shall be included in the payment for clearing & grubbing of which is considered incidental or appurtenant.

SECTION 401 - TRAFFIC CONTROL

Traffic control shall conform to Section 401 of the MAG Uniform Standard Specifications and COP Supplement to MAG except as modified herein.

Subsection 401.1 – Description

Replace this subsection with the following:

This work shall consist of traffic control devices and flagmen or pilot cars in accordance with Section 401 of the COP Supplement and the City of Phoenix Traffic Barricade Manual, latest revision.

a. Traffic Control Devices
   All traffic and/or traffic control devices on this project shall be provided, maintained and/or controlled as specified in the City of Phoenix Traffic Barricade Manual, latest revision.

b. Street Closure Permits
   Permission to restrict city streets, sidewalks and alleys (street closure permits) shall be requested as specified in Section III of the City of Phoenix Traffic Barricade Manual.

c. Traffic Manual
   Unless otherwise provided for in the following "General Traffic Regulations," all traffic on this project shall be regulated as specified in Section IV of the City of Phoenix Traffic Barricade Manual.

d. Prior Approval
   No deviation to the "General Traffic Regulation" will be allowed or implemented unless submitted to the Engineer for review and approval two weeks prior to the proposed work.

Subsection 401.5 – General Traffic Regulations

a. Local Access Requirements

The Contractor shall maintain local access to all side streets, access roads, driveways, alleys, and parking lots at all times and shall notify residents 72 hours in advance of any restrictions which will affect their access. The Contractor shall restore the access as soon as possible. If the primary access cannot be restored in a timely manner, the Contractor shall provide an alternative, which shall be predetermined with the residents prior to imposing any restrictions. Any local street restrictions imposed shall be such that local area traffic circulation is maintained unless specified to be closed herein or as shown on the detour plans.

b. Flagging of Traffic

Intermittent flagging of traffic in both directions will be allowed during daylight hours to facilitate construction and access for heavy construction equipment.

c. Traffic Control Plan

The Contractor shall submit a Traffic Control Plan (TCP) for approval, showing placement of all traffic control devices, including all conflicting signs to be covered/removed or relocated, or other features that may conflict with the placement of temporary signage. This plan shall be professionally drawn on a 24" x 36" reproducible medium, and shall be submitted to the Engineer at the Pre-Construction Conference meeting.

d. Business Access Requirements

Access shall be maintained to adjacent businesses at all times during their hours of operation. Access may be maintained by such measures as constructing driveways in half sections, or by providing bridging over new concrete. Properties having more than one point of access shall not have more than one access restricted for more than fourteen (14) calendar days at any given time. Access to adjacent driveways shall be provided during all non-working hours. Any business restrictions shall be coordinated with the affected business in writing at least seven (7) days prior to imposing restrictions.

e. Pedestrian Access Requirements

The Contractor shall ensure that all sidewalks on this project remain open and safely usable at all times. Such measures as backfilling or ramping to existing sidewalks, or providing alternate sidewalk areas adjacent to existing sidewalks may be used. In high pedestrian use areas, the Engineer may request temporary hard-surface walkways, such as plywood sheets to be installed at no additional cost to the District.

f. Bus Stops

The Contractor shall maintain all existing bus stop locations on this project in a safe manner, or provide alternate bus stop locations as required by the Engineer.

g. Sanitation Pickup

The Contractor shall provide sanitation pickup for affected residents by relocating trash containers, or by providing alternative measures acceptable to the Sanitation Division of the City of Phoenix Public Works Department.

h. Traffic Control and Safety

At the time of the Pre-Construction Conference, the Contractor shall designate an employee, other than the Project Superintendent, who is well qualified and experienced in construction traffic and safety, to be available on the project site during all periods of construction to coordinate and maintain safe barricading whenever construction restricts traffic.

i. Special Sign Requirements

j. Special Notification Signs

k. Coordination with COP Construction Traffic Control
The Contractor shall contact Tony Arviso at 262-6565 or John Perez at 495-6934 at Construction Traffic Control, City of Phoenix.

Subsection 401.5.1 – Special Traffic Regulations
Replace this subsection with the following:

a. 43rd and Southern Avenues are considered a major street and the following lane closure restrictions will apply:

b. For night time work or on weekends the Contractor shall minimize noise disturbance to the surrounding residential areas by disengaging "back-up beepers" and utilizing back-up strobe lights with spotters, and by increasing the muffler capacities of all equipment.

c. For construction of the basin, the Contractor shall maintain one lane of traffic in each direction.

d. Prior to excavation, the Contractor shall:
1. Develop a haul route plan and obtain a no fee permit from COP Development Services Department
2. Obtain COP Street Transportation Department approval of haul route, truck volumes and operating hours.
3. Obtain COP Development Services Department grading permit, including Floodplain Section if applicable, for the proposed spoil location
4. Street Transportation Department Permit does not release Contractor from MAG Subsection 108.5 requirements.

Subsection 401.7 - Payment
Replace this subsection with the following:
Payment for traffic control, including all mobilization, signage, materials, and maintenance shall be made on the basis of the lump sum price bid.
ITEM 401 -1 - TRAFFIC CONTROL

Payment for off-duty City of Phoenix uniformed officers as mandated by the City of Phoenix will be on an as-used basis as determined by the Engineer. The Contractor shall submit documentation as required by the Engineer to support payment for this item. Payment for off-duty uniformed officers shall be made on the basis of the contract unit price per hour.
ITEM 401-2 - OFF-DUTY UNIFORMED OFFICER

SECTION 405 - MONUMENTS

Monuments shall conform to Section 405 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 405.1 – Description

Add the following:

New MAG 120-1 Type 'B' monuments shall be set with the construction of the cul-de-sac at the north end of 41st Drive.

Subsection 405.5 - Payment

Replace this subsection with the following:

Payment for monuments will be made on the basis of the price bid for each monument and shall be considered full compensation for all construction equipment, labor, materials, pavement removal, and all incidentals necessary to accomplish the work in conformance to the plans.

ITEM 405-1 – SURVEY MONUMENTS (MAG Det 120-1-B)

SECTION 425 - TOPSOILS

Topsoil shall conform to Sections 425 and 795.2 of the MAG Uniform Standard Specifications and the City of Phoenix Supplemental Specifications.

Subsection 425.1 - Description:

Add the following:

Topsoil shall be placed in the bottoms and along the slops of the basin to the depth shown on the plans. The topsoil shall be placed to the finished grade as shown in the plans.

Subsection 425.2 - Materials:

Refer to Section 430 of these Special Provisions.

Subsection 425.5 - Payment:

Replace this subsection with the following:

Payment for the placement of topsoil shall be made on the basis of the price bid per cubic yard for topsoil in place. Price bid shall include the over excavation, hauling, and disposal of the excavated material, all labor, material, and equipment necessary for providing and placing the topsoil in accordance with the plans.

ITEM 425-1 – TOPSOIL

SECTION 430 – LANDSCAPING AND PLANTING

Landscaping and planting shall conform to Section 430 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 430.1 - Description:

Add the following paragraphs:

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 damages will be repaired by the Contractor at no additional cost to the Contracting Agency.

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

The work under this section shall consist of furnishing all labor, materials and equipment to install native seed mix, bermuda grass seed, decomposed granite, concrete header, and installation of trees and shrubs.

Subsection 430.2 - General:

Add the following sentence:

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.

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

All materials and products shall conform to the requirements of the City Supplement to MAG Specifications Section 795.

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.

Water costs are the contractor 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 graded 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.

Determine location of underground utilities and perform work in a manner, which will avoid possible damages. The contractor at no additional costs will repair any damages to the Contracting Agency. Hand excavates, as required. Maintain stakes by others until removal is mutually agreed upon by parties concerned.

If rock or other obstructions are encountered in excavation for planting, notify the owner's representative. Proceed with work only as directed.

Ship materials with Certificate of Inspection required by governing authorities.

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. The contractor may make substitution of a larger size of the same species 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.

The Engineer reserves the right to take and analyze samples of materials for conformity to specifications at any time. Contractor shall furnish samples upon request. Rejected materials shall be immediately removed from the site at the contractor's expense. The contractor shall pay cost of removing materials not meeting specifications.

All herbicide / pesticide applicators shall be properly licensed for application of non-restricted use chemicals with an 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.

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 relocate 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" looses depths and compact too adjacent ground densities.

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.

During Landscape Work, keep pavements clean and work areas in orderly conditions. 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.

Do not treat any area with a pre-emergence control that is to receive bermuda grass or native seed mix.

Subsection 430.3.1 - Preparation of In-Place Soil:
Add the following:
Topsoil will be placed in the bottom and along the slopes of the basin conforming to Section 215 and Section 425.

For the topsoil being placed, 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:

Organic matter 2-inch deep (approx. 6.2 CY per 1,000 SF)
Sulfur 15 LBS per 1,000 SF
Iron Chelate 1 OZ per 1,000 SF

Till soil and amendments to homogenous fine mixture, free of lump 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 areas, remove ridges. Apply fertilizer, reference City Supplement to MAG Section 795, at the rate recommended by the manufacturer (approximately 6-lbs/1000 sf) for initial seeding operations.

Moisten prepared lawn areas if soil is dry.

Subsection 430.3.4 - Seed Mix
Bermuda grass shall be planted on all basin side slopes and the bottom of the basins.

The native grass and wildflower mix shall be as identified on the project plans.

Subsection 430.3.5 - Seedbed Preparation
Prior to placing any seed, the Contractor is to verify that rough and final grading is complete and has been accepted by Engineer.

Mix soil amendments and fertilizers with topsoil at rates specified in Subsection 430.3.1. Apply soil amendments on surface of topsoil and incorporate thoroughly into the top 6-inches before planting, using approved equipment.

Fine grade the turf area to a smooth, even surface with loose, uniformly fine texture. Lightly roll, rake, and remove ridges and fill depressions to meet finish grades. The Contractor shall achieve 85% compaction for the topsoil. Remove trash, debris, stones larger than 1-inch in any dimension, and other objects, which may interfere with planting or the maintenance operation of the turf area.

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

Lightly moisten prepared turf and native grass and wildflower mix area before planting if soil is very dry, or to achieve desired compaction. Allow surface to dry off and loosen top 1-inch before planting the bermuda grass seed. Do not create muddy soil conditions.

Restore prepared areas to specified condition if eroded or otherwise disturbed after fine grading and prior to seeding.

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.

Subsection 430.3.6 - Application of seed mix
The bermuda grass seed and native grass and wildflower mix shall be installed per MAG City of Phoenix Supplements, Revised July 1, 1994, and Subsections 430.11.4 and 430.11.5. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

The bermuda grass seed shall be applied using a spreader or seeding machine at a rate of 4 lbs/1,000 sf. Do not seed when wind velocity exceeds five miles per hour. Distribute seed evenly over the entire area by sowing equal

quantities in two directions at right angles to each other. The seeding rate is specified in pure live seed (pls). Any change to the specie of bermuda grass or the rate of application will be approved by the Engineer.

The bermuda grass seed shall be planted after night time temperatures reach or exceed 65 degrees. Use hulled seed for greater than 65 degree planting, and un-hulled seed for winter planting.

The native grass and wildflower seed shall be applied using a spreader or seeding machine at the rates specified by the supplier. Do not seed when wind velocity exceeds five miles per hour. Distribute seed evenly over the entire area by sowing equal quantities in two directions at right angles to each other. The seeding rate is specified in pure live seed (pls). Any change to the native grass and wildflower mix or the rate of application will be approved by the Engineer.

Subsection 430.3.7 - Acceptance:
At the end of the 120-day guarantee and maintenance period, the Engineer will make an inspection to determine acceptability of the Bermuda grass seed mix and the native grass and wildflower seed mix.
Bermuda grass area will be acceptable provided requirements, including maintenance, have been complied with, and a vigorous, healthy, well rooted lawn is established, free of weeds, bare areas greater than 2-inches in diameter, and surface irregularities.

Subsection 430.4 – Decomposed Granite Area:
Add the following paragraphs:
The areas on which the granite mulch or river runs is to be placed shall be graded according to the drawings, prior to the placement of any granite or river run. The ground shall be reasonably smooth and rocks larger than 1" in diameter, within the top 1" 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 a depth is not indicated the minimum depth shall be two inches.

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.

Subsection 430.5.6 - Shrub and Tree Pits:
Delete the entire section and replace with the following:

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

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

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

Prior to delivery of any species to the project site, the Contractor shall make the necessary arrangements with the Engineer for an inspection of the plant material. The contractor will pay for travel to non-local Nurseries, out of the metropolitan Phoenix area, when requested 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.

Prior to planting, a percolation test shall be performed on all tree-planting pits to determine adequate drainage. Fill pit half-full with water. Allow 24 hours to drain. If pit has not substantially drained, a caisson shall be installed. Each caisson shall have a four-foot (4') by 8-inch (8") diameter hole filled with 1-1/2 inch diameter crushed stone. Fill to bottom of pit. Adjust depth of caissons if ground water, caliche, or rock is encountered

Do not prune prior to delivery unless otherwise approved by owner's 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.

Prepared backfill 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.

Plant Size	Amount of Fertilizer
1 gallon	1 pound (one fifth of a bag)
5 gallon	2.5 pounds (one half 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 for approval.

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

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" 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

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

Stake all trees per plans. Set stakes vertically 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.

Surface drainage of planting areas: Provide proper surface drainage of planted areas. Any discrepancy in the Plans or Specifications, obstructions on the site, or prior work done by another party which Contractor feels precludes establishing proper drainage, shall be brought to the attention of the Engineer in writing for correction and relief.

Subsection 430.8 - Plant Guarantee and Maintenance:

Add the following paragraphs.

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. Make replacements within seven days of notification from the Engineer. Remove dead plants within seven days of notification. Replacements shall be of the same kind and size as originally specified and shall be installed as described in the contract documents.

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 120 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 reseeding 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 weeds free, plant materials and turf are in satisfactory growing condition, and 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.

Subsection 430.10 - Measurement and Payment

Replace this subsection with the following:

Payment shall be considered full compensation for all labor, materials, equipment, and all other items necessary and incidental to the installation of landscaping, complete in place including but not limited to trees, soil

preparation according to the plans, and the 120-day establishment and maintenance period. Payment for landscaping shall be made on the basis of the lump sum price bid.

ITEM 430-1 – LANDSCAPING (15 gallon trees)

Payment shall be considered full compensation for all labor, materials, equipment, soil preparation, and all other items necessary and incidental to the application of the bermuda seed in the bottom and on the side slopes of the basin, and the 120-day establishment and maintenance period. Payment for the bermuda seed shall be made on the basis of the price bid per acre.

ITEM 430-2 - BERMUDA GRASS (seed)

Payment shall be considered full compensation for all labor, materials, equipment, soil preparation, and all other items necessary and incidental to the application of the native seed mix in the areas shown in the plans, and the 120-day establishment and maintenance period. Payment for the native seed shall be made on the basis of the price bid per acre.

ITEM 430-3 – NATIVE SEED

Payment for decomposed granite and the stabilized decomposed granite shall be made on the basis of the price bid per square foot. Price bid shall include all labor, material, and equipment necessary to place decomposed granite in accordance with the plans.

ITEM 430-4 - STABILIZED DECOMPOSED GRANITE

ITEM 430-5 – DECOMPOSED GRANITE

SECTION 440 - SPRINKLER IRRIGATION SYSTEM INSTALLATION

Sprinkler irrigation system installation shall conform to Section 440 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 440.1 - Description

The work shall consist of the installation of an irrigation system for all plantings, and an irrigation system for the bermuda grass.

The Contractor shall install all irrigation systems, lines, sprinkler heads, and other irrigation as shown on the plans. The irrigation system lines and spray headers will be adjusted as required to accommodate the newly graded area contours. All new materials and hardware for irrigation lines, valves, heads, etc. shall satisfy the requirements of Section 440 and Section 757.

An irrigation station will also be installed to support the irrigation systems for the basins. This work includes the installation of a water service line and water meter off the existing 8-inch water main located in 43rd Avenue. The 4" water service line from the water main and the water meter will be installed by the City Water Services Department (WSD). The Contractor will contact the WSD a minimum of 30 calendar days in advance for the installation of the water service line and the meter. Contact the WSD at 200 West Washington, Eighth Floor, at 495-5601.

The cost of providing the electrical service to the irrigation station, including but not limited to all pavement replacement and APS fees and related costs will be incidental to the cost of the irrigation installation.

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 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.

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.

A. American Society of Testing Materials (ASTM) - Specifications and Test Methods specifically referenced in this Section.

B. Underwriters 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.

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 cost 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 the Engineer approves products.

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	Emitters

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 feet 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.

Before the final inspection, the Contractor shall deliver to 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: the Engineer shall approve As-Built drawings 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 hermetically 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. Contractor to 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. Contractor also to 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 procurred 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. Four quick-coupler keys and matching hose swivels for each type of quick-coupling valve installed.
C. 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 emitters 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 with work until unsatisfactory conditions have been corrected.

440.6.1 Staking: Mark with powdered lime, routing of pressure supplies line and stake locations of various components, sprinkler heads and emitters. 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 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 inches of clearance between each line, and not less than 12 inches of clearance between lines of other trades, to permit service or 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 plan. 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 can not 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 areas, 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 pipes, 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 pipeline to prevent uneven settlement. Installation of pipe shall be installed in accordance with ASAE Standard: ASAE 376. Pipe shall be clean prior to installation and shall be maintained in that condition during installation. When pipe lying 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.

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 colors.

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. A separate hot wire to its controller shall connect each valve.

Two spare #12 AGW wire 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 and Wastewater 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 Contractors responsibility to submit the forms to the Engineer and to Water Quality Division, Backflow Prevention Unit. Final acceptance will not be given until the Engineer approves the reports.

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 locking 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 they control without approval of the Engineer.

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

CUBIC FEET OF GRAVEL PER DRAIN VALVE-DISTANCE OF PIPING TO BE DRAINED CUB				
PIPE SIZE	0 – 250 LF	251-500 LF	501-750 LF	751-1000 L
1	.75	1.50	2.25	3
1-1/4"	.75	1.50	2.25	3
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 Couplers and Hose Bibcocks shall be installed as shown on the plans, or as specified. Their location shall be a minimum of 3 feet from curbs, pavements and walks, unless approved otherwise by the Engineer. Quick-couplers shall be installed on 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 inches 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 flood 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.

440.6.8 Emitters: Install emitters where indicated on the drawings, staked and approved. Emitter heads shall be installed as detailed.

440.6.9 Riser Assemblies: 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 conduits for control wiring 2 feet beyond concrete slab or walls and provide bushings for all conduits. 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 drawings. 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 backfill 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.

440.12 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

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. The Contractor shall furnish all equipment, materials, and labor necessary to preform the tests 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 he course of the Plant Establishment Guarantee and Maintenance Period.

Subsection 440.8 - Measurement and Payment
Payment for the irrigation system for all plantings, and including the irrigation station shall be made on the basis of the lump sum price bid. Price bid shall include all labor, materials, tools, and equipment to complete the sprinkler irrigation system for all plantings and for the complete installation of the irrigation station including the electrical hook-up by APS, and water service connection as provided by the City according to the plans.
ITEM 440-1 - DRIP IRRIGATION SYSTEM (Complete)

Payment for the bermuda grass irrigation system shall be made on the basis of the lump sum price bid. Price bid shall include all labor, materials, tools, and equipment to complete the sprinkler irrigation system for the bermuda grass, according to the plans.
ITEM 440-2 - TURF IRRIGATION SYSTEM (Complete)

SECTION 505 - CONCRETE STRUCTURES

Structural concrete shall conform to Section 505 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 505.1 - Description
Add the following:
The work under this section shall consist of furnishing all labor, materials and equipment for the construction of all cast-in-place and other concrete structures including the concrete inlet structures, catch basins, and the basin outlet structure as located and indicated on the plans.

Concrete shall conform to the requirements of Section 725 of the MAG Uniform Standard Specifications, and mix designs shall additionally meet the requirements of Chapter 5, Section 5.3 of ACI STANDARD 318-89. The Contractor shall submit mix designs and certifications of conformance with the above requirements for the written approval of the Engineer.

Class "A" Concrete, f'c = 3,000 psi, shall be used for all concrete structures.

The use of Class F fly ash will be permitted in all concrete mixes, subject to approval of mix design by Engineer.

Transit Concrete mixes used on the project must carry current certification from ADOT or Arizona Rock Products Association.

The reinforcing steel shall conform to Section 727, Grade 60, of the MAG Uniform Standard Specifications

The 3" PVC weep holes shall be installed as shown on the plans.

Shop Drawings shall be submitted for the following:
- Product Data: Admixtures and patching materials.
- Placement Drawings:
  a. Concrete, identifying location of each type of construction joint.
  b. Reinforcing steel.
- Plastic Type Water Stops: Details of splices to be used and method of securing water stop in the forms and supporting water stop so as to maintain proper orientation and location during concrete placement.

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

Subsection 505.6 - Placing Concrete
Add the following:
Place concrete in accordance with ACI 301-89. Prior to placing concrete, remove loose soil and water from excavation and subgrade and debris and foreign material from forms. Obtain Engineer's approval of subgrade before placing reinforcing steel. Check reinforcing steel for proper placement and correct discrepancies. Before depositing new concrete on old concrete, clean surface using sandblast or bushhammer or other mechanical means to obtain a 1/4-inch rough profile. Maximum vertical drop to final placement shall be 6 feet, when not guided with chutes or other devices to prevent segregation caused by impact with reinforcing. Do not use aluminum pipe or aluminum conveying devices.

Steps performed in preparation for placing concrete shall meet requirements and recommendations of ACI 304R-89 and ACI 301-89, except as modified herein. Ends of chutes, piping, hopper gates, and other points of concrete discharge throughout the conveying, hoisting, pumping, and placing system shall be designed and arranged for concrete to pass without becoming segregated. Do not use chutes longer than 50 feet. The minimum slopes of chutes shall be angled to allow concrete to readily flow without segregation. Conveyor belts shall be approved by Engineer, wiped clean with a device which does not allow mortar to adhere to belt, and conveyor belts and chutes covered.
Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during placing, for adequate redundancy to ensure completion of concrete placement without cold joints in case of a primary placing equipment breakdown. Minimum pump hose (conduit) diameter shall be 4 inches. Replace pumping equipment and hoses (conduits) that are not functioning properly.

Provide intermediate construction joints at maximum spacing of 30 feet. Should placement sequence result in cold joint, install water stop in joint.

Limit size of each placement to allow for strength gain and volume change caused by shrinkage. Minimum time between adjacent placements for construction of the spillway floor slab shall be seven (7) days.

Consolidate concrete with internal vibrators with minimum frequency of 8,000 cycles per minute and amplitude required to consolidate concrete in section being placed. Provide at least one standby vibrator in operable condition at placement site prior to placing concrete. Consolidation equipment and methods shall conform with the requirements of ACI 309R-87. Provide sufficient windows in forms or limit form height to allow for concrete placement through windows and for visual observation of concrete. Vibration consolidation shall not exceed a distance of 5 feet from point of placement. Vibrate concrete in vicinity of joints to obtain impervious concrete there.

When vibrating concrete, apply approved vibrator at points spaced not farther apart than vibrator's effective radius. Apply close enough to forms to vibrate surface effectively but not damage form surfaces. Vibrate until concrete becomes uniformly plastic. Vibrator must penetrate fresh placed concrete and into previous layer of fresh concrete below.

Subsection 505.6.1 - Joints
Add the following:
To new concrete wall horizontal constructions joints, thoroughly clean and saturate joint with water. Cover horizontal wall surfaces with minimum 2 inches of grout, as specified in Section 776, and immediately place concrete. Limit concrete lift placed immediately on top of grout to 12 inches thick. Thoroughly vibrate to mix and consolidate grout and concrete together.

To old concrete (greater than 60 days old), mechanically roughen existing concrete surfaces to a clean, rough surface using a "Blastrac" by Wheelabrator-Frye, Inc.; or "Porta-Shotblast" by Nelco Manufacturing Corp, to remove existing concrete surface, and provide a minimum roughness profile of 1/4-inch. Saturate surface with water for 24 hours; cover with 2 inches of grout, and place grout as specified for new concrete.

Construction joints shall be constructed as straight joints and made either vertical or horizontal. Concrete placement shall commence after the joint preparation is complete.

For construction joints, prior to placement of abutting concrete, clean contact surface by removing laitance and spillage from reinforcing steel and dowels. Then roughen surface to a minimum of 1/4-inch amplitude by either sandblasting after the concrete has fully cured, water blasting after the concrete has partially cured, or if the concrete is green, cutting the fresh concrete with high pressure water and hand tools. Perform cleaning so as not to damage water stop, if one is present.

Join water stops at intersections to provide continuous seal. Center water stop on joint. Secure water stop in correct position to avoid displacement during concrete placement. Repair or replace damaged water stop. Place concrete and vibrate to obtain impervious concrete in the vicinity of all joints. For joints in slabs, make sure that the space beneath plastic water stop is completely filled with concrete. Also, during concrete placement, make a visual inspection of the entire water stop area. Limit concrete placement to elevation of water stop in first pass, vibrate the concrete under the water stop, lift the water stop to confirm full consolidation without voids, then place remaining concrete to full height of slab. Apply procedure to full length of plastic water stops.

Plastic water stops shall be installed in accordance with manufacturer's written instructions. Splice in accordance with the water stop manufacturer's written instructions using a thermostatically controlled heating iron. Butt splice unless specifically detailed otherwise. Allow at least 10 minutes before the new splice is pulled or strained in any way. Finished splices shall provide a cross section that is dense and free of porosity with tensile strength of not less than 80 percent of the unspliced materials. Wire looped plastic water stop may be substituted for plastic water stop.

Subsection 505.8 - Curing
Add the following:
Use one of the following methods as approved by Engineer.

Walls shall have only water curing procedures used. Method 1: Leave concrete forms in place and keep entire surfaces of forms and concrete wet for 10 days. Method 2: Continuously sprinkle with water 100 percent of exposed surfaces for 10 days starting immediately after removal of forms.

Slabs shall use one of the following methods: Method 1: Protect surface by water ponding for 10 days; Method 2: Cover with burlap or cotton mats and keep continuously wet for 10 days; Method 3: Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously wet for 10 days; or Method 4: Continuously sprinkle exposed surface for 10 days. Other agreed-upon methods that will keep moisture present and uniform at all times on surface of slabs. Do not use curing compounds.

Subsection 505.9 - Finishing Concrete
Add the following:
A heavy rake finish shall be applied to the floor of the inlet spillway structure prior to the sloping surface The sloping surface of the spillway shall have a rough broom finish applied to the floor.

All exposed concrete structures including the concrete channel lining, inlet spillway structure, and the outlet structure shall be colored using a "light brown" admixture. The color shall conform to Davis Color "Flag Stone Brown #64" as manufactured by Davis Colors, or an approved equal, with respect to hue, value, and chroma. A test panel shall be made and the concrete color shall be approved by the Engineer prior to use. The color shall be added at the rate of 2 pounds per 94-pound sack of cement. The cost of the coloring is incidental to the cost of the concrete.

A clear protective water based coating shall be applied to all exposed concrete structure surface areas. The coating shall be Graffiti Protector #J-44, produced by Dayton Superior, or approved equal. The coating shall be clear and contain no coloring. The cost of the coating is incidental to the cost of the concrete.

A form liner shall be used for the finish on all outside vertical faces of the outlet structure except on the coping band at the top. The form liner shall be VA D.O.T. Fractured Rib design, No. 367, uni-cast and/or multi-cast sheets as manufactured by Greenstreak, or approved equal. Form liners shall be prepared, placed and stripped per the manufacturer's requirements, recommendations and specifications. The form liner shall not infringe on or reduce the required thickness of the retaining wall as detailed on the plans. The cost of the form liner is incidental to the cost of the outlet structure.

Prior to starting patching work, obtain quantities of color-matched patching material and manufacturer's detailed instructions for use to provide a structural patch with finish to match adjacent surface. Develop patching techniques with epoxy manufacturer on mockup panel. Dress surface of patches that will remain exposed to view to match color and texture of adjacent surfaces. Patching of concrete shall provide a structurally sound surface finish, uniform in appearance or upgrade finish by other means until acceptable to Engineer.

For tops of walls, screed surfaces to true level planes. After initial water has been absorbed, float with wood float and trowel with steel trowel to smooth finish free from trowel marks.

Spray evaporation retardant onto surface of fresh flatwork concrete immediately after screeding to react with surface moisture. Reapply as needed to ensure a continuous moist surface until final finishing is completed.

Subsection 505.9.6 - Finishing and Patching Surfaces
Add the following new section:

When patching *defective* areas, remove *defective* concrete to a depth of sound concrete. Small shallow holes caused by air entrapment at surface of forms shall not be considered *defective* unless amount is greater than 3/4 inch in diameter or as stipulated by the Engineer. Obtain Engineer's approval of chipping work.

Cut out honeycombed and *defective* areas. Cut edges perpendicular to surface at least 1 inch deep. Do not feather edges. Soak area with water for 24 hours. Patch with non-shrink grout as specified in Section 776. Finish surfaces to match adjacent concrete. Keep patches damp for minimum 7 days or spray with curing compound to minimize shrinking.

To patch form tie holes, fill with Category I grout as specified in Section 776. Use only enough water to dry pack. Compact grout using steel hammer and steel tool to drive grout to high density. Cure grout with water. Make sure color of patch after curing matches color of adjacent concrete.

Subsection 505.10 - Payment
Payment for concrete structures shall be made on the basis of the price bid cubic yard of concrete. Payment shall be full compensation for all labor, materials, reinforcing steel, access barriers, and grates, equipment, excavation and backfill, color admixture, protective coating, and all other items necessary and incidental to construct the structures complete in place according to the plans and these Special Provisions exclusive of flapgates and handrails.
ITEM 505-1 - INLET SPILLWAY STRUCTURE
ITEM 505-2 – OUTLET STRUCTURE
ITEM 505-3 - SOUTH INLET STRUCTURE
ITEM 505-4 - NORTH INLET STRUCTURE

SECTION 510 - CONCRETE BLOCK MASONRY

Concrete Block Masonry shall conform to Section 510 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 510.2 - Construction
Add the following:
The work shall include the construction of the concrete block masonry fence including all footings, joints, corners, step-downs, and pilasters matching existing wall type and dimensions, and all other work required to complete the installation of the walls or fences as specified on the plans and in the Special Provisions.

Surfaces of concrete block masonry shall be prepared for the application of paint as specified on the plans and in Section 530 of the MAG Uniform Standard Specifications.

Subsection 510.6 - Payment
Replace this section with the following:
Measurement and payment for concrete block masonry fence shall be made on the basis of the price bid per linear foot and shall include full compensation for furnishing all labor, materials, tools, and equipment, and doing all the work involved in constructing the fence complete in place as specified on the plans and in the Special Provisions.
ITEM 510 – 1 - CONCRETE BLOCK MASONRY WALL

SECTION 515 - STEEL STRUCTURES

Steel Structures shall conform to Section 515 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 515.1 - Description
The work under this section shall consist of supplying and installing Waterman Model F-10 or approved equivalent flapgates and the inlet grates and access barriers and associated embedments for the outlet structure according to the plans and these Special Provisions.

All material for the inlet grate and access barrier shall be A36 steel. The inlet grates, access barriers and associated embedments shall be galvanized in accordance with MAG Section 771.

Subsection 515.7 - Payment
No payment will be made for access barriers, or inlet grates and associated embedment angles as such, the cost thereof shall be included in cost of the Outlet Structure, North or South Inlet Structure made on the basis of the lump sum price bid per each. Payment shall be full compensation for all labor, materials, equipment, and all other items necessary to complete the work in place according to the plans and these Special Provisions.
ITEM 515-1 - 36" FLAP GATE

SECTION 520 - STEEL HANDRAILS

Steel handrails shall conform to Section 520 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 520.1 - Description

Add the following:

The work under this section shall include providing and erecting steel handrails as shown in the plans.

All steel handrails shall be painted in accordance with MAG Section 790. The paint color shall be a light brown in color as approved by the Engineer.

Subsection 520.5 - Payment

Payment for handrails shall be made on the basis of the price bid per linear foot. Payment shall be full compensation for all labor, materials, equipment, and painting, and all other items necessary to complete the work in place according to the plans and these Special Provisions.

ITEM 520-1 - STEEL HANDRAILS

SECTION 601 - TRENCH EXCAVATION, BACKFILLING AND COMPACTION

Trench excavation, backfilling and compaction shall conform to Section 601 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 601.4.2 – Bedding

Replace this subsection with the following:

Bedding material shall be 1/2 sack CLSM and shall conform to the requirements set forth in MAG Section 728. CLSM shall have a slump of 7 +/- 1 inch and have a minimum of 50 psi compressive strength and a maximum of 100 psi based on a 28-day test.

CLSM bedding material shall be placed in a uniform manner that will prevent voids in, or segregation of, the bedding material, and will not float or shift the pipe. CLSM bedding material shall be placed from bottom of pipe to pipe springline. No backfilling above the CLSM shall be commenced until 24 hours after the cement-treated slurry has been placed.

Bedding material above the springline of the pipe shall be granular material containing no pieces larger than 1 ½ inchs and free of broken concrete, broken pavement, wood or other deleterious material.

No water consolidation will be permitted.

Where mechanical compaction is used, the moisture content shall be such that the specified compaction can be obtained. Bedding lifts shall not exceed 12 inches loose and extreme care will be taken to prevent damage to or movement of the conduit by the compaction equipment.

The Contractor may opt to use cement-treated slurry from the pipe springline to the within one foot from the top of the pipe.

Subsection 601.6 - Payment:

No payment will be included in the proposal, nor direct payment made for trench excavation, foundation, bedding, 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 615 - SEWER LINE CONSTRUCTION

Sewer line construction shall conform to Section 615 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 615.1 - Description
Add the following
The work in this section shall include constructing a new 8" sewer line from the 41st Dr Ave to 43rd Ave along the basins south property line

Subsection 615.13 - Measurement and Payment
Replace this subsection with the following:
Measurement will be made horizontally along the length of the pipe rounded to the nearest foot including all fittings.

Payment for sewer pipe construction shall be made at the unit price bid per linear foot, and shall be full compensation for furnishing and installing the pipe and fittings complete in place, as specified, including excavation, removals if necessary, backfilling, compaction, sheeting and bracing, testing, and all incidental work not specifically covered in other pay items.
ITEM 615-1 - 8" SANITARY SEWER PIPE (VCP)

SECTION 618 – STORM DRAIN CONSTRUCTION

The work under this section shall conform to Section 618 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 618.1 – Description
Add the following:
The work under this section shall consist of furnishing and installing Rubber Gasketed Reinforced Concrete Pipe (RGRCP)and boring and jacking at the locations and to the grades and slopes indicated on the plans.

Subsection 618.2 – Materials
Add the following:
Concrete pipe, joints, gaskets, and testing shall be according to MAG Section 735 and as specified below.

Subsection 618.4 – Jacking Pipe
Add the following to this subsection:
Pipeline installations should be accomplished by dry boring, tunneling, jacking, or other approved methods.

The following requirements shall apply to these construction methods:

1. The use of water under pressure (jetting) or puddling will not be permitted to facilitate boring, pushing or jacking operations. Some boring may require water to lubricate cutter and pipe and under such conditions, is considered dry boring.
2. Where unstable soil conditions exist, boring or tunneling operations shall be conducted in such a manner as not to be detrimental to the utilities being crossed.
3. If excessive voids or too large a bored hole is produced during pipeline installations, or if it is necessary to abandon a bored or tunneled hole, prompt remedial action should be taken by the Contractor.
4. All voids or abandoned holes caused by boring or jacking are to be filled by pressure grouting. The grout material should be a sand cement slurry with a minimum of two (2) sacks of cement per cubic yard and a minimum of water to assure satisfactory placement.
5. The hole diameter resulting from bored or tunneled installations shall not exceed the outside diameter of the pipe by more than two (2) inches on pipes with an inside diameter greater than twelve (12) inches.

Subsection 618.5 – Measurement
Replace Paragraph C with the following:
Jacked Pipe
Measurement for the tunneled and/or jacked RGRCP shall be the number of horizontal linear feet of

surface undisturbed by the cut and cover construction on the ends of the tunneling and or jacking operation except for any amount that exceeds the limits as shown on the plans. any amount that is tunneled and or jacked beyond the limits as shown on the plans shall be measured as trenched installation.

Subsection 618.6 – Payment

Replace this subsection with the following:

Payment for storm drain construction shall be made at the unit price bid per linear foot. This shall be full compensation for furnishing and installing the pipe and fittings complete in place, as specified, including excavation, boring and jacking, backfilling, compaction, shoring, sheeting and bracing, testing and all incidental work not specifically covered in other pay items.

ITEM 618-1 - 30 INCH RGRCP (Bored & Jacked)
ITEM 618-2 - 36 INCH RGRCP, Class III
ITEM 618-3 – 48 INCH RGRCP, Class III
ITEM 618-4 - 66 INCH RGRCP, Class IV
ITEM 618-5 - 72 INCH RGRCP, Class IV

Payment for storm drain connector pipe shall be made at the unit price bid per linear foot. This shall be full compensation for furnishing and installing the pipe and fittings complete in place, as specified, including excavation, cutting and removing existing pipe & plugging existing pipe, placing pipe collars as needed per MAG DET 505, backfilling, compaction, shoring, sheeting and bracing, testing and all incidental work not specifically covered in other pay items.

ITEM 618-6 - 15 INCH CATCH BASIN CONNECTOR PIPE
ITEM 618-7 - 18 INCH CATCH BASIN CONNECTOR PIPE
ITEM 618-8 – 24 INCH CATCH BASIN CONNECTOR PIPE
ITEM 618-9 - 30 INCH CATCH BASIN CONNECTOR PIPE

Payment for the prefabricated tees shall be at the contract unit price for each . Such payment shall be for the cost of fabrication only. The cost of installation is covered under item 618-1 of the Bid Schedule.

ITEM 618-10 – 48" x 48" x 15" PREBABRICATED TEE
ITEM 618-11 – 48" x 48" x 18" PREBABRICATED TEE
ITEM 618-12 – 48" x 48" x 24" PREBABRICATED TEE
ITEM 618-13 – 48" x 48" x 30" PREBABRICATED TEE

Payment for the installing pipe plugs shall be at the contract unit price for each plug larger than 24 inch. No payment will be made for plugs less than 24 inch, the cost thereof shall be considered incidental to the item for which such plug is appurtenant.

ITEM 618-14 – PIPE PLUG, MAG DET 427

Payment for the prefabricated bends shall be at the contract unit price for each . Such payment shall be for the cost of fabrication only. The cost of installation is covered under item 618-1 of the Bid Schedule.

ITEM 618-15 – 66 INCH PREFABRICATED BEND

SECTION 625 - MANHOLE CONSTRUCTION

Manhole construction shall conform to Section 625 of the MAG Uniform Standard Specifications and the City of Phoenix Supplemental Specifications except as modified herein.

Subsection 625.1 - Description

The work includes the installation of the manhole structures for the storm drains entering the basin and the relocated sanitary sewer line in accordance with the plans.

Subsection 625.5 - Payment
Payment for manhole construction shall be made at the unit price bid per each. Price bid shall include all labor, materials, and equipment necessary to install manholes including excavation, bedding, backfill, compaction, embedments, rims, and covers, and all incidental work.
ITEM 625-1 – SANITARY SEWER MANHOLE (MAG 420)
ITEM 625-2 – STORM DRAIN MANHOLE, MAG DET 520 AND 522
ITEM 625-3 – SPECIAL JUNCTION STRUCTURE WITH MANHOLE (DET 1)
ITEM 625-4 – SPECIAL JUNCTION STRUCTURE WITH MANHOLE (DET 2)
ITEM 625-5 – MODIFY SANITARY SEWER MANHOLE

SECTION 650 - INSTRUMENTATION CONDUIT

Add this section to the MAG Uniform Standard Specifications.

Subsection 650.1 - Description
The work in this section shall include installing galvanized and pvc conduit to facilitate the future installation of weather monitoring equipment.

Subsection 650.2 - Conduit
Galvanized and Schedule 80 PVC in 2-inch diameter as required. Pipe shall conform to ASTM D 1785. Use Schedule 80 fittings conforming to ASTM D 2467 with primer and adhesive solvent connections conforming to ASTM D 2564. Install conduit as shown on plans. Provide and install 200-lb minimum test pull string in conduit.

Subsection 650.2 - Measurement
Measurement will be made horizontally along the centerline length of the pipe rounded to the nearest foot including all fittings.

Subsection 650.2 - Payment
Payment for instrumentation conduit installation shall be made at the unit price bid per linear foot, and shall be full compensation for furnishing and installing the pipe and fittings, concrete collar, excavation, compaction, and all incidental work not specifically covered in other pay items to complete this item in-place as specified.
ITEM 650-1 - 2" DIA INSTRUMENTATION CONDUIT

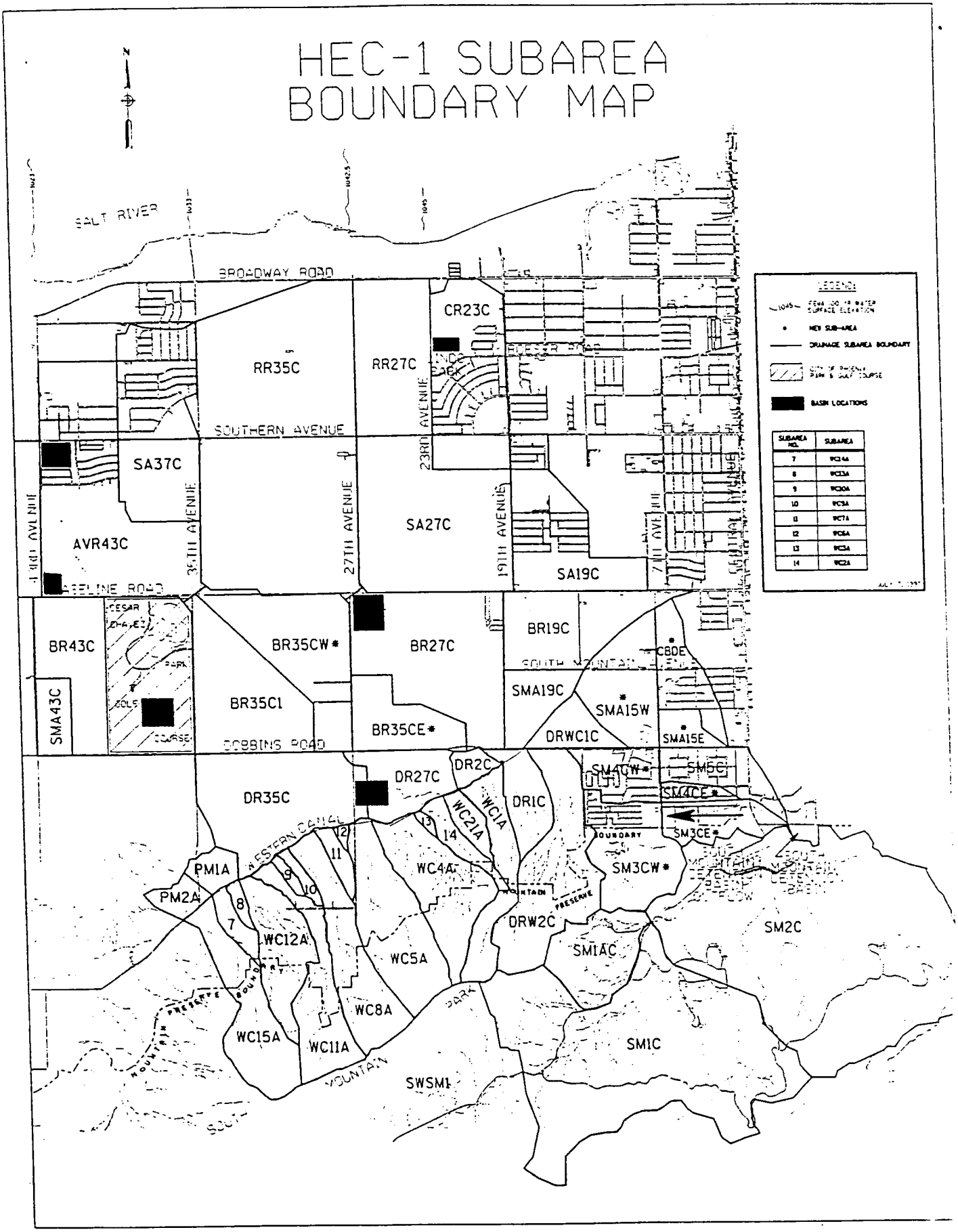
SECTION 725 - PORTLAND CEMENT CONCRETE

Portland cement concrete shall conform to Section 725 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 725.2 - Portland Cement
Add the following:
Cement shall be Portland Cement, conforming to the requirements of ASTM C-150, Type II, unless noted otherwise on the plans or in the specifications.

Subsection 725.6 - Admixtures
Add the following:
When an air-entraining agent is authorized, the amount used will be limited to the extent that the amount of air by volume shall not be less than 4 percent nor more than 6 percent. Air-entraining agents complying with AASHTO M-154 or ASTM C-260 will be permitted as long as strength requirements are met. Any admixture shall be measured accurately by mechanical means into each batch by equipment and in a method approved by the Engineer.

HEC-1 SUBAREA BOUNDARY MAP



```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  HEC-1     *
*          JUL  1997                    *
*        VERSION 4.1                    *
*                                       *
*  RUN DATE  28MAY98  TIME  10:25:22    *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    1         ID    LAVEEN ADMP INVESTIGATION BY HDR ENGINEERING
    2         ID    MODIFICATIONS IN MAY 1998 BY FCD
    3         ID    LAVEEN ADMS (FINAL HEC-1) 100-,25-,10-YR FUTURE 24-HR STORM        CBA FILE
    4         ID    HIDDEN VALLEY WATERSHED/CHAMPION DRAIN WATERSHED
    5         ID    INPUT FILE NAME  43FutP2M.DAT
    6         ID    3 BASIN ALTERNATIVE, FUTURE   DEVELOPMENT
    7         ID    BASIN AT NW COR 43RD AVE & BASELINE RD
    8         ID    24-HOUR SCS TYPE II RAINFALL - 100, 25, 10-yr frequency
              *DIAGRAM
    9         IT       5                    1000
   10         IO       5
              *
   11         JR    PREC   .6296   .7857    1.00

   12         KK    SM1C
   13         KM   SUB-BASIN SM1C-LAND USE- NATURAL DESERT(MOUNTAIN)
   14         KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
   15         KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
   16         IN      30
   17         BA   1.840
   18         PB    3.78
   19         KM   RAINFALL DEPTH OF 4.20 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
   20         PC    .000    .005    .011    .016    .022    .028    .035    .041    .048    .056
   21         PC    .068    .071    .080    .089    .098    .109    .120    .133    .147    .163
   22         PC    .181    .204    .235    .283    .663    .735    .772    .799    .820    .838
   23         PC    .854    .868    .880    .891    .902    .912    .921    .929    .937    .945
   24         PC    .952    .959    .965    .972    .978    .984    .989    .995   1.000
   25         KM   THE FOLLOWING PC RECORD USED A 24-HOUR SCS TYPE II STORM
   26         LG    .150    .346   3.800    .623  50.000
   27         UC    .450    .220
   28         UA       0       3       5       8      12      20      43      75      90      96
   29         UA     100
              *

   30         KK   SM1AC
   31         KM   SUB-BASIN SM1AC-LAND USE- NATURAL DESERT(MOUNTAIN)
   32         KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
   33         KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
   34         BA    .280
   35         LG    .150    .343   4.050    .528  10.000
   36         UC    .367    .288
   37         UA       0       3       5       8      12      20      43      75      90      96
   38         UA     100
              *

   39         KK    CSM1
   40         KM   COMBINE FLOW FROM SUB-BASIN SM1C WITH SM1AC AT COMPUTATOIN
   41         KM   POINT CSM1
   42         HC       2
              *
```

1 HEC-1 INPUT PAGE 2

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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   43         KK    RSM1
   44         KM   ROUTE FLOW FROM COMPUTATION POINT CSM1  TO COMPUTATION POINT CSM2
```

```
45          RS       2    ELEV  1375.5
46          RC   0.035   0.035   0.035    4300   0.017
47          RX       0      90     190     230     310     380     490     590
48          RY    1380    1380    1377  1375.5    1377    1380    1383    1390
            *

49          KK    SM2C
50          KM    SUB-BASIN SM2C-LAND USE- NATURAL DESERT MOUNTAIN
51          KM    24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
52          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
            *       1       2
53          BA   2.190
54          LG    .150    .350   3.310    .820  86.300
55          UC    .383    .134
56          UA       0       3       5       8      12      20      43      75      90      96
57          UA     100
            *

58          KK    CSM2
59          KM    COMBINE RUNOFF FROM SUB-BASIN SM2C TO ROUTED FLOW FROM COMPUTATION
60          KM    POINT CSM1
61          HC       2
            *

62          KK    RDENT
63          KM    ROUTE INFLOW HYDROGRAPH THROUGH SOUTH MOUNTAIN DETENTION BASIN
64          RS       1    ELEV    1292
65          SA    2.30    7.80   15.91   19.96   24.08   28.27   30.45   31.91
66          SE    1292    1294    1300    1305    1310    1315    1318    1320
67          SL    1298    7.06    0.58     0.5
68          SS    1318     200     2.7     1.5
            *

69          KK    RSM2
70          KM    ROUTE FLOW FROM COMPUTATOIN POINT CSM2 TO COMPUTATOIN POINT CSM3
71          RS      12    ELEV    1226
72          RC   0.040   0.040   0.040    6600   0.019    1228
73          RX       0      70     100     140     160     190     240     320
74          RY    1228  1227.5    1227    1226    1228  1228.5    1229    1230
            *
            *  REVISIONS DUE TO PROPOSED IMPROVEMENTS.

75          KK    SM3CE
76          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
77          BA     .17
78          LG     .16    .348    3.85    .607     1.5
79          UC   0.227   0.158
80          UA       0       3       5       8      12      20      43      75      90      96
81          UA     100
            *
```



```
LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

82          KK    C3CE
83          KM    COMBINE HYDROGRAPHS
84          HC       2
            *

85          KK  RSM3CE
86          KM    ROUTE RUNOFF FROM SM3CE TO 7th AVE & DOBBINS
87          RD    1980  0.0066   0.014            CIRC     4.5
            *

88          KK    SM4CE
89          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
90          BA     .05
91          LG    0.26    0.35     4.6    .592    14.4
92          UC   0.087   0.081
93          UA       0       5      16      30      65      77      84      90      94      97
94          UA     100
            *

95          KK    SM5C
96          KM    SUB-BASIN SM5C-LAND USE-URBAN
97          KM    24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
98          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
99          BA    .200
100         LG    .200    .349   4.300    .555  18.000
101         UC    .383    .355
102         UA       0       5      16      30      65      77      84      90      94      97
103         UA     100
            *

104         KK    CSM5C
105         KM    COMBINE HYDROGRAPHS FROM SM3CE, SM4CE, & SM5C
106         HC       3
            *

107         KK  DIVM5C
108         KM        Divert flow in excess of 250 cfs - Storm Drain Capacity
109         DT  DCSM5C
110         DI       0     250     500
111         DQ       0       0     250
```

```
                *
                * FLOW FROM SM5C ROUTED THROUGH PIPE NORTH ALONG 7th AVE.

   112          KK  RCSM5C
   113          KM   ROUTE FLOW THROUGH PIPE TO BOTTOM OF SMA15E
   114          RD    1200   .0066    .014            CIRC       6
                *

   115          KK  SMA15E
   116          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
   117          BA     .07
   118          LG      .3     .25    4.35      0.4        5
   119          UC    .081   0.057
   120          UA       0        3        9       18       28       42       59       73       87       92
1                                          HEC-1 INPUT                                                    PAGE  4

LINE            ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   121          UA     100
                *

   122          KK    C15E
   123          KM   COMBINE HYDROGRAPHS FROM SMA15E & RCSM5C
   124          HC       2
                *

   125          KK  DIV15E
   126          KM        Divert flow in excess of 270 cfs  - Storm Drain Capacity
   127          DT   DC15E
   128          DI       0      270      540
   129          DQ       0        0      270
                *
                * SMA15C SPLIT INTO SMA15E & SMA15W DUE TO PROPOSED IMPROVEMENTS

   130          KK   RC15E
   131          KM   ROUTE HYDROGRAPH FROM C15E TO BOTTOM OF CBDE
   132          RD    4710   .0055    .014            CIRC       7
                *

   133          KK    CBDE
   134          KM   BASIN EAST OF CENTRAL 7th AVE FROM BASELINE TO NORTH OF DOBBINS
   135          BA    0.17
   136          LG     .35      .25     4.3      .33        9
   137          UC     .65      .65
   138          UA       0        3        9       18       28       42       59       73       87       92
   139          UA     100
                *

   140          KK   CCBDE
   141          KM   COMBINE HYDROGRAPHS
   142          HC       2
                *

   143          KK  DIVbde
   144          KM        Divert flow in excerss of 300 cfs - Storm Drain Capacity
   145          DT  DCCBDE
   146          DI       0      300      900
   147          DQ       0        0      600
                *

   148          KK  RCCBDE
   149          KM   ROUTE HYDROGRAPH THROUGH PIPE TO BOTTOM OF BR19C
   150          RD    5750   .0032    .014            CIRC       8
                *

   151          KK  RETCBD
   152          KM        Retrieve Diverted Hydrograph DCCBDE
   153          DR  DCCBDE
                *
1                                          HEC-1 INPUT                                                    PAGE  5

LINE            ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   154          KK   RCDIV
   155          KM        Route combined divertee hydrographs to BR19C
   156          RD    5200   0.008   0.030            TRAP     10.0     20.0
                *

   157          KK   BR19C
   158          KM   SUB-BASIN BR19C-LAND USE - 180 SCRES OF FUTURE DEVELOPMENT
   159          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
   160          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
   161          BA    .390
   162          LG      .3     .25      4.4      .39        5
   163          UC      .5       .3
   164          UA       0        5       16       30       65       77       84       90       94       97
   165          UA     100
                *

   166          KK  RETAIN
   167          KM   RETAIN 100-YR 2-HR VOLUME FROM BASIN BR19C
   168          DT  RETAIN      20
   169          DI       0      500     3000
   170          DQ       0      500     3000
```

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171          KK  CBR19C
172          KM   COMBINE HYDROGRAPHS FROM BR19C & ROUTED FLOW
173          HC       3
             *
174          KK  RBR19C
175          KM   ROUTE HYDROGRAPH THROUGH PIPE TO DETENTION BASIN @ 27th & BASELINE
176          KM   USE DIVERT ROUTINE TO PASS 156 CFS TO CPB27C
177          RD    4800   .0032    .014            CIRC      10
             *
178          KK  DIV19C
179          KM   DIVERT 156 CFS TO CPB27C
180          DT   D1927              156
181          DI       0      156    5000
182          DQ       0      156     156
             *
183          KK  RETM5C
184          KM       Retrieve Diverted Hydrgraph DCSM5C
185          DR  DCSM5C
             *
186          KK  RET15E
187          KM       Retrieve Diverted Hydrgraph DC15E
188          DR   DC15E
             *
1                                        HEC-1 INPUT                                        PAGE  6

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

189          KK  COMDIV
190          KM       Combine diverted hydrographs north of Dobbins and 7th Ave.
191          HC       2
             *
192          KK   RCDIV
193          KM       Route combined diverted hydrographs to SMA15W
194          RD    3600   0.015   0.030            TRAP    10.0    20.0
             *
195          KK  SMA15W
196          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
197          BA    0.29
198          LG      .3     .25    4.65     .33       5
199          UC     .31     .15
200          UA       0       5      16      30      65      77      84      90      94      97
201          UA     100
             *
202          KK  RETAIN
203          KM   RETAIN 100-YR 2-HR VOLUME FROM BASIN SMA15W
204          DT  RETAIN       6
205          DI       0     500    3000
206          DQ       0     500    3000
             *
207          KK  CSMA15W
208          KM       Combine flows at SMA15W
209          HC       2
             *
210          KK  RSM19C
211          KM   ROUTE FLOW FROM SUB-BASIN SA15C TO COMPUTATION POINT CPS19C
212          RS       4    ELEV  1139.2
213          RC   0.070   0.070   0.070    2030    0.01  1140.5
214          RX      50     150     210     260     310     360     450     580
215          RY  1140.5  1139.5  1139.2  1139.2  1139.2  1139.2  1139.5  1140.5
             *
216          KK  SMA19C
217          KM   SUB-BASIN SMA19C-LAND USE - ENTIRE BASIN FULLEY DEVELOPED
218          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
219          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
220          BA    .156
221          LG      .3     .25    4.15     .45       5
222          UC     .83    1.21
223          UA       0       5      16      30      65      77      84      90      94      97
224          UA     100
             *
1                                        HEC-1 INPUT                                        PAGE  7

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

225          KK  RETAIN
226          KM   RETAIN 100-YR 2-HR VOLUME FROM BASIN SMA19C
227          DT  RETAIN       7
228          DI       0     500    3000
229          DQ       0     500    3000
             *
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230          KK  CPS13C
231          KM   COMBINE ROUTED FLOW FROM SUB-BASIN SMA13C TO RUNOFF FROM SUB-BASIN SMA13C
232          HC       2
             *

233          KK  RRB27C
234          KM   ROUTE FLOW FROM COMPUTATION POINT CPS13C TO COMPUTATION POINT CPB27C
235          RS       22     ELEV   1107.8
236          RC    0.070    0.070    0.070     7400   0.0090     1110
237          RX        0      260      350      770      920     1170     1320     1500
238          RY     1110     1109     1109     1108     1108   1107.8     1108     1110
             *
             * SM3C SPLIT INTO SM3CE & SM3CW DUE TO PROPOSED IMPROVEMENTS

239          KK   SM3CW
240          BA     .31
241          LG     .16    0.349     3.85    0.007      1.5
242          UC   0.415    0.299
243          UA        0        3        5        8       12       20       43       75       90       96
244          UA      100
             *

245          KK    RSM3
246          KM   ROUTE FLOW FROM COMPUTATION POINT CSM3 TO COMPUTATION POINT CSM4
247          RS        4     ELEV     1176
248          RC    0.040    0.040    0.040     3000   0.0095
249          RX        0      120      190      270      330      400      470      530
250          RY     1178   1177.5     1177     1176     1176     1177   1177.5     1178
             *
             * SM4C SPLIT INTO SM4CE & SM4CW DUE TO PROPOSED IMPROVEMENTS

251          KK   SM4CW
252          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
253          BA     .19
254          LG     .26      .35     3.85    0.592     14.4
255          UC     .33     .306
256          UA        0        5       16       30       65       77       84       90       94       97
257          UA      100
             *

258          KK    RSM4
259          KM   ROUTE FLOW FROM SUB-BASIN SM4C TO COMPUTATION POINT CSM4
260          RS        2     ELEV     1168
261          RC    0.035    0.035    0.035     1200    0.012
262          RX        0       50       80      110      130      160      180      200
263          RY     1170   1169.5     1169   1168.5     1168   1168.5     1169     1170
             *
```



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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

264          KK   DRW2C
265          KM   SUB-BASIN DRW2C-LAND USE- NATURAL DESERT(HILLSLOPE,MOUNTAIN)
266          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
267          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
268          BA    .530
269          LG    .150     .340    3.250     .859   30.000
270          UC    .517     .377
271          UA       0        3        5        8       12       20       43       75       90       96
272          UA     100
             *

273          KK  DRWC1C
274          KM   SUB-BASIN DRWC1C-LAND USE-ENTIRE BASIN FULLY DEVELOPED
275          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
276          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
277          BA   .120
278          LG      .3      .25         4      .48         0
279          UC      .6      .73
280          UA       0        5       16       30       65       77       84       90       94       97
281          UA     100
             *

282          KK  RETAIN
283          KM   RETAIN 100-YR 2-HR VOLUME FROM BASIN DRWC1C
284          DT  RETAIN      4.5
285          DI       0      500     3000
286          DQ       0      500     3000
             *

287          KK    CSM4
288          KM   COMBINE RUNOFF FROM SUB-BASINS DRW2C AND DRWC1C WITH ROUTED FLOW FROM SM4C
289          KM   AND COMPUTATION POINT CSM3
290          HC        4
             *

291          KK    RSM5
292          KM   ROUTE FLOW FROM COMPUTATION POINT CSM4 TO COMPUTATION POINT CSM5
293          RS        1     ELEV     1156
294          RC    0.045    0.045    0.045     1800   0.0078
295          RX        0       80      130      160      180      190      220      260
296          RY     1160     1159   1158.5     1158     1156     1156     1158     1160
             *
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```
297          KK   DR1C
298          KM   SUB-BASIN DR1C-LAND USE-NATURAL DESERT(HILLSLOPE
299          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
300          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
301          BA    .160
302          LG    .150    .265   5.300    .198    .000
303          UC    .417    .442
304          UA       0       3       5       8      12      20      43      75      90      96
305          UA     100
             *
```

HEC-1 INPUT PAGE 9

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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

306          KK   WC1A
307          KM   SUB-BASIN WC1A-LAND USE- NATURAL DESERT,(HILLSLOPES)
308          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
309          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
310          BA    .250
311          LG    .150    .264   4.680    .217    40.0
312          UC    .400    .404
313          UA       0       3       5       8      12      20      43      75      90      96
314          UA     100
             *

315          KK   RSM6
316          KM   ROUTE FLOW FROM SUB-BASIN WC1A TO COMPUTATION POINT CPDR2C
317          RS       1    ELEV    1146
318          RC   0.045   0.045   0.045    1150   0.012    1150
319          RX       0      30      50      70      90     110     130     170
320          RY    1152    1151    1150    1148    1146    1146    1148    1150
             *

321          KK   DR2C
322          KM   SUB-BASIN DR2C-LAND USE- NATURAL DESERT(HILLSLOPE),AGRICULTURAL
323          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
324          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
325          BA    .050
326          LG    .150    .325   4.255    .423    .000
327          UC    .350    .318
328          UA       0       3       5       8      12      20      43      75      90      96
329          UA     100
             *

330          KK  CPDR2C
331          KM   COMBINE FLOW FROM SUB-BASINS DR2C AND DR1C TO ROUTED FLOW FROM SUB-BASIN WC1A
332          KM   AND COMPUTATION POINT CSM4
333          HC       4
             *

334          KK  RRB27C
335          KM   ROUTE FLOW FROM COMPUTATION POINT CPDR2C TO COMPUTATION POINT CPB27C
336          RS      15    ELEV  1107.8
337          RC   0.070   0.070   0.070    7400   0.009    1110
338          RX       0     260     550     770     920    1170    1320    1500
339          RY    1110    1109    1109    1108    1108  1107.8    1108    1110
             *

340          KK   BR27C
341          KM   SUB-BASIN BR27C-LAND USE - ENTIRE BASIN FULLY DEVELOPED
342          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
343          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
344          BA    .780
345          LG     .3     .25      4.1     .46       5
346          UC    .75     .59
347          UA       0       5      16      30      65      77      84      90      94      97
348          UA     100
             *
```

HEC-1 INPUT PAGE 10

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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

349          KK  RETAIN
350          KM   RETAIN 100-YR 2-HR VOLUME FROM BASIN BR27C
351          DT  RETAIN      34
352          DI       0     500    3000
353          DQ       0     500    3000
             *

354          KK   C27C
355          KM   COMBINE HYDROGRAPHS FLOWING INTO DETENTION BASIN
356          HC       4
             *

357          KK   WC2A
358          KM   SUB-BASIN WC2A -LAND USE- NATURAL DESERT HILLSLOPES; MINOR DEVELOPMENT
359          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
360          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
361          BA    .080
362          LG    .150    .251   8.600    .070    .000
363          UC    .383    .530
364          UA       0       3       5       8      12      20      43      75      90      96
365          UA     100
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                *
 366            KK  RD27.1
 367            KM   ROUTE FLOW FROM SUB-BASIN WC2A  TO COMPUTATION POINT CD27.1
 368            RS       1     ELEV    1147
 369            RC   0.035   0.035   0.035     360   0.016    1150
 370            RX       0      30      40      55      70      85     105     130
 371            RY    1150    1150    1148    1147    1148    1149    1150    1151
                *

 372            KK  WC2.1A
 373            KM   SUB-BASIN WC2.1A-LAND USE- NATURAL DESERT HILLSLOPES; MINOR DEVELOPMENT
 374            KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 375            KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
 376            BA    .080
 377            LG    .150    .290   4.000    .520    .000
 378            UC    .350    .310
 379            UA       0       3       5       8      12      20      43      75      90      96
 380            UA     100
                *

 381            KK  RD27.2
 382            KM   ROUTE FLOW FROM SUB-BASIN WC2.1A TO COMPUTATION POINT CD27.1
 383            RS       1     ELEV    1148
 384            RC   0.035   0.035   0.035    1000   0.015    1153
 385            RX       0      35      75     100     135     145     165     195
 386            RY    1153    1152    1150    1149    1148    1150    1152    1154
                *
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 387            KK  CD27.1
 388            KM   COMBINE ROUTED FLOW FROM SUB-BASINS WC2A AND WC2.1A
 389            HC       2
                *

 390            KK  RD27.3
 391            KM   ROUTE FLOW FROM COMPUTATION POINT CP27.1 TO COMPUTATION POINT CP27.2
 392            RS       1     ELEV    1141
 393            RC   0.035   0.035   0.035     450   0.011    1144
 394            RX       0      50     115     125     140     150     160     180
 395            RY    1144    1143    1142    1141    1142    1144    1146    1148
                *

 396            KK   WC3A
 397            KM   SUB-BASIN WC3A--LAND USE- NATURAL DESERT HILLSLOPES; MINOR DEVELOPMENT
 398            KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 399            KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
 400            BA    .014
 401            LG    .150    .250   8.600    .066    .000
 402            UC    .300    .467
 403            UA       0       3       5       8      12      20      43      75      90      96
 404            UA     100
                *

 405            KK  RD27.4
 406            KM   ROUTE FLOW FROM SUB-BASIN WC3A TO COMPUTATION POINT CD27.2
 407            RS       1     ELEV  1141.8
 408            RC   0.035   0.040   0.035     640   0.022
 409            RX       0      40      80     100     110     120     150     200
 410            RY    1145    1144    1143    1142  1141.8    1142    1144    1145
                *

 411            KK  CD27.2
 412            KM   COMBINE ROUTED FLOWS FROM SUB-BASIN WC3A AND COMPUTATION POINT CD27.1
 413            HC       2
                *

 414            KK  RD27.5
 415            KM   ROUTE FLOW FROM COMPUTATION POINT CD27.2 TO COMPUTATION POINT CD27.3
 416            RS       1     ELEV    1121
 417            RC   0.035   0.035   0.035    1400   0.014
 418            RX       0      40     100     160     175     190     240     260
 419            RY    1126    1124    1123    1122    1121    1122    1124    1126
                *

 420            KK   WC4A
 421            KM   SUB-BASIN WC4A -LAND USE- DESERT MOUNTAIN, DESERT HILLS;  MINOR DEVELOPMENT
 422            KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 423            KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
 424            BA    .360
 425            LG    .150    .297   3.950    .546  25.000
 426            UC    .383    .273
 427            UA       0       3       5       8      12      20      43      75      90      96
 428            UA     100
                *
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 429            KK  RD27.6
 430            KM   ROUTE FLOW FROM SUB-BASIN WC4A TO COMPUTATION POINT CD27.3
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RS        1    ELEV    1140
RC   0.035   0.035   0.035    2000   0.016
RX        0      60     100     180     225     300     435     500
RY     1142    1141  1140.5    1140  1140.5    1141    1142
*

KK  CD27.3
KM   COMBINE ROUTED FLOWS FROM COMPUTATION POINT CD27.2 AND SUB-BASIN WC4A
HC        2
*

KK  RD27.7
KM   ROUTE FLOW FROM COMPUTATION POINT CD27.3 TO COMPUTATION POINT CD27.4
RS        2    ELEV    1115
RC   0.043   0.050   0.035     950   0.006
RX        0      20     135     170     220     280     400     460
RY  1116.5    1116  1115.5    1115  1115.5  1115.8    1116  1116.5
*

KK   DR27C
KM   SUB-BASIN DR27C-LAND USE- AGRICULTURE, DESERT HILLS; MINOR DEVELOMENT
KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
BA    .230
LG    .210    .345   3.996    .609    .000
UC    .467    .352
UA       0       3       5       8      12      20      43      75      90      96
UA     100
*

KK    WC5A
KM   SUB-BASIN WC5A -LAND USE- DESERT HILLS; MINOR DEVELOMENT
KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
*       1       2
BA    .420
LG    .150    .346   2.980   1.050  28.000
UC    .500    .359
UA       0       3       5       8      12      20      43      75      90      96
UA     100
*

KK  CD27.4
KM   COMBINE RUNOFF FROM SUB-BASIN DR27C WITH ROUTED FLOW FROM COMPUTATION POINT
KM   CD27.3 & WC5A
HC        3
*
* PROPOSED DETENTION BASIN
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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

KK  ST27.4
KM   PROPOSED DETENTION BASIN AT 27th & DOBBINS, 36" RCP OUTLET
RS        1    STOR
SV        0    56.6   115.4
SQ        0      38      80
SE        0       3       6
*

KK  RST274
KM   ROUTE DISCHARGE FROM DETENTION BASIN TO BR35CE
RD    2520   .0051    .012            CIRC       3
*
*  BASIN BR35C2 SPLIT DUE TO PROPOSED IMPROVEMENT

KK  BR35CE
KM   ENTIRE BASIN FULLY DEVELOPED
KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FO RTHIS BASIN
BA     .23
LG      .3     .25    4.15     .45       5
UC      .5     .36
UA       0       5      16      30      65      77      84      90      94      97
UA     100
*

KK  RETAIN
KM   RETAIN 100-YR 2-HR VOLUME FROM BASIN BR35CE
DT  RETAIN      11
DI        0     500    3000
DQ        0     500    3000
*

KK   C35CE
KM   COMBINE HYDROGRAPHS FROM C35CE & ST27C
HC        2
*

KK   R35CE
KM   ROUTE HYDROGRAPH THROUGH PIPE TO CPB27C (27th & BASELINE)
RD    2450  0.0051    .014            CIRC     4.5
*

KK   D35CE
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435          KM   DIVERT 43 CFS TO 27th & BASELINE, REST INTO BASIN
436          DT   D35CE          156
437          DI      0      43    5000
438          DQ      0      43      43
             *

439          KK  D27BAS
440          KM   COMBINE HYDROGRAPH FOR ROUTING THROUGH DETENTION BASIN @ 27th & BASELINE
441          HC      2
             *  PROPOSED DETENTION BASE @ 27th & BASELINE
1                                        HEC-1 INPUT                                        PAGE 14

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

502          KK   ST27C
503          KM   DETENTION BASIN 27th & BASELINE W/ 36" RCP OUTLET
504          RS      1    STOR
505          SV      0   116.3   274.9
506          SQ      0      38      90
507          SE      0       3       7
             *

508          KK   D1927
509          KM   RETREIVE 156 CFS FROM DIV1927
510          DR   D1927
             *

511          KK   D35CE
512          KM   RETREIVE 43 CFS FROM D35CE
513          DR   D35CE
             *

514          KK  CPB27C
515          KM   COMBINE HYDROGRAPHS FOR ROUTING TO 35TH & BASELINE
516          HC      3
             *

517          KK  RPB27C
518          KM   ROUTE HYDROGRAPH FROM 27th & BASELINE THROUGH PIPE TO 35TH & BASELINE
519          RD    5280  0.0049   0.012            CIRC     5.5
             *

520          KK  BR35CW
521          KM   75 ACRES OF FUTURE DEVELOPMENT
522          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
523          BA     .5
524          LG    .28     .25    4.55     .42      22
525          UC    .67     .47
526          UA      0       5      16      30      65      77      84      90      94      97
527          UA    100
             *

528          KK  RETAIN
529          KM   RETAIN 100-YR 2-HR VOLUME FROM BASIN BR35CW
530          DT  RETAIN      10
531          DI      0     500    3000
532          DQ      0     500    3000
             *

533          KK  BR35C1
534          KM    SUB-BASIN BR35C1-LAND USE- 200 ACRES OF FUTURE DEVELOPMENT
535          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
536          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
537          BA    .550
538          LG     .23     .25     4.5     .44       0
539          UC    0.81     .57
540          UA      0       5      16      30      65      77      84      90      94      97
541          UA    100
             *

1                                        HEC-1 INPUT                                        PAGE 15

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

542          KK  RETAIN
543          KM   RETAIN 100-YR 2-HR VOLUME FROM BASIN BR35C1
544          DT  RETAIN      21
545          DI      0     500    3000
546          DQ      0     500    3000
             *

547          KK  CPB352
548          KM    COMBINE RUNOFF FROM RPB27C, BR35CW, BR35C1
549          HC      3
             *

550          KK  RPB352
551          KM   ROUTE COMBINED HYDROGRAPH TO 39TH & BASELINE
552          RD    2640   .0049    .012            CIRC       9
             *

553          KK    WC6A
554          KM   SUB-BASIN WC6A -LAND USE- NATURAL DESERT HILLSLOPES; MINOR DEVELOPMENT
555          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
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556          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
557          BA    .114
558          LG    .150    .270   3.750    .293    .000
559          UC    .233    .259
560          UA       0       3       5       8      12      20      43      75      90      96
561          UA     100
             *

562          KK  RD35.2
563          KM   ROUTE RUNOFF FROM SUB-BASIN WC6A TO COMPUTATION POINT CD35.1
564          RS      13    ELEV  1117.8
565          RC   0.070   0.070   0.070    3800   0.015
566          RX       1     130     240     290     340     440     530     655
567          RY    1122    1120    1118  1117.8    1118    1119    1120    1122
             * CD35.1
             *  COMBINE ROUTED FLOW FROM SUB-BASINS WC5A AND WC6A
             *       2

568          KK  RD35.3
569          KM   ROUTE FLOW FROM COMPUTATION POINT CD35.1 TO COMPUTATION POINT CD35.2
570          RS       6    ELEV  1089.6
571          RC   0.035   0.035   0.035    2480   0.005  1090.5
572          RX       0     100     200     350     435     480     500     525
573          RY    1092    1091    1090  1089.3  1089.7  1089.6    1090  1090.5
             *

574          KK    WC7A
575          KM   SUB-BASIN WC7A -LAND USE- NATURAL DESERT HILLSLOPES; MINOR DEVELOPMENT
576          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
577          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
578          BA    .350
579          LG    .150    .270   7.000    .141    .000
580          UC    .317    .332
581          UA       0       3       5       8      12      20      43      75      90      96
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

582          UA     100
             *

583          KK  RD35.4
584          KM   ROUTE RUNOFF FROM SUB-BASIN WC7A TO COMPUTATION POINT CD35.3
585          RS       4    ELEV  1125.8
586          RC   0.035   0.035   0.035    2800   0.018  1128.5
587          RX       0     100     170     240     250     260     330     360
588          RY    1129    1128    1127    1126  1125.8    1126    1128  1128.5
             *

589          KK    WC8A
590          KM   SUB-BASIN WC8A -LAND USE- DESERT MOUNTAIN, DESERT HILLS; MINOR DEVELOMENT
591          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
592          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
593          BA    .350
594          LG    .150    .321   3.700    .651  30.000
595          UC    .433    .366
596          UA       0       3       5       8      12      20      43      75      90      96
597          UA     100
             *

598          KK  RD35.5
599          KM   ROUTE FLOW FROM SUB-BASIN WC8A TO COMPUTATION POINT CD35.3
600          RS       2    ELEV    1137
601          RC   0.030   0.030   0.030    2200   0.022    1139
602          RX       0      50     125     190     240     370     400     450
603          RY    1139    1138  1137.5    1137  1137.5    1138    1140    1141
             *

604          KK  CD35.3
605          KM   COMBINE ROUTED FLOW FROM SUB-BASINS WC7A AND WC8A
606          HC       2
             *

607          KK  RD35.6
608          KM   ROUTE FLOW FROM COMPUTATION POINT CD35.3 TO COMPUTATION POINT CD35.4
609          RS       1    ELEV    1101
610          RC   0.030   0.035   0.035     700   0.011
611          RX       0      30      60     110     140     180     240     350
612          RY    1103  1101.8  1101.6  1101.4    1101  1101.4  1101.7    1103
             *

613          KK    WC9A
614          KM   SUB-BASIN WC9A -LAND USE- NATURAL DESERT HILLSLOPES; MINOR DEVELOPMENT
615          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
616          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
617          BA    .025
618          LG    .150    .250   8.600    .066    .000
619          UC    .300    .420
620          UA       0       3       5       8      12      20      43      75      90      96
621          UA     100
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
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KK  RD35.7
KM   ROUTE RUNOFF FROM SUB-BASIN WC9A TO COMPUTATION POINT CD35.5
RS       1    ELEV    1128
RC   0.035   0.035   0.035    1000   0.025    1130
RX       0      30      40      60      70      90     120     140
RY    1130    1130    1129    1129  1128.5    1129    1130  1130.5
*

KK   WC10A
KM   SUB-BASIN WC10A -LAND USE- NATURAL DESERT HILLSLOPES; MINOR DEVELOPMENT
KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
BA    .020
LG    .150    .260   5.800    .059    .000
UC    .233    .289
UA       0       3       5       8      12      20      43      75      90      96
UA     100
*

KK  RD35.8
KM   ROUTE RUNOFF FROM SUB-BASIN WC10A TO COMPUTATION POINT CD35.5
RS       1    ELEV    1132
RC   0.035   0.035   0.035    1000   0.025
RX       0      30      50      70     100     140     210     260
RY    1134    1134    1133    1132    1132    1133  1133.5    1134
*

KK  CD35.5
KM   COMBINE ROUTED FLOW FROM SUB-BASINS WC9A AND WC10A
HC       2
*

KK  RD35.9
KM   ROUTE FLOW FROM COMPUTATION POINT CD35.5 TO COMPUTATION POINT CD35.6
RS       2    ELEV  1114.8
RC   0.030   0.030   0.030    1200   0.015
RX       0      60     110     170     210     240     330     370
RY    1116  1115.8  1115.5    1115  1114.8    1115  1115.8    1116
*

KK   WC11A
KM   SUB-BASIN WC11A -LAND USE- DESERT MOUNTAINS, DESERT HILLS; MINOR DEVELOPMENT
KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
BA    .290
LG    .150    .335   3.600    .703  53.000
UC    .367    .357
UA       0       3       5       8      12      20      43      75      90      96
UA     100
*
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LINE  ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

KK  RD3510
KM   ROUTE RUNOFF FROM SUB-BASIN WC11A TO COMPUTATION POINT CD35.7
RS       1    ELEV    1131
RC   0.050   0.050   0.050    1100   0.024
RX       0      50     170     180     225     260     380     460
RY    1132  1131.8  1131.6  1131.5    1131  1131.5  1131.8    1132
*

KK   WC12A
KM   SUB-BASIN WC12A -LAND USE- DESERT MOUNTAIN, DESERT HILLS; MINOR DEVELOPMENT
KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
BA    .260
LG    .150    .320   3.800    .632  28.000
UC    .333    .217
UA       0       3       5       8      12      20      43      75      90      96
UA     100
*

KK  RD3511
KM   ROUTE RUNOFF FROM SUB-BASIN WC12A TO COMPUTATION POINT CD35.7
RS       1    ELEV    1143
RC   0.040   0.040   0.040    1200   0.022    1144
RX       0      10      25      45      70     120     235     290
RY  1144.5    1144  1143.5    1143  1143.5  1143.7  1143.8    1144
*

KK  CD35.7
KM   COMBINE ROUTED FLOWS FROM SUB-BASINS WC11A AND WC12A
HC       2
*

KK  RD3512
KM   ROUTE FLOW FROM COMPUTATION POINT CD35.7 TO COMPUTATION POINT CD35.6
RS       2    ELEV  1120.5
RC   0.055   0.055   0.055    1080   0.006
RX       0      20      50      70     130     180     400     460
RY  1122.5    1122    1121  1120.5    1121  1121.5    1122  1122.5
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 691          KK  CD35.6
 692          KM   COMBINE ROUTED FLOW FROM COMPUTATION POINTS CD35.5 AND CD35.7
 693          HC       2

 694          KK  RD3513
 695          KM   ROUTE FLOW FROM COMPUTATION POINT CD35.6 TO COMPUTATION POINT CD35.4
 696          RS       1    ELEV    1101
 697          RC   0.040   0.035   0.030    1000   0.012
 698          RX       0      40     130     210     280     340     670     615
 699          RY  1102.5    1102  1101.8  1101.5    1101  1101.5    1102  1102.5
              *
1                                        HEC-1 INPUT                                                    PAGE 19

LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 700          KK  CD35.4
 701          KM   COMBINE ROUTED FLOW FROM COMPUTATION POINTS CD35.3 AND CD35.6
 702          HC       2
              *

 703          KK  RD3514
 704          KM   ROUTE FLOW FROM COMPUTATION POINT CD35.4 TO COMPUTATION POINT CD35.2
 705          RS       3    ELEV  1192.5
 706          RC   0.070   0.070   0.070    1400   0.006    1194
 707          RX       0     120     200     300     400     470     560     660
 708          RY    1194  1193.0  1192.8  1192.5  1192.5  1192.8    1193    1194
              *

 709          KK   WC15A
 710          KM   SUB-BASIN WC15A -LAND USE- DESERT MOUNTAIN, DESERT HILLS; MINOR DEVELOMENT
 711          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 712          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
              *      1       2
 713          BA    .360
 714          LG    .150    .320   3.350    .784  50.000
 715          UC    .317    .245
 716          UA       0       3       5       8      12      20      43      75      90      96
 717          UA     100
              *

 718          KK  RD3515
 719          KM   ROUTE RUNOFF FROM SUB-BASIN WC15A TO COMPUTATION POINT CD35.8
 720          RS       1    ELEV    1132
 721          RC   0.030   0.035   0.030    1250   0.014    1136
 722          RX       0      30      50      70      85     100     140     200
 723          RY    1140    1138    1136    1134    1132    1134    1135    1136
              *

 724          KK    PM2A
 725          KM   SUB-BASIN PM2A -LAND USE- DESERT MOUNTAIN, DESERT HILLS; MINOR DEVELOMENT
 726          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 727          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
 728          BA    .070
 729          LG    .150    .332   4.100    .502  15.000
 730          UC    .300    .282
 731          UA       0       3       5       8      12      20      43      75      90      96
 732          UA     100
              *

 733          KK  CD35.8
 734          KM   COMBINE ROUTED FLOW FROM SUB-BASIN WC15A TO SUB-BASIN PM2A
 735          HC       2
              *
1                                        HEC-1 INPUT                                                    PAGE 20

LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 736          KK  RD3516
 737          KM   ROUTE FLOW FROM COMPUTATION POINT CD35.8 TO COMPUTATION POINT CD35.9
 738          RS       1    ELEV    1122
 739          RC   0.035   0.040   0.030    1400   0.008    1126
 740          RX       0      25      35      50     130     150     200     260
 741          RY    1130    1126    1124    1122    1122    1124    1125    1126
              *

 742          KK   WC13A
 743          KM   SUB-BASIN WC13A -LAND USE- NATURAL DESERT HILLSLOPES; MINOR DEVELOPMENT
 744          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 745          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
 746          BA    .013
 747          LG    .150    .250   8.600    .066    .000
 748          UC    .250    .341
 749          UA       0       3       5       8      12      20      43      75      90      96
 750          UA     100
              *

 751          KK  RD3517
 752          KM   ROUTE RUNOFF FROM SUB-BASIN WC13A TO COMPUTATION POINT CD35.9
 753          RS       3    ELEV    1131
 754          RC   0.035   0.035   0.035    1290   0.023
 755          RX       0     115     180     225     270     350     435     530
 756          RY    1132  1131.5  1131.2    1131  1131.2  1131.5  1131.8    1132
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                *
                KK   WC14A
                KM   SUB-BASIN WC14A -LAND USE- NATURAL DESERT HILLSLOPES; MINOR DEVELOPMENT
                KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
                KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
                BA    .050
                LG    .150    .230   4.000    .820    .000
                UC    .367    .427
                UA       0       3       5       8      12      20      43      75      90      96
                UA     100
                *

                KK  RD3518
                KM   ROUTE RUNOFF FROM SUB-BASIN WC14A TO COMPUTATION POINT CD35.9
                RS       6    ELEV  1133.4
                RC   0.040   0.045   0.040    2000   0.013
                RX       0      60     150     220     250     280     310     360
                RY    1134  1133.9  1133.7  1133.4  1133.7  1133.8  1133.9    1134
                *

                KK    PM1A
                KM   SUB-BASIN PM1A -LAND USE- AGRICULTURE, DESERT HILLS; MINOR DEVELOPMENT
                KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
                KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
                BA    .070
                LG    .380    .097   4.210    .697    2.00
                UC    .383    .279
                UA       0       3       5       8      12      20      43      75      90      96
```



```
LINE            ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

                UA     100
                *

                KK  CD35.9
                KM   COMBINE ROUTED FLOWS FROM SUB-BASINS WC13A AND WC14A, COMPUTATION POINT
                KM   CD35.8 WITH RUNOFF FROM SUB-BASIN PM1A
                HC       4
                *

                KK  RD3519
                KM   ROUTE FLOW FROM COMPUTATION POINT CD35.9 TO COMPUTATION POINT CD35.2
                RS       1    ELEV    1101
                RC   0.040   0.045   0.040    3360   0.012
                RX       0      80     190     270     310     335     440     480
                RY  1102.5    1102  1101.7  1101.5    1101  1101.5    1102  1102.5
                *

                KK   DR35C
                KM   SUB-BASIN DR35C -LAND USE- AGRICULTURE; MINOR DEVELOPMENT
                KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
                KM   THIS BASIN USED RAINFALL REDUCTION FATOR OF .90
                BA    .600
                LG    .360    .221   4.200    .454    .000
                UC    .717    .443
                UA       0       3       5       8      12      20      43      75      90      96
                UA     100
                *

                KK  CD35.2
                KM   COMBINE ROUTED FLOWS FROM COMPUTATION POINTS CD35.1, CD35.4 AND CD35.9 WITH
                KM   RUNOFF FROM SUB-BASIN DR35C
                HC       4
                *
                *  DUMMY BASIN TO SIMULATE FUTURE GOLF COURSE STORAGE

                KK     STG
                KM   DUMMY BASIN SIMULATING FUTURE GOLF COURSE
                RS       1    STOR
                SV       0     100    5000
                SQ       0      50      50
                *

                KK  RSTG39
                KM   ROUTE DISCHARGE FROM STG TO 39TH & BASELINE
                RD    7920   0.004    .014            CIRC       5
                *

                KK    CG39
                KM   COMBINE HYDROGRAPHS FROM GOLF COURSE & RPB352
                HC       2
                *
```



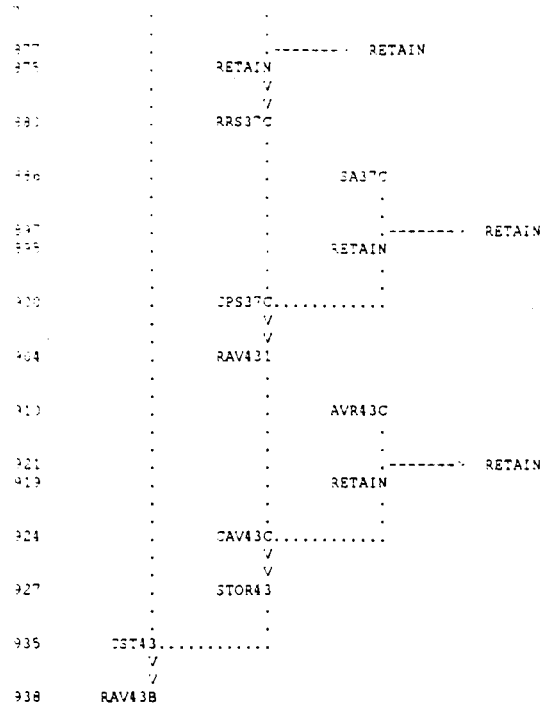
```
LINE            ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

                KK  RSTG43
                KM   ROUTE COMBINED HYDRGRAPH TO 43RD & BASELINE
                RD    2640   0.028    .012            CIRC      10
                *

                KK  SMA43C
```

```
819          KM   SUB-BASIN SMA43C-LAND USE - ENTIRE BASIN FULLY DEVELOPED
820          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
821          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
822          BA     .130
823          LG      .3      .25      4.2      .62       15
824          UC     .42      .27
825          UA       0        5       16       30       65       77       84       90       94       97
826          UA     100
             *

827          KK  RETAIN
828          KM   RETAIN 100-YR 2-HR VOLUME FROM BASIN SMA43C
829          DT  RETAIN        7
830          DI        0      500     3000
831          DQ        0      500     3000
             *

832          KK  RB43C2
833          KM   ROUTE RUNOFF FROM SUB-BASIN SMA43C TO CBR43C
834          RS        3     ELEV  1043.3
835          RC     0.02     0.07     0.07     2600    0.003  1044.2
836          RX        0        1       55       56       65       70       90      120
837          RY   1044.2   1043.2   1043.2   1044.1   1043.5   1043.7   1043.8   1044.2
             *
             * BR43C Modified May 1998

838          KK   BR43C
839          KM   SUB-BASIN BR43C-LAND USE - ENTIRE BASIN FULLE DEVELOPED
840          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
841          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
842          BA     .35
843          LG     .24      .25      4.6      .43       28
844          UC   0.967    0.985
845          UA       0        5       16       30       65       77       84       90       94       97
846          UA     100
             *
             * RETAIN MODIFIED MAY 1998

847          KK  RETAIN
848          KM   RETAIN 75% of 100-YR 24-HR VOLUME FROM BASIN BR43C
849          DT  RETAIN       25
850          DI        0      500     3000
851          DQ        0      500     3000
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

852          KK  CBR43C
853          KM   COMBINE ROUTED FLOWS AT 43RD & BASELINE
854          HC        3
             *
             *
             * PROPOSED DETENTION BASIN @ BASELINE & 43RD AVE

855          KK   STR43M
856          KM   PROPOSED BASIN AT THE NW CORNER OF 43RD AVE AND BASELINE
857          KM   DATA REFLECTS INLET CONTROL OUTFALL - 54" PIPE
858          KO        3
859          RS        1    STOR
860          SQ        0       26       80      115      175      210      240      265
861          SV        0       12     25.2     39.6     55.3     72.3     90.6    110.4
862          SE     1022     1024     1026     1028     1030     1032     1034     1036
             *

863          KK  RBR43C
864          KM   ROUTE HYDROGRAPH FROM CBR43C TO 43RD & SOUTHERN
865          RD     5280    .0028     .012             CIRC       15
             *

866          KK   RR35C
867          KM   SUB-BASIN RR35C-LAND USE - 770 ACRES OF FUTURE DEVELOPMENT
868          KM   24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
869          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
870          BA   1.890
871          LG     .27      .25      5.4      .27       24
872          UC     .75      .23
873          UA       0        5       16       30       65       77       84       90       94       97
874          UA     100
             *

875          KK  RETAIN
876          KM   RETAIN 100-YR 2-HR VOLUME FROM BASIN RR35C
877          DT  RETAIN      110
878          DI        0      500     3000
879          DQ        0      500     3000
             *

880          KK  RRS37C
881          KM   ROUTE FLOW FROM COMPUTATION POINT CPR35C TO COMPUTATION POINT CPS37C
882          RS        8   ELEV     1025
883          RC     0.10     0.10     0.10     2400   0.0025
884          RX        0      280      470      630      700      840     1390     1860
885          RY     1028     1026     1026     1025     1025     1025     1026     1028
```

```
                    *
                    KK  SA37C
                    KM  SUB-BASIN SA37C-LAND USE- 136 ACRES OF FUTURE DEVELOPMENT
                    KM  24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
                    KM  THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
                    BA   .590
                    LG    .29     .19     5.6     .17      17
                                          HEC-1 INPUT                                          PAGE 24

  LINE              ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

                    UC    .71     .32
                    UA      0       5      16      30      65      77      84      90      94      97
                    UA    100
                    *

                    KK  RETAIN
                    KM  RETAIN 100-YR 2-HR VOLUME FROM BASIN SA37C
                    DT  RETAIN      23
                    DI        0     500    3000
                    DQ        0     500    3000
                    *

                    KK  CPS37C
                    KM    COMBINE ROUTED FLOW FROM COMPUTATION POINT CPS37C WITH RUNOFF FROM SUB-
                    KM    BASIN SA37C
                    HC        2
                    *

                    KK  RAV431
                    KM  ROUTE FLOW FROM COMPUTATION POINT CPS37C TO COMPUTATION POINT CAV43C
                    RS       15    ELEV  1020.6
                    RC     0.10    0.10    0.10    3200  0.0012
                    RX        0     380     620     980    1320    1560    1700    2200
                    RY   1022.8    1021  1020.6  1020.9  1021.4  1021.6  1021.8  1022.8
                    *

                    KK  AVR43C
                    KM  SUB-BASIN AVR43C -LAND USE- 240 ACRES OF FUTURE DEVELOPMENT
                    KM  24-HOUR TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
                    KM  THIS BASIN USED RAINFALL REDUCTION FACTOR OF .90
                    BA   1.030
                    LG     .29     .25     5.4     .27      17
                    UC     .67      .3
                    UA       0       5      16      30      65      77      84      90      94      97
                    UA     100
                    *

                    KK  RETAIN
                    KM  RETAIN 100-YR 2-HR VOLUME FROM BASIN AVR43C
                    DT  RETAIN      32
                    DI        0     500    3000
                    DQ        0     500    3000
                    *

                    KK  CAV43C
                    KM  COMBINE ROUTED FLOW FROM COMPUTATION POINT CPS37C, AVR43C
                    HC        2
                    *
                    * PROPOSED DETENTION BASIN
1                                         HEC-1 INPUT                                          PAGE 25

  LINE              ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

                    KK  STOR43
                    KM  PROPOSED BASIN AT THE CORNER OF 43RD AVE AND SOUTHERN
                    KM  DATA REFLECTS TW @ 1018 3-36" OPENINGS
                    KO        3
                    RS        1    STOR
                    SV        0     0.1    12.1    45.6    65.6    88.4   111.1   133.9   146.5
                    SQ        0       0       0       0       0       0       0    56.3     340
                    SE     1002    1003    1006    1012    1014    1016    1018    1020    1021
                    *

                    KK  CST43
                    KM  COMBINE OUTFLOW OF DETENTION BASIN (STOR43) & PIPE FLOW (RBR43C
                    HC        2
                    *

                    KK  RAV43B
                    KM  ROUTE COMBINED DISCHARGE TO SALT RIVER
                    RD     5400  0.0028    .012            CIRC      15
                    *

                    ZZ
1

  355       STR43
              V
              V
  963       RBR43C
              .
              .
  966           .       RR35C
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUL   1997                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   26MAY98  TIME  10:25:22   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*        609 SECOND STREET              *
*      DAVIS, CALIFORNIA 95616          *
*          (916) 756-1104               *
*                                       *
*****************************************
```

LAVEEN ADMP INVESTIGATION BY HDR ENGINEERING
MODIFICATIONS IN MAY 1998 BY FCD
LAVEEN ADMS (FINAL HEC-1) 100-,25-,10-YR FUTURE 24-HR STORM CBA FILE
HIDDEN VALLEY WATERSHED/CHAMPION DRAIN WATERSHED
INPUT FILE NAME 43FutP2M.DAT
3 BASIN ALTERNATIVE, FUTURE DEVELOPMENT
BASIN AT NW COR 43RD AVE & BASELINE RD
24-HOUR SCS TYPE II RAINFALL - 100, 25, 10-yr frequency

IO 10 OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	5	MINUTES IN COMPUTATION INTERVAL
IDATE 1	0	STARTING DATE
ITIME	0000	STARTING TIME
NQ	1000	NUMBER OF HYDROGRAPH ORDINATES
NDDATE 4	0	ENDING DATE
NDTIME	1115	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 83.25 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION

.63 .79 1.00

*** ***

```
            **************
            *            *
455 KK      *    STR43   *    M
            *            *
            **************
```

```
448 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

359 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       STOR  TYPE OF INITIAL CONDITION
                    RSVRIC        .00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

361 SV           STORAGE          .0      12.0      25.2      39.6      55.3      72.3      90.6     110.4

362 SE          ELEVATION     1022.00   1024.00   1026.00   1028.00   1030.00   1032.00   1034.00   1036.00

360 SQ          DISCHARGE          0.       26.       80.      115.      175.      210.      240.      265.
                                                                      ***
```

*** *** *** *** ***

HYDROGRAPH AT STATION STR43
FOR PLAN 1, RATIO = .63

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	83.25-HR
		(CFS)				
169.	23.00		168.	150.	84.	73.
		(INCHES)	.117	.419	.707	.710
		(AC-FT)	83.	298.	502.	504.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	83.25-HR
54.	22.92	53.	49.	29.	25.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	83.25-HR
1029.81	23.00	1029.77	1029.17	1026.33	1025.76

CUMULATIVE AREA = 13.31 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION STR43
FOR PLAN 1, RATIO = .79

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	83.25-HR
		(CFS)				
212.	24.33		210.	196.	119.	103.
		(INCHES)	.147	.548	.999	1.002
		(AC-FT)	104.	389.	709.	712.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	83.25-HR
73.	24.33	73.	66.	40.	35.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	83.25-HR
1032.13	24.33	1032.04	1031.21	1027.91	1027.13

CUMULATIVE AREA = 13.31 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION STR43
FOR PLAN 1, RATIO = 1.00

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	83.25-HR
		(CFS)				

+	264.	28.42		264.	253.	170.	149.
			(INCHES)	.134	.727	1.441	1.446
			(AC-FT)	131.	502.	1023.	1027.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	83.25-HR
+ (AC-FT)	(HR)					
131.	28.33		109.	101.	83.	55.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	83.25-HR
+ (FEET)	(HR)					
1035.95	28.33		1035.88	1035.36	1030.67	1029.53

CUMULATIVE AREA = 13.31 SQ MI

... ...

```
            *************
            *           *
927 KK      *   STOR43  *
            *           *
            *************
```

930 KO OUTPUT CONTROL VARIABLES
IPRNT 3 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

931 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP STOR TYPE OF INITIAL CONDITION
RSVRIC .00 INITIAL CONDITION
X .00 WORKING R AND D COEFFICIENT

932 SV	STORAGE	.0	.1	12.1	45.6	65.6	88.4	111.1	133.9	146.5
933 SQ	DISCHARGE	0.	0.	0.	0.	0.	0.	0.	56.	340.
934 SE	ELEVATION	1002.00	1003.00	1006.00	1012.00	1014.00	1016.00	1018.00	1020.00	1021.00

... ...

HYDROGRAPH AT STATION STOR43
FOR PLAN 1, RATIO = .63

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	83.25-HR
+ CFS	(HR)					
		(CFS)				
+ 0.	.00		0.	0.	0.	0.
		(INCHES)	.000	.000	.000	.000
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	83.25-HR
+ AC-FT	(HR)					
17.	46.08		17.	17.	15.	13.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	83.25-HR
+ FEET	(HR)					
1006.85	49.92		1006.85	1006.84	1006.54	1005.92

CUMULATIVE AREA = 3.51 SQ MI

... ...

HYDROGRAPH AT STATION STOR43
FOR PLAN 1, RATIO = .79

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	83.25-HR
+ CFS	(HR)					
		(CFS)				
+ 0.	.00		0.	0.	0.	0.
		(INCHES)	.000	.000	.000	.000
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	83.25-HR
+ (AC-FT)	(HR)					
64.	52.17		64.	64.	58.	50.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	83.25-HR

(FEET)	(HR)				
1019.99	22.17	1018.68	1018.87	1018.17	1011.87

CUMULATIVE AREA = 3.51 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION STOR43
FOR PLAN 1, RATIO = 1.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	83.25-HR
(CFS)	(HR)				
		CFS			
32.	22.50	31.	19.	7.	6.
		(INCHES) .082	.202	.212	.212
		(AC-FT) 15.	38.	40.	40.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	83.25-HR
(AC-FT)	(HR)				
124.	22.50	124.	119.	109.	94.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	83.25-HR
(FEET)	(HR)				
1019.15	22.50	1019.10	1018.68	1017.72	1015.59

CUMULATIVE AREA = 3.51 SQ MI

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .63	RATIO 2 .79	RATIO 3 1.00
HYDROGRAPH AT	SM1C	1.84	1	FLOW	1046.	1519.	2160.
				TIME	12.25	12.25	12.25
HYDROGRAPH AT	SM1AC	.28	1	FLOW	82.	156.	253.
				TIME	12.17	12.17	12.17
2 COMBINED AT	CSM1	2.12	1	FLOW	1127.	1669.	2401.
				TIME	12.25	12.25	12.17
ROUTED TO	RSM1	2.12	1	FLOW	1057.	1584.	2321.
				TIME	12.33	12.33	12.33
			** PEAK STAGES IN FEET **				
			1	STAGE	1377.37	1377.72	1378.07
				TIME	12.33	12.33	12.33
HYDROGRAPH AT	SM2C	2.19	1	FLOW	2040.	2635.	3451.
				TIME	12.17	12.17	12.17
2 COMBINED AT	CSM2	4.31	1	FLOW	2865.	3954.	5481.
				TIME	12.17	12.17	12.17
ROUTED TO	RDENT	4.31	1	FLOW	114.	129.	146.
				TIME	16.00	16.42	17.33
			** PEAK STAGES IN FEET **				
			1	STAGE	1309.99	1313.39	1317.80
				TIME	16.00	16.42	17.42
ROUTED TO	RSM2	4.31	1	FLOW	114.	128.	146.
				TIME	16.33	16.75	17.67
			** PEAK STAGES IN FEET **				
			1	STAGE	1227.12	1227.16	1227.21
				TIME	16.25	16.42	17.25
HYDROGRAPH AT	SM3CE	.17	1	FLOW	41.	95.	168.
				TIME	12.08	12.08	12.08
2 COMBINED AT	C3CE	4.48	1	FLOW	114.	157.	242.
				TIME	16.33	12.08	12.08
ROUTED TO							

-	RSM3CE	4.48	1	FLOW	114.	182.	237.
				TIME	12.33	12.08	12.08
HYDROGRAPH AT							
-	SM4CE	.05	1	FLOW	17.	24.	27.
				TIME	12.00	12.00	12.00
HYDROGRAPH AT							
-	SM5C	.20	1	FLOW	83.	100.	164.
				TIME	12.17	12.08	12.08
3 COMBINED AT							
-	C3M5C	4.73	1	FLOW	169.	276.	440.
				TIME	12.08	12.08	12.08
DIVERSION TO							
-	DC3M5C	4.73	1	FLOW	0.	26.	190.
				TIME	.00	12.08	12.08
HYDROGRAPH AT							
-	DIVM5C	4.73	1	FLOW	150.	250.	250.
				TIME	12.08	12.00	11.83
ROUTED TO							
-	RC3M5C	4.73	1	FLOW	149.	250.	250.
				TIME	12.17	12.08	12.00
HYDROGRAPH AT							
+	SMA15E	.07	1	FLOW	42.	65.	96.
				TIME	12.00	12.00	12.00
2 COMBINED AT							
+	C15E	4.80	1	FLOW	171.	308.	346.
				TIME	12.08	12.00	12.00
DIVERSION TO							
+	DC15E	4.80	1	FLOW	0.	38.	76.
				TIME	.00	12.00	12.00
HYDROGRAPH AT							
+	DIV15E	4.80	1	FLOW	171.	270.	270.
				TIME	12.08	11.92	11.75
ROUTED TO							
+	RC15E	4.80	1	FLOW	173.	274.	274.
				TIME	12.17	12.08	11.92
HYDROGRAPH AT							
+	CBDE	.17	1	FLOW	46.	73.	108.
				TIME	12.42	12.42	12.42
2 COMBINED AT							
-	CCBDE	4.97	1	FLOW	208.	325.	361.
				TIME	12.17	12.25	12.25
DIVERSION TO							
-	DCCBDE	4.97	1	FLOW	0.	25.	61.
				TIME	.00	12.25	12.25
HYDROGRAPH AT							
-	DIVbde	4.97	1	FLOW	208.	300.	300.
				TIME	12.17	12.00	11.92
ROUTED TO							
-	RCCBDE	4.97	1	FLOW	205.	302.	302.
				TIME	12.33	12.25	12.08
HYDROGRAPH AT							
+	RETCBD	.00	1	FLOW	0.	25.	61.
				TIME	.00	12.25	12.25
ROUTED TO							
+	RCDIV	.00	1	FLOW	0.	21.	60.
				TIME	.00	12.75	12.67
HYDROGRAPH AT							
-	BR19C	.39	1	FLOW	146.	243.	370.
				TIME	12.17	12.17	12.17
DIVERSION TO							
-	RETAIN	.39	1	FLOW	146.	243.	370.
				TIME	12.17	12.17	12.17
HYDROGRAPH AT							
+	RETAIN	.39	1	FLOW	0.	0.	101.
				TIME	.00	.00	12.67
3 COMBINED AT							
+	CBR19C	5.36	1	FLOW	205.	302.	460.
				TIME	12.33	12.25	12.67
ROUTED TO							
+	RBR19C	5.36	1	FLOW	204.	304.	439.
				TIME	12.42	12.33	12.83

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DIVERSION TO
+                    D1327       5.36    1   FLOW          156.      156.      156.
                                             TIME        12.25     12.08     12.00

HYDROGRAPH AT
+                    DIV19C      5.36    1   FLOW           48.      148.      293.
                                             TIME        12.42     12.33     12.33

HYDROGRAPH AT
+                    RETM5C       .00    1   FLOW            0.       0.      143.
                                             TIME         .00     12.08     12.08

HYDROGRAPH AT
+                    RET15E       .00    1   FLOW            0.      38.       76.
                                             TIME         .00     12.00     12.00

 2 COMBINED AT
+                    COMDIV       .00    1   FLOW            0.      50.      363.
                                             TIME         .00     12.00     12.00

ROUTED TO
+                    RCDIV        .00    1   FLOW            0.      39.      249.
                                             TIME         .00     12.25     12.17

HYDROGRAPH AT
+                    SMA15W       .29    1   FLOW          161.     250.      372.
                                             TIME        12.08     12.08     12.00

DIVERSION TO
+                    RETAIN       .29    1   FLOW          161.     226.      289.
                                             TIME        12.08     11.92     11.83

HYDROGRAPH AT
+                    RETAIN       .29    1   FLOW           97.     250.      372.
                                             TIME        12.25     12.08     12.00

 2 COMBINED AT
+                    CSMA15       .29    1   FLOW           87.     250.      577.
                                             TIME        12.25     12.08     12.08

ROUTED TO
+                    RSM19C       .29    1   FLOW           17.     125.      426.
                                             TIME        13.00     12.58     12.42

                                         ** PEAK STAGES IN FEET **
                                         1   STAGE     1139.35   1139.65   1140.04
                                             TIME        13.00     12.58     12.42

HYDROGRAPH AT
+                    SMA19C       .16    1   FLOW           21.      37.       58.
                                             TIME        12.42     12.42     12.42

DIVERSION TO
+                    RETAIN       .16    1   FLOW           21.      37.       58.
                                             TIME        12.42     12.42     12.42

HYDROGRAPH AT
+                    RETAIN       .16    1   FLOW            0.       0.       19.
                                             TIME         .00       .00     14.00

 2 COMBINED AT
+                    CPS19C       .45    1   FLOW           17.     125.      426.
                                             TIME        13.00     12.58     12.42

ROUTED TO
+                    RRB27C       .45    1   FLOW            5.      29.      151.
                                             TIME        18.42     15.67     14.25

                                         ** PEAK STAGES IN FEET **
                                         1   STAGE     1107.92   1108.04   1108.23
                                             TIME        18.42     15.67     14.25

HYDROGRAPH AT
+                    SM3CW        .31    1   FLOW           55.     134.      240.
                                             TIME        12.25     12.25     12.25

ROUTED TO
+                    RSM3C        .31    1   FLOW           35.     107.      209.
                                             TIME        12.75     12.50     12.50

                                         ** PEAK STAGES IN FEET **
                                         1   STAGE     1176.30   1176.55   1176.76
                                             TIME        12.75     12.50     12.50

HYDROGRAPH AT
+                    SM4CW        .19    1   FLOW           47.      96.      162.
                                             TIME        12.08     12.08     12.08

ROUTED TO
+                    RSM4         .19    1   FLOW           44.      91.      158.
                                             TIME        12.25     12.17     12.17

                                         ** PEAK STAGES IN FEET **
                                         1   STAGE     1168.63   1168.82   1169.01
                                             TIME        12.25     12.17     12.17
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HYDROGRAPH AT							
+	DRWC2C	.63	1	FLOW	149.	246.	401.
				TIME	12.33	12.33	12.33
HYDROGRAPH AT							
+	DRWC1C	.12	1	FLOW	20.	39.	63.
				TIME	12.25	12.25	12.25
DIVERSION TO							
+	RETAIN	.12	1	FLOW	20.	39.	63.
				TIME	12.25	12.25	12.25
HYDROGRAPH AT							
+	RETAIN	.12	1	FLOW	0.	0.	24.
				TIME	.00	.00	13.08
4 COMBINED AT							
+	CSM4	1.15	1	FLOW	196.	394.	702.
				TIME	12.33	12.33	12.33
ROUTED TO							
+	RSM5	1.15	1	FLOW	174.	359.	653.
				TIME	12.42	12.50	12.42
			** PEAK STAGES IN FEET **				
			1	STAGE	1157.77	1158.63	1159.03
				TIME	12.42	12.50	12.42
HYDROGRAPH AT							
+	DR1C	.16	1	FLOW	76.	109.	152.
				TIME	12.25	12.25	12.25
HYDROGRAPH AT							
+	WC1A	.25	1	FLOW	153.	205.	274.
				TIME	12.25	12.25	12.25
ROUTED TO							
+	RSM6	.25	1	FLOW	148.	199.	268.
				TIME	12.25	12.25	12.25
			** PEAK STAGES IN FEET **				
			1	STAGE	1147.28	1147.49	1147.73
				TIME	12.25	12.25	12.25
HYDROGRAPH AT							
+	DR2C	.05	1	FLOW	16.	29.	46.
				TIME	12.17	12.17	12.17
4 COMBINED AT							
+	CPDR2C	1.61	1	FLOW	395.	638.	1054.
				TIME	12.33	12.33	12.33
ROUTED TO							
+	RRB27C	1.61	1	FLOW	262.	481.	825.
				TIME	13.83	13.58	13.33
			** PEAK STAGES IN FEET **				
			1	STAGE	1108.34	1108.52	1108.74
				TIME	13.83	13.58	13.33
HYDROGRAPH AT							
+	BR27C	.78	1	FLOW	165.	296.	466.
				TIME	12.33	12.33	12.25
DIVERSION TO							
+	RETAIN	.78	1	FLOW	165.	296.	466.
				TIME	12.33	12.33	12.25
HYDROGRAPH AT							
+	RETAIN	.78	1	FLOW	0.	0.	190.
				TIME	.00	.00	13.00
4 COMBINED AT							
+	C27C	8.20	1	FLOW	262.	482.	1015.
				TIME	13.83	13.58	13.33
HYDROGRAPH AT							
+	WC2A	.08	1	FLOW	43.	57.	78.
				TIME	12.25	12.25	12.25
ROUTED TO							
+	RD27.1	.08	1	FLOW	41.	56.	76.
				TIME	12.33	12.25	12.25
			** PEAK STAGES IN FEET **				
			1	STAGE	1147.92	1148.02	1148.15
				TIME	12.33	12.25	12.25
HYDROGRAPH AT							
+	WC2.1A	.08	1	FLOW	22.	43.	70.
				TIME	12.17	12.17	12.17
ROUTED TO							
+	RD27.2	.08	1	FLOW	21.	41.	67.

				TIME	12.08	12.08	12.08
				** PEAK STAGES IN FEET **			
			1	STAGE	1148.60	1148.43	1148.23
				TIME	12.08	12.08	12.08
COMBINED AT							
+	CD27.1	.16	1	FLOW	60.	97.	143.
				TIME	12.08	12.25	12.25
ROUTED TO							
+	RD27.3	.16	1	FLOW	92.	95.	141.
				TIME	12.33	12.33	12.25
				** PEAK STAGES IN FEET **			
			1	STAGE	1142.19	1142.38	1142.56
				TIME	12.33	12.33	12.25
HYDROGRAPH AT							
+	WC3A	.01	1	FLOW	8.	11.	15.
				TIME	12.17	12.17	12.17
ROUTED TO							
+	RD27.4	.01	1	FLOW	8.	11.	15.
				TIME	12.25	12.25	12.25
				** PEAK STAGES IN FEET **			
			1	STAGE	1142.10	1142.14	1142.19
				TIME	12.25	12.25	12.25
COMBINED AT							
+	CD27.2	.17	1	FLOW	69.	105.	155.
				TIME	12.33	12.25	12.25
ROUTED TO							
+	RD27.5	.17	1	FLOW	64.	99.	146.
				TIME	12.42	12.42	12.33
				** PEAK STAGES IN FEET **			
			1	STAGE	1122.12	1122.33	1122.49
				TIME	12.42	12.42	12.33
HYDROGRAPH AT							
+	WC4A	.36	1	FLOW	152.	245.	369.
				TIME	12.17	12.17	12.17
ROUTED TO							
+	RD27.6	.36	1	FLOW	139.	233.	351.
				TIME	12.42	12.33	12.33
				** PEAK STAGES IN FEET **			
			1	STAGE	1140.48	1140.59	1140.69
				TIME	12.42	12.33	12.33
COMBINED AT							
+	CD27.3	.53	1	FLOW	203.	329.	498.
				TIME	12.42	12.33	12.33
ROUTED TO							
+	RD27.7	.53	1	FLOW	188.	312.	484.
				TIME	12.50	12.50	12.42
				** PEAK STAGES IN FEET **			
			1	STAGE	1116.01	1116.15	1116.30
				TIME	12.50	12.50	12.42
HYDROGRAPH AT							
+	DR27C	.23	1	FLOW	28.	82.	157.
				TIME	12.33	12.25	12.25
HYDROGRAPH AT							
+	WC5A	.42	1	FLOW	96.	164.	290.
				TIME	12.25	12.33	12.25
COMBINED AT							
+	CD27.4	1.18	1	FLOW	282.	626.	891.
				TIME	12.50	12.42	12.33
ROUTED TO							
+	ST27.4	1.18	1	FLOW	18.	29.	45.
				TIME	14.50	14.25	14.08
				** PEAK STAGES IN FEET **			
			1	STAGE	1.42	2.25	3.50
				TIME	14.50	14.25	14.08
ROUTED TO							
+	RST27A	1.18	1	FLOW	18.	29.	45.
				TIME	14.58	14.33	14.17
HYDROGRAPH AT							
+	BR35CE	.23	1	FLOW	71.	125.	194.
				TIME	12.17	12.17	12.17
DIVERSION TO							

+	RETAIN	.03	1	FLOW	71.	135.	194.
				TIME	12.17	12.17	12.17
HYDROGRAPH AT							
+	RETAIN	.33	1	FLOW	0.	0.	64.
				TIME	.00	.00	12.75
2 COMBINED AT							
+	D35CE	1.41	1	FLOW	18.	29.	87.
				TIME	14.58	14.33	12.75
ROUTED TO							
+	R35CE	1.41	1	FLOW	18.	29.	85.
				TIME	14.67	14.42	12.83
DIVERSION TO							
+	D35CE	1.41	1	FLOW	18.	29.	43.
				TIME	14.67	14.42	12.75
HYDROGRAPH AT							
+	D35CE	1.41	1	FLOW	0.	0.	42.
				TIME	.00	.00	12.83
2 COMBINED AT							
+	C27BAS	9.61	1	FLOW	262.	482.	1028.
				TIME	13.83	13.58	13.33
ROUTED TO							
+	ST27C	9.61	1	FLOW	13.	24.	45.
				TIME	21.33	19.58	18.25
				** PEAK STAGES IN FEET **			
			1	STAGE	1.06	1.88	3.55
				TIME	21.50	19.67	18.33
HYDROGRAPH AT							
+	D1927	.00	1	FLOW	156.	156.	156.
				TIME	12.25	12.08	12.00
HYDROGRAPH AT							
+	D35CE	.00	1	FLOW	18.	29.	43.
				TIME	14.67	14.42	12.75
3 COMBINED AT							
+	CPB27C	9.61	1	FLOW	168.	192.	239.
				TIME	12.75	13.58	15.42
ROUTED TO							
+	RPB27C	9.61	1	FLOW	168.	192.	239.
				TIME	12.83	13.67	15.50
HYDROGRAPH AT							
+	BR35CW	.50	1	FLOW	170.	265.	391.
				TIME	12.25	12.25	12.25
DIVERSION TO							
+	RETAIN	.50	1	FLOW	170.	227.	222.
				TIME	12.25	12.08	12.00
HYDROGRAPH AT							
+	RETAIN	.50	1	FLOW	135.	265.	391.
				TIME	12.50	12.25	12.25
HYDROGRAPH AT							
+	BR35C1	.55	1	FLOW	113.	205.	324.
				TIME	12.33	12.33	12.33
DIVERSION TO							
+	RETAIN	.55	1	FLOW	113.	205.	324.
				TIME	12.33	12.33	12.33
HYDROGRAPH AT							
+	RETAIN	.55	1	FLOW	0.	0.	151.
				TIME	.00	.00	12.92
3 COMBINED AT							
+	CPB352	10.66	1	FLOW	298.	432.	554.
				TIME	12.50	12.25	12.25
ROUTED TO							
+	RPB352	10.66	1	FLOW	290.	425.	553.
				TIME	12.50	12.33	12.25
HYDROGRAPH AT							
+	WC6A	.01	1	FLOW	8.	12.	17.
				TIME	12.08	12.08	12.08
ROUTED TO							
+	RD35.2	.01	1	FLOW	4.	5.	7.
				TIME	13.67	13.67	13.42
				** PEAK STAGES IN FEET **			
			1	STAGE	1117.91	1117.96	1118.01
				TIME	13.67	13.67	13.42

ROUTED TO							
+	RD35.3	.11	1	FLOW	3.	4.	9.
				TIME	14.42	14.75	14.58
				** PEAK STAGES IN FEET **			
			1	STAGE	1089.74	1089.76	1089.79
				TIME	14.92	14.75	14.58
HYDROGRAPH AT							
+	WC7A	.05	1	FLOW	29.	41.	57.
				TIME	12.17	12.17	12.17
ROUTED TO							
+	RD35.4	.05	1	FLOW	25.	36.	51.
				TIME	12.42	12.42	12.42
				** PEAK STAGES IN FEET **			
			1	STAGE	1126.27	1126.34	1126.41
				TIME	12.42	12.42	12.42
HYDROGRAPH AT							
+	WC8A	.35	1	FLOW	122.	201.	307.
				TIME	12.25	12.25	12.25
ROUTED TO							
+	RD35.5	.35	1	FLOW	112.	185.	287.
				TIME	12.42	12.42	12.33
				** PEAK STAGES IN FEET **			
			1	STAGE	1137.55	1137.67	1137.78
				TIME	12.42	12.42	12.33
2 COMBINED AT							
+	CD35.3	.40	1	FLOW	137.	222.	338.
				TIME	12.42	12.42	12.33
ROUTED TO							
+	RD35.6	.40	1	FLOW	133.	217.	336.
				TIME	12.50	12.42	12.42
				** PEAK STAGES IN FEET **			
			1	STAGE	1101.73	1101.84	1101.97
				TIME	12.50	12.42	12.42
HYDROGRAPH AT							
+	WC9A	.03	1	FLOW	16.	21.	28.
				TIME	12.17	12.17	12.17
ROUTED TO							
+	RD35.7	.03	1	FLOW	15.	20.	27.
				TIME	12.25	12.25	12.25
				** PEAK STAGES IN FEET **			
			1	STAGE	1128.52	1128.58	1128.65
				TIME	12.25	12.25	12.25
HYDROGRAPH AT							
+	WC10A	.02	1	FLOW	16.	21.	28.
				TIME	12.08	12.08	12.08
ROUTED TO							
+	RD35.8	.02	1	FLOW	15.	20.	26.
				TIME	12.17	12.17	12.17
				** PEAK STAGES IN FEET **			
			1	STAGE	1132.20	1132.23	1132.27
				TIME	12.17	12.17	12.17
2 COMBINED AT							
+	CD35.5	.05	1	FLOW	29.	39.	52.
				TIME	12.25	12.17	12.17
ROUTED TO							
+	RD35.9	.05	1	FLOW	27.	37.	50.
				TIME	12.33	12.33	12.33
				** PEAK STAGES IN FEET **			
			1	STAGE	1115.09	1115.13	1115.17
				TIME	12.33	12.33	12.33
HYDROGRAPH AT							
+	WC11A	.29	1	FLOW	143.	207.	295.
				TIME	12.17	12.17	12.17
ROUTED TO							
+	RD3510	.29	1	FLOW	131.	190.	274.
				TIME	12.33	12.33	12.25
				** PEAK STAGES IN FEET **			
			1	STAGE	1131.74	1131.82	1131.90
				TIME	12.33	12.33	12.25
HYDROGRAPH AT							
+	WC12A	.26	1	FLOW	111.	183.	280.
				TIME	12.17	12.17	12.17

ROUTED TO							
+	RD3511	.26	1	FLOW	100.	169.	262.
				TIME	12.25	12.25	12.25
				** PEAK STAGES IN FEET **			
			1	STAGE	1143.79	1143.89	1143.99
				TIME	12.25	12.25	12.25
2 COMBINED AT							
+	CD35.7	.33	1	FLOW	229.	358.	536.
				TIME	12.25	12.25	12.25
ROUTED TO							
+	RD3512	.33	1	FLOW	214.	332.	499.
				TIME	12.42	12.42	12.33
				** PEAK STAGES IN FEET **			
			1	STAGE	1121.76	1121.95	1122.15
				TIME	12.42	12.42	12.33
2 COMBINED AT							
+	CD35.6	.59	1	FLOW	241.	368.	549.
				TIME	12.42	12.42	12.33
ROUTED TO							
+	RD3513	.59	1	FLOW	228.	354.	530.
				TIME	12.50	12.50	12.42
				** PEAK STAGES IN FEET **			
			1	STAGE	1101.78	1101.88	1101.99
				TIME	12.50	12.50	12.42
2 COMBINED AT							
+	CD35.4	1.00	1	FLOW	361.	569.	867.
				TIME	12.50	12.50	12.42
ROUTED TO							
+	RD3514	1.00	1	FLOW	330.	530.	808.
				TIME	12.75	12.67	12.67
				** PEAK STAGES IN FEET **			
			1	STAGE	1193.32	1193.52	1193.75
				TIME	12.75	12.67	12.67
HYDROGRAPH AT							
+	WC15A	.36	1	FLOW	193.	285.	411.
				TIME	12.17	12.17	12.17
ROUTED TO							
+	RD3515	.36	1	FLOW	187.	277.	403.
				TIME	12.17	12.17	12.17
				** PEAK STAGES IN FEET **			
			1	STAGE	1134.15	1134.46	1134.77
				TIME	12.17	12.17	12.17
HYDROGRAPH AT							
+	PM2A	.07	1	FLOW	26.	44.	68.
				TIME	12.17	12.17	12.17
2 COMBINED AT							
+	CD35.8	.43	1	FLOW	212.	321.	471.
				TIME	12.17	12.17	12.17
ROUTED TO							
+	RD3516	.43	1	FLOW	199.	307.	455.
				TIME	12.25	12.25	12.25
				** PEAK STAGES IN FEET **			
			1	STAGE	1122.82	1123.06	1123.33
				TIME	12.25	12.25	12.25
HYDROGRAPH AT							
+	WC13A	.01	1	FLOW	9.	12.	16.
				TIME	12.08	12.08	12.08
ROUTED TO							
+	RD3517	.01	1	FLOW	8.	11.	15.
				TIME	12.33	12.33	12.33
				** PEAK STAGES IN FEET **			
			1	STAGE	1131.17	1131.19	1131.21
				TIME	12.33	12.33	12.33
HYDROGRAPH AT							
+	WC14A	.05	1	FLOW	12.	22.	37.
				TIME	12.25	12.25	12.17
ROUTED TO							
+	RD3518	.05	1	FLOW	9.	19.	32.
				TIME	12.75	12.58	12.58
				** PEAK STAGES IN FEET **			
			1	STAGE	1133.64	1133.72	1133.78

				TIME	12.75	12.58	12.58
HYDROGRAPH AT							
+	PM1A	.07	1	FLOW	22.	41.	94.
				TIME	12.17	12.17	12.17
4 COMBINED AT							
-	CD35.9	.56	1	FLOW	230.	361.	542.
				TIME	12.25	12.25	12.25
ROUTED TO							
+	RD3519	.56	1	FLOW	150.	246.	397.
				TIME	12.58	12.50	12.50
				** PEAK STAGES IN FEET **			
			1	STAGE	1101.87	1101.98	1102.11
				TIME	12.58	12.50	12.50
HYDROGRAPH AT							
+	DR35C	.60	1	FLOW	146.	273.	435.
				TIME	12.42	12.42	12.42
4 COMBINED AT							
-	CD35.2	2.17	1	FLOW	573.	976.	1551.
				TIME	12.67	12.58	12.58
ROUTED TO							
+	STG	2.17	1	FLOW	33.	50.	50.
				TIME	15.83	15.42	12.92
ROUTED TO							
+	RSTG39	2.17	1	FLOW	33.	50.	90.
				TIME	16.08	15.67	13.25
2 COMBINED AT							
-	CG39	12.83	1	FLOW	297.	432.	562.
				TIME	12.58	12.33	12.25
ROUTED TO							
+	RSTG43	12.83	1	FLOW	297.	419.	559.
				TIME	12.58	12.33	12.25
HYDROGRAPH AT							
-	SMA43C	.13	1	FLOW	46.	81.	127.
				TIME	12.08	12.08	12.08
DIVERSION TO							
+	RETAIN	.13	1	FLOW	46.	81.	127.
				TIME	12.08	12.08	12.08
HYDROGRAPH AT							
-	RETAIN	.13	1	FLOW	0.	0.	37.
				TIME	.00	.00	12.58
ROUTED TO							
+	RB43C2	.13	1	FLOW	7.	7.	20.
				TIME	.08	.08	12.92
				** PEAK STAGES IN FEET **			
			1	STAGE	1043.33	1043.33	1043.44
				TIME	.08	.08	12.92
HYDROGRAPH AT							
+	BR43C	.35	1	FLOW	79.	119.	171.
				TIME	12.42	12.42	12.42
DIVERSION TO							
+	RETAIN	.35	1	FLOW	79.	119.	171.
				TIME	12.42	12.42	12.42
HYDROGRAPH AT							
+	RETAIN	.35	1	FLOW	0.	0.	48.
				TIME	.00	.00	14.17
3 COMBINED AT							
-	CBR43C	13.31	1	FLOW	297.	419.	559.
				TIME	12.58	12.33	12.25
ROUTED TO							
+	STR43	13.31	1	FLOW	169.	212.	264.
				TIME	23.00	24.33	25.42
				** PEAK STAGES IN FEET **			
			1	STAGE	1029.81	1032.10	1035.95
				TIME	23.00	24.33	25.33
ROUTED TO							
+	RBR43C	13.31	1	FLOW	169.	212.	264.
				TIME	23.08	24.42	25.50
HYDROGRAPH AT							
+	RR35C	1.89	1	FLOW	1015.	1465.	2063.
				TIME	12.25	12.17	12.17
DIVERSION TO							

	RETAIN	1.89	1	FLOW	1015.	1465.	2063.
				TIME	12.08	12.17	12.17
HYDROGRAPH AT							
	RETAIN	1.89	1	FLOW	.0	113.	1246.
				TIME	.00	15.25	12.83
ROUTED TO							
	RRS37C	1.89	1	FLOW	0.	39.	556.
				TIME	.00	15.42	13.42
			** PEAK STAGES IN FEET **				
			1	STAGE	1025.00	1025.05	1026.21
				TIME	.00	15.42	13.42
HYDROGRAPH AT							
	SA37C	.59	1	FLOW	328.	454.	624.
				TIME	12.25	12.25	12.25
DIVERSION TO							
	RETAIN	.59	1	FLOW	328.	454.	614.
				TIME	12.25	12.25	12.17
HYDROGRAPH AT							
	RETAIN	.59	1	FLOW	78.	308.	580.
				TIME	12.92	12.50	12.33
2 COMBINED AT							
	CPS37C	2.48	1	FLOW	78.	308.	580.
				TIME	12.92	12.50	12.33
ROUTED TO							
	RAV431	2.48	1	FLOW	11.	62.	396.
				TIME	18.00	15.50	14.92
			** PEAK STAGES IN FEET **				
			1	STAGE	1020.88	1021.15	1021.78
				TIME	18.00	15.50	14.92
HYDROGRAPH AT							
	AVR43C	1.03	1	FLOW	485.	726.	1038.
				TIME	12.17	12.17	12.17
DIVERSION TO							
	RETAIN	1.03	1	FLOW	485.	726.	953.
				TIME	12.17	12.17	12.08
HYDROGRAPH AT							
	RETAIN	1.03	1	FLOW	164.	600.	1022.
				TIME	12.75	12.33	12.25
2 COMBINED AT							
	CAV43C	3.51	1	FLOW	164.	600.	1022.
				TIME	12.75	12.33	12.25
ROUTED TO							
	STOR43	3.51	1	FLOW	0.	0.	32.
				TIME	.00	.00	22.50
			** PEAK STAGES IN FEET **				
			1	STAGE	1006.85	1013.88	1019.15
				TIME	49.92	52.17	22.50
2 COMBINED AT							
	CST43	16.82	1	FLOW	169.	212.	295.
				TIME	23.08	24.42	24.25
ROUTED TO							
	RAV43B	16.82	1	FLOW	169.	212.	295.
				TIME	23.17	24.50	24.33

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
RSM3CE	MANE	2.81	113.79	982.76	1.34	5.00	113.79	980.00	1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3195E+03 EXCESS= .0000E+00 OUTFLOW= .3195E+03 BASIN STORAGE= .5535E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RSM3CE	MANE	2.63	154.36	727.09	1.81	5.00	151.68	725.00	1.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4313E+03 EXCESS= .0000E+00 OUTFLOW= .4313E+03 BASIN STORAGE= .1686E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Baffle Drop

Ref. Design of Small Dams , Bureau of Reclamation, Second Ed 1973
Baffle drop for the spillway into the 43rd Ave. detention basin, trial 2
Date: March 9, 1998

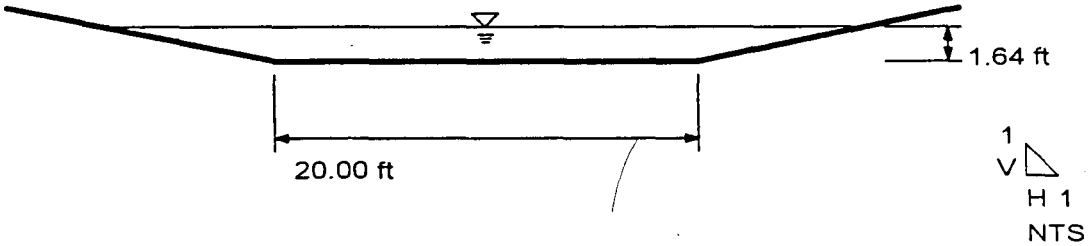
pg 366

Discharge, Q (cfs)	200	400	600	800	1000
Chute Width, W (ft)	30	30	30	30	30
Unit Discharge, q (cfs/ft)	6.67	13.33	20.00	26.67	33.33
Spillway height, Hs (ft)	13	13	13	13	13
Spillway Slope, Z:1	5	5	5	5	5
Entrance Velocity, V1 (fps) From HEC - 2 Run	4.44	5.75	6.66	7.37	7.97
depth	1.5	2.32	3	3.62	4.18
Froude number	0.64	0.67	0.68	0.68	0.69
Ideal Velocity, Vi=(qg)^1/3-5	0.99	2.54	3.64	4.50	5.24
Critical Velocity, Vc=(qg)^1/3	5.99	7.54	8.64	9.50	10.24
Critical Depth, Dc=(q2/g)^1/3	1.11	1.77	2.32	2.81	3.26
Baffle Height,H (ft)	0.89	1.41	1.85	2.24	2.60
Baffle Width, Wb (ft), 1.5H	1.34	2.12	2.78	3.37	3.91
Baffle Row Spacing, 5H	4.45	7.07	9.26	11.22	13.02
Number of Baffles per row	11	7	5	4	4
Number of rows	15	9	7	6	5
Wall Height, Hw (ft), 3H	2.67	4.24	5.56	6.73	7.81

Grass Lined Low-Flow Section
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\haestad\fmw\43rdav.fm2
Worksheet	basin-low flow
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.030	
Channel Slope	0.001400	ft/ft
Depth	1.64	ft
Left Side Slope	5.000000	H : V
Right Side Slope	5.000000	H : V
Bottom Width	20.00	ft
Discharge	100.00	cfs



Grass Lined Low-Flow Channel
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\haestad\fmw\43rdav.fm2
Worksheet	basin-low flow
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.001400	ft/ft
Left Side Slope	5.000000	H : V
Right Side Slope	5.000000	H : V
Bottom Width	20.00	ft
Discharge	100.00	cfs

Results		
Depth	1.64	ft
Flow Area	46.26	ft²
Wetted Perimeter	36.73	ft
Top Width	36.40	ft
Critical Depth	0.85	ft
Critical Slope	0.014710	ft/ft
Velocity	2.16	ft/s
Velocity Head	0.07	ft
Specific Energy	1.71	ft
Froude Number	0.34	
Flow is subcritical.		

43rd Ave Detention Basin Outlet

Basin Outlet works that flow into proposed stormdrain through a 72" connector. The assumption is that the SD is flowing at capacity and the beginning TW for the SD is 1018(Salt River at Q10 stage. The outlet structure will be outfitted with backflow preventers on all orifices entering the structure to keep the SD from outleting into the basin. All flows in excess of basin capacity will spill into 43rd Ave.

Top of Basin	1021	Coefficient of discharge for square opening		0.59
Bottom of Basin	1002	Qo = Ca(2gh)^.5	Qw = CLH^3/2	
Tailwater	1018			

	Outlet A		Outlet B		Outlet C		Emergency Spillway			Outlet into 43rd SD
Dia. of orifice (ft)	3		3		0		Length =	62		6
Invert of orifice	1002		1008		1014		Coefficient	2.66		1002
Center of orifice	1003.5		1009.5		1014		Elevation =	1020		1005
Area of orifice (sf)	7.065		7.065		0					28.26
Water Elevation	Available Head (ft)	Discharge (cfs)	Available Head (ft)	Discharge (cfs)	Available Head (ft)	Discharge (cfs)	Available Head (ft)	Discharge (cfs)	Total Discharge (cfs)	Discharge (cfs)
1002	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1004	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1006	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1008	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1010	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1012	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1014	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1016	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1018	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1020	2	47.3	2	47.3	2	0.0	0	0.0	95	56.3
1021	3	57.9	3	57.9	3	0.0	1	164.9	281	84.4

* Discharge based upon submerged entrance and exit of connector pipe because of TW.

Principal Outlet Capacity with Tailwater

H = HWE - TWE

$V = (H/[(1+Ke/2g) +(n^2L/2.21R^(4/3))]$

Ref. Std Handbook for Civil Engineers; Entrance and Exit Submerged.

*Q = V * A

g - gravity -	32.2
Ke - entrance loss -	0.15
n - friction coeifficient -	0.013
D - diameter culvert (in) -	72
L - culvert length -	50
R - hydraulic radius , ft -	1.5
A - area of pipe, sq-ft -	28.26
TWE - tailwater elevation -	1018

1+Ke/2g -	1.002
n^2L -	0.008
2.21R^(4/3) -	3.795

HWE	H	V	*Qsub
1002	0	0.00	0.0
1003	0	0.00	0.0
1004	0	0.00	0.0
1006	0	0.00	0.0
1008	0	0.00	0.0
1010	0	0.00	0.0
1012	0	0.00	0.0
1014	0	0.00	0.0
1016	0	0.00	0.0
1018	0	0.00	0.0
1020	2	1.99	56.3
1021	3	2.99	84.4

* Connector pipe outlet is submerged at both ends when TW of 1018 (Q10 in Salt River) exists.

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REPORT ON GEOTECHNICAL INVESTIGATION

DESIGNATION: 43rd Avenue Channel
Flood Control Basin

LOCATION: 43rd Avenue & Southern
Phoenix, Arizona

DRAFT

CLIENT: Maricopa Flood Control District

PROJECT NO: 980172SA

DATE: May 27, 1998

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DRAFT

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INTRODUCTION

DRAFT

This report presents the results of a subsoil investigation carried out for the Flood Control District of Maricopa County 43rd Avenue Channel, FCD Project No. 117010. The project includes a Flood Control Detention Basin to be located at the southeast corner of 43rd Avenue and Southern Avenue, and a storm drain to be located in 43rd Avenue from Baseline Road to an outfall north of Broadway Road at the Salt River in Phoenix, Arizona.

Preliminary information calls for the construction of a 20± acre storm water detention basin and about 2 miles of storm sewer pipeline along 43rd Avenue. The basin will be as deep as 25 to 30 feet. Improvements will include a pump station and possible small park area. The pipeline will be located within the 43rd Avenue right of way, flowing north from Baseline Road to the Salt River. It is assumed that the pipeline will be no deeper than 20 feet deep on the southern end to 35 feet deep on the north end. It is assumed that the pump station will be supported in a slab on grade building located outside of the detention basin.

GENERAL SITE AND SOIL CONDITIONS

Site Conditions - The retention basin/pump station is located in a vacant lot area bounded on the north by Southern Avenue, on the south and east by residential property and the west by 43rd Avenue. At the time of the investigation, the site was covered with grasses, weeds and small trees. A small dry wash was noted in the south central portion of the site. There was no indications of previous foundations visible on the surface. The proposed storm drain is located along the 43rd Avenue alignment. The roadway is paved with asphaltic concrete of various widths. The adjacent development includes a mixture of vacant, agricultural, commercial and residential development.

General Subsurface Conditions - Subsoil conditions at the retention basin/pump station site at 43rd Avenue consists of fine sandy to silty clay and fine sandy silt to depths of 7 to 13 feet below grade where it grades into silty sand of various gradations including gravel with some clay lenses noted. At about 16 feet, the gradation turned into sand, gravel and cobbles (SGC) where auger refusal was encountered. A monitoring well installed in this area using a Becker Hammer rig indicated that the SGC materials extend to at least 35 feet, the termination point of the boring. Standard penetration resistance (SPT) values range from 10 to 50+ blows per foot of penetration.

Subsoils at the boring locations along the pipe line alignment are comprise of fine grained interbedded sandy clays, sandy silts, clayey sands, silty sands, silty and clayey gravels overlying sands, gravels and cobbles of various gradations. The depth to the contact with the cobbly soil is on the order of 15 to 18 feet on the southern end, becoming shallower to the north, generally at a depth greater than 10 feet. All of the pipeline borings were drilled with a Becker Hammer Drill (AP1100) due to the concern about advancing the borings to the prescribed depth in cobbles. The recorded penetration resistance (casing pile driver) values range from 5 to 100+ blows per foot of penetration.

No pipeline borings were advanced to groundwater during this investigation due to the lack of the required ADWR permits. Borings B-9 to B-12 were terminated at the recorded depths of 31 to 34 feet deep at the point were the soils became very moist indicating that the boring was approaching the groundwater surface. The water table was originally encountered at a depth of 35±feet during the drilling of the monitoring well site. A second reading of the monitoring well 6 days after completion indicated a stable water table depth of 27 feet. Based on the ADWR well records reviewed and attached in the appendix of this report, the regional water table is reported to be 35 to 50 feet deep south of Southern Avenue and 30 to 40 feet north of southern. These reported depths are consistent with the indications in the pipeline borings where the soils become very moist at the level the boring was terminated. This level will likely fluctuate depending on time of year, flows in the Salt River and the effects of draw down on the adjacent wells.

Laboratory testing along the pipeline alignment revealed plasticity indices ranging from "non-plastic" to 12 percent. The fraction finer than the No. 200 sieve ranges from [6]to [93] percent. Laboratory resistivity tests indicated results ranging from 1400 to 4670 ohm-cm in the saturated state and pH values of 8.6 to 9.9. The upper clayey subsoils in the retention basin area exhibit a potential for volume increase due to wetting on the order of 3.2 percent when compacted to moistures and densities normally expected during construction. When subjected to an axial pressure of 2,200 lbs/ft², an undisturbed sample exhibited additional strain on the order of 2.5 percent when inundated.

ANALYSIS AND RECOMMENDATIONS

GENERAL

The shallow groundwater will be a factor that needs to be addressed in the design and construction of the basin and pipeline. For preliminary analysis, it is recommended that a current static level of 27 to 30 feet below grade be used. As the well data indicates, it appears that this water table may be under a slight pressure as the table rose after penetrating the water surface. This may result in unstable excavations as they

approach the water table. The water table will likely fluctuate over time and may rise above the current levels as the area is developed and the amount of groundwater pumping is reduced. Flows in the Salt River may also have an impact on water levels, especially along the pipeline close to the outfall. Depending on the depth of the pipeline north of Southern Avenue, groundwater may be encountered. It may be possible to control the water in trenches and/or excavations by simple pumping and/or allowing it to drain through the pipe and/or trench back to the River (assuming that the flowline is above the current River water level). A detailed ground water hydrology study would be required to estimate what those future water levels may be and quantities of water that may be generated during construction.

PIPELINE ANALYSIS

Soil Corrosion - Laboratory resistivity tests conducted indicate values range from [600 ohm-cm to 700 ohm-cm. This reflects a severe degree of corrosiveness in a saturated state. Soil pH is on the order of 7.4 to 7.5.] Accordingly, suitable pipe wall thickness and corrosion protection should be selected per the trench/traffic load and lifetime requirements of the project.

Excavation - The presence of non and or low cohesive soils and cobbles at the depths encountered will result in unstable trench concerns. This in-ability to hold a vertical cut and proper bottom shape were these materials are encountered will make cast-in-place concrete pipe not feasible. These cobbles may also result in the need to require bedding under the pipe to prevent cobbles from inflicting point loads and injury to the pipe. Bedding should be selected per the requirements of the pipe materials used and the trench loading conditions.

All excavations should be braced and/or shored in accordance with all current governmental guidelines. Each section should be addressed by the responsible general and/or excavating contractor for establishing safe cut slopes in accordance with current OSHA guidelines. Based on the types of soils encountered in the borings, the upper fine grained soils (Type B) would need to be sloped at 1:1 and the lower granular soils (Type C) would need to be sloped at 1½:1. Cuts deeper than 20 feet and/or bracing would have to be designed by a professional engineer. The fact that a boring was advanced to a particular depth should not lead to the assumption that it is necessarily excavatable by conventional means. Very dense and/or cemented conditions may require more aggressive removal techniques. The presence of very dense conditions and cobbles (and possible small boulders) may impede progress and the ability to cut neat trenches.

PUMP STATION ANALYSIS

Analysis - While the exact configuration of the structure is unknown at this time, it is assumed that the structure will be a slab on grade, masonry wall building. An alternate recommendation is provided in the event that there is a below grade wet well vault supporting a structure above. Analysis of the field and laboratory data indicates that the shallow subsoils at the pump station site are generally favorable for the support of the proposed structure subject to remedial earthwork. Test results indicate that the shallow soils are sensitive to moisture increases which could result in excessive settlement should the bearing soils become wet. Accordingly, recommendations are made to over-excavate and re-compact the bearing soils to a depth of 2+ feet below the proposed bottom of footing elevation or existing grade, whichever is deeper. Any screen walls or other minor structure not connected to the pump house may be founded on the shallow soils at reduced bearing capacity with increased risk for settlement.

Excavation for a wet well structure would likely extend to depths greater than 20 feet below grade which will terminate within the very dense silty sand and/or gravely soil. It was not possible to auger drill to the prescribed depth. In order to advance the well to the prescribed depth, it was necessary to use special drilling equipment. This granular zone typically continues as heavy granular material of various gradations with some thin fine grained deposits possible. It is not expected to have any substantial clay deposits that would have a negative impact on the type of structure proposed. The excavation should be examined during construction to ensure the exposed soils are as assumed for the recommendations presented herein.

The clayey surface soils exhibit a swell potential. The potential is usually strong enough to cause differential movements of any surface slabs-on-grade such as floors and sidewalks but not enough to cause damage to structures. Accordingly, attention must be paid to provide proper drainage to limit the potential for water infiltrating under slabs. A minimum slope of at least 5 percent for a distance of 10 feet is recommended for unpaved landscaped areas. Typical recommendations to reduce the swell potential include reducing the compaction requirements and requiring higher moisture contents during pad preparation and/or requiring at least one foot of non-expansive material to be placed directly beneath the building slabs and slab contiguous to the structure such as sidewalks. The site-available low and non-plastic soils that will be generated during excavation of the retention basin can be used in this regard.

For exterior slabs on grade, frequent jointing is recommended to control cracking and reduce tripping hazards should differential movement occur. It is also recommended to pin the landing slab to the building floor/stem wall. This will reduce the potential for the exterior slab lifting and blocking the operation of outswinging doors. Pinning typically consists of 24 inch long No. 4 reinforcing steel dowels placed at 12 inch centers.

Site Preparation - The entire area to be occupied by the proposed construction should be stripped of all vegetation, debris, rubble and obviously loose surface soils. Additional material should be removed to provide space for the required 12 inches of non-expansive under slab fill.

If grading plans require placing structural fill below footing bottom elevation, the exposed grade should be scarified to a depth of 8 inches, moisture-conditioned to optimum (±2 percent) and compacted to at least 95 percent of maximum dry density as determined by ASTM D-698.

All cut areas and areas above footing bottom elevation that are to receive only floor slab fill should be scarified 8 inches, moisture-conditioned to optimum and uniformly compacted to 95 percent of maximum dry density as determined by ASTM D-698. Areas that expose clayey soils (CL or SC classification should be scarified 8 inches, moisture-conditioned to at least optimum to 3 percent above optimum and lightly but uniformly compacted to at least 90 but not more than 95 percent of maximum dry density.

Foundation Design - It is recommended that the pump station wet well structure be founded on a pad/mat foundation bearing on undisturbed native dense granular soil at 20+ feet below existing grade. The surface pump station building not supported by the wet well may be supported on shallow spread foundations bearing on at least 30 inches (24 inches of fill and 6± inches pre-compacted subgrade) at minimum depth below lowest adjacent grade. Screen walls and/or any other minor surface structures may be founded on the native soils at reduced bearing capacity. The following allowable bearing capacities are available for design:

Recommended Allowable Bearing Capacities

Location	Bearing Medium	Bearing Depth, ft	Bearing Capacity, psf
Pump Station Wet Well	Very Dense Silty Gravel	2.0(1)	6,000
Pump Station	2.5 ft. Engineered Fill	1.5(2)	2,500
Minor Structures	Native Sandy Silt/Clay	1.5(3)	1,500

Notes:

1. Bearing Depth refers to depth below pump station base slab level at 20+ feet below grade
2. Bearing Depth refers to depth below lowest adjacent grade within 5 feet of foundation element bearing on at least 2.5 feet (2.0 ft. fill + 6 in. compacted subgrade) of engineered fill.
3. Bearing Depth refers to depth below lowest adjacent grade within 5 feet of foundation element bearing on undisturbed native soil.

These bearing capacities refer to the total of all loads, dead and live, and are net pressures. They may be increased one-third for wind, seismic or other loads of short duration. All footing excavations should be level and cleaned of all loose or disturbed materials. Positive drainage away from the proposed structure must be maintained at all times.

Estimated settlements under design loads are on the order of ½ to ¾-inch, virtually all of which will occur during construction. Post-construction differential settlements will be negligible, under existing and compacted moisture contents. Additional localized settlements of the same magnitude (or greater for footings bearing on fine grained native soils) could occur if native supporting soils were to experience a significant increase in moisture content. Positive drainage away from structures, and controlled routing of roof runoff must be provided to prevent ponding adjacent to perimeter walls. Planters requiring heavy watering should be considered with caution. Care should be taken in design and construction to insure that domestic and interior storm drain water is contained to prevent seepage.

Continuous footings and stem walls should be reinforced to distribute stresses arising from small differential movements, and long walls should be provided with control joints to accommodate these movements. Reinforcement and frequent control joints are suggested to allow slight movement and prevent minor floor slab cracking.

Lateral Pressures - The following lateral pressure values may be utilized for the proposed construction:

Active Pressure	
Unrestrained Walls	35 pcf
Restrained Walls	60 pcf
Passive Pressure	
Continuous Footings	350 pcf
Spread Footings or Drilled Piers	400 pcf
Coefficient of Friction (With Passive Pressure)	0.35
Coefficient of Friction (Without Passive Pressure)	0.45

All backfill must be compacted to not less than 95 percent (ASTM D-698) to mobilize these passive values at low strain. Expansive native soils should not be used as wall backfill, except as a surface seal to limit infiltration of storm/irrigation water. The expansive pressures could greatly increase active pressures.

Fill And Backfill - Clayey native soils (with Unified Soil Classification of CL or SC) are considered suitable for use in general grading fills but should **not** be used in the top foot of pad fill (in the case of slabs-on-grade for surface structures) or as wall backfill. The top foot should be completed with an approved low or non-expansive soil, either selectively used on-site soils or import. Import can be common borrow (as specified below) or select granular soil. If select is used, the 4 inches of under slab A.B.C. may be included as part of the 12 inches. Otherwise, a full 12 inches of common borrow should be used in addition to the normal 4 inches of A.B.C.

Well graded granular soils are recommended for wall backfill in the saturated zone. If native soils are to be used for wall backfill (as opposed to importing granular soil) above that level, low to non-plastic soils such as the silty sands and gravels should be selectively stockpiled for use in this regard. Maximum particle size should not exceed 3 inches. The upper 24 inches of wall backfill may consist of the clayey soils act as a barrier to surface water infiltration.

Successful backfill of sub-surface walls is difficult to achieve given the tight access. The cleaner sandy soils located in the intermediate zone or well graded granular import should be specified for all below-grade wall backfill. Placement and compaction must be carefully controlled in order to minimize the potential

for post construction settlement should the backfill zone be subjected to water infiltration. Even the most well controlled fills could experience additional settlement on the order of 1 inch if subjected to significant moisture increases. Accordingly, consideration should be given to constructing a structural slab over the backfill zone in the most critical areas or reinforce and pin the landing/entry slabs to the building stem wall to span over the backfill zone. This will reduce the potential for the exterior slab dropping and creating a tripping hazard.

If imported common fill for use in site grading is required, it should be examined by a Soils Engineer to ensure that it is of low swell potential and free of organic or otherwise deleterious material. In general, the fill should have 100 percent passing the 3-inch sieve and no more than 60 percent passing the 200 sieve. For the fine fraction (passing the 40 sieve), the liquid limit and plasticity index should not exceed 30 percent and 10 percent, respectively. It should exhibit less than 1.5 percent swell potential when compacted to 95 percent of maximum dry density (ASTM D-698) at a moisture content of 2 percent below optimum, confined under a 100 psf surcharge, and inundated.

Fill should be placed on subgrade which has been properly prepared and approved by a Soils Engineer. Fill must be wetted and thoroughly mixed to achieve optimum moisture content, ±2 percent (optimum to +3 percent for underslab fill). Fill should be placed in horizontal lifts of 8-inch thickness (or as dictated by compaction equipment) and compacted to the percent of maximum dry density per ASTM D-698 set forth as follows:

A.	Building Areas	
1.	Below footing level	95
2.	Below slabs-on-grade (non-expansive soils)	95
3.	Below slabs-on-grade (expansive native soils)	90 - 95 (max)
B.	Utility Trench Backfill	
1.	More than 2.0' below finish S/G	90
2.	Within 2.0' of finish S/G	95
C.	Aggregate Base Course	
1.	Below floor slabs	95
D.	Landscape Areas	
1.	Miscellaneous fill	90
2.	Utility trench - more than 1.0' below F/G	85
3.	Utility trench - within 1.0' of F/G	90

Utilities Installation - Trench excavations for shallow utilities can be accomplished by conventional trenching equipment although very dense soils and cobbles (and possibly boulders) may impede progress and could require the use of heavier equipment. Trench walls may stand near-vertical for the short periods of time required to install utilities although some sloughing may occur in looser and/or sandy soils necessitating laying back of side slopes and/or shoring (see above). Adequate precautions must be taken to protect workmen in accordance with all current governmental regulations.

Backfill of trenches may be carried out with native excavated material. (<3 inches in size). This material should be moisture-conditioned, placed in 8-inch lifts and mechanically compacted. Water settling is not recommended. Compaction requirements are summarized in the "Fill And Backfill" section of this report.

Slabs-On-Grade - To facilitate fine grading operations and aid in concrete curing, a 4-inch thick layer of granular material conforming to the gradation for Aggregate Base Course (A.B.C.) as per M.A.G. Specification Section 702 should be utilized beneath slabs-on-grade near the surface. Dried subgrade soils **must** be re-moistened prior to placing the A.B.C. if allowed to dry out.

A Modulus of Subgrade Reaction, k, of 250 pci. may be used for design of the pump station base slab.

GENERAL

The scope of this investigation and report does not include regional considerations such as seismic activity and ground fissures resulting from subsidence due to groundwater withdrawal, nor any considerations of hazardous releases or toxic contamination of any type.

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

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

Respectfully submitted,

SPEEDIE & ASSOCIATES, INC.

DRAFT

Prabhakar (Peter) Rupal, P.E.

DRAFT

Gregg A. Creaser, P.E.

APPENDIX

FIELD AND LABORATORY INVESTIGATION

SOIL BORING LOCATION PLAN

SOIL LOG LEGEND

LOG OF TEST BORINGS

TABULATION OF TEST DATA

CONSOLIDATION TEST DATA

MOISTURE-DENSITY RELATIONS

SWELL TEST DATA

pH & RESISTIVITY TEST DATA

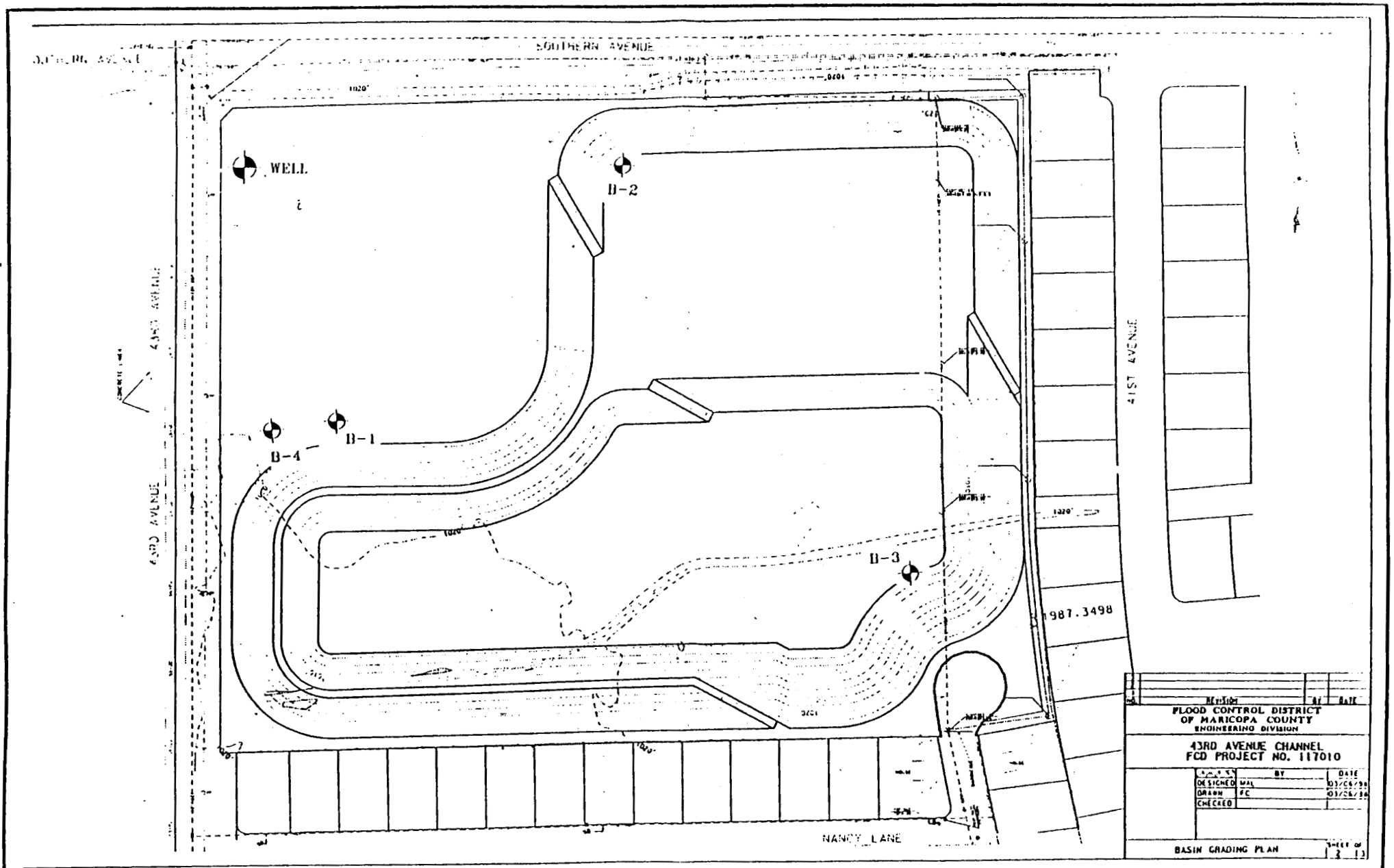
SOIL CHEMISTRY DATA

WELL DATA

FIELD AND LABORATORY INVESTIGATION

On March 12, 1998, a total of three soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plan. All exploration work was carried out under the full-time supervision of our soils technician, who recorded subsurface conditions and obtained samples for laboratory testing. The soil borings were advanced with a truck-mounted CME-55 drill rig utilizing 7-inch diameter hollow stem flight augers. On March 25, 1998, we returned to the site to attempt to deepen the borings with a truck-mounted CME-75HD drill rig utilizing 7-inch diameter hollow stem flight augers. Auger refusal was again met at shallow depth. On May 11 and 12, 1998, a total of nine soil test borings were drilled in 43rd Avenue and the well site with a truck-mounted AP1100 Becker Hammer drill using air to return cutting to the surface. Detailed information regarding the borings and samples obtained can be found on an individual Log of Test Boring prepared for each drilling location.

Laboratory testing consisted of moisture content, dry density, grain-size distribution and plasticity (Atterberg Limits) tests for classification and design parameters. Compression tests were performed on a selected ring sample in order to estimate settlements and determine effects of inundation. Remolded swell tests were performed on samples compacted to densities and moisture contents expected during construction. Laboratory resistivity, pH and sulfate tests were also conducted for corrosivity analysis. All field and laboratory data are presented in this appendix.



SOIL BORING LOCATION PLAN

Flood Detention Basin
SEC 43rd Ave. & Southern Ave.
Phoenix, Arizona

– Approximate Soil Boring Locations

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS

Rig Type: Becker AP1100
Boring Type: Air Compressed
Surface Elevation: N/A
Station: 61 + 40, R 50

Visual Classification

Depth (feet) | Graphic Log | Sample Number | Depth of Sample | Natural Water Content (%) | In-place Dry Density (P.C.F.) | Penetration Resistance Blows per Foot (0 – 25)

0

Brown SILTY FINE SAND (SM-Dry) with Trace Gravel

Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
2.0	--	--	
4.0	--	--	
6.0	--	--	
8.0	--	--	
10.0	--	--	
12.0	--	--	
14.0	--	--	

Trace Cobbles — 15.0

Brown SANDY SILTY GRAVEL (GM-Dry) with Little Cobbles

Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
16.0	--	--	64/12
18.0	--	--	
20.0	--	--	
22.0	--	--	
24.0	--	--	82/1
26.0	--	--	88/12
28.0	--	--	70/12
30.0		--	

29.5

PRELIMINARY

Boring Date: 5-12-98
Field Engineer/Technician: K. Gravel
Driller: B. Mouis
Contractor: Layne Enviro.

Water Level

Depth	Hour	Date
35'	10:00 am	5-12-98
27'	2:30 pm	5-18-98

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: WELL

Storm Water Detention Basin
43th Ave. & Southern
Phoenix, Arizona

Project No.: 980172SA

Rig Type: Becker AP1100
Boring Type: Air Compressed
Surface Elevation: N/A
Station: 61+40, R 50

Visual Classification

Depth (feet) | Graphic Log

30

Brown SILTY GRAVEL (GM-Moist to Wet) with Little Sand

35.0

35 — End of Boring

40

45

50

55

60

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 — 25 — 50)
		--		
	32.0	--	--	
	34.0	--	--	57/12"

PRELIMINARY

Boring Date: 5-12-98
Field Engineer/Technician: K. Gravel
Driller: B. Mouis
Contractor: Layne Enviro.

Water Level

Depth	Hour	Date
35'	10:00 am	5-12-98
27'	2:30 pm	5-18-98

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: WELL

Storm Water Detention Basin

43th Ave. & Southern

Phoenix, Arizona

Project No.: 980172SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Graphic Log	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25)
0		Very Stiff to Stiff Brown SANDY SILT (ML-Moist)	RS-1	2.0	9.4	101.7	
5		Weak Calcareous Cementation	S-2	6.0	--	--	
10			S-3	11.0	--	--	
12.5		Very Dense Brown WELL GRADED SAND (SW-Moist) with Little Gravel	S-4	15.5	--	--	65/12
15							
17.0		Auger Refusal on Cobbles					
20							
25							
30							

PRELIMINARY

Boring Date: 3-12-98
Field Engineer/Technician: K.Gravel
Driller: B. Freeman
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

Storm Water Detention Basin
43th Ave. & Southern
Phoenix, Arizona

Project No.: 980172SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Graphic Log	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25)
0		Very Stiff Brown SANDY CLAY (CL-Moist) with Weak Calcareous Cementation	RS-1	2.0	12.9	85.7	
3.0		Stiff Brown SANDY SILT (ML-Moist) with Weak Calcareous Cementation	BS-2	4.5	--	--	
5			S-3	6.0	--	--	
10			S-4	11.0	--	--	
11.5		Very Dense Brown SILTY SAND (SM-Moist) With Little Gravel	S-5	15.0	--	--	50/6"
15							
16.0		Auger Refusal on Cobbles					
20							
25							
30							

PRELIMINARY

Boring Date: 3-12-98
Field Engineer/Technician: K.Gravel
Driller: B. Freeman
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 2

Storm Water Detention Basin

43th Ave. & Southern

Phoenix, Arizona

Project No.: 980172SA

Rig Type: CME-55
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Graphic Log	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25)
0		Very Stiff Brown SANDY CLAY SILTY CLAY (ML/CL-Moist) with Weak Calcareous Cementation	S-1	2.5	--	--	
			BS-2	4.5	--	--	
5			RS-3	5.5	--	--	
		7.0					
		Medium Dense Brown SILTY SAND (SM-Moist) with Fine Layers of Clay					
10			S-4	11.0	--	--	
		with Little Gravel					
15			S-5	16.0	--	--	
		17.0					
		Auger Refusal on Cobbles					
20							
25							
30							

PRELIMINARY

Boring Date: 3-12-98
Field Engineer/Technician: K.Gravel
Driller: B. Freeman
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 3

Storm Water Detention Basin
43th Ave. & Southern
Phoenix, Arizona

Project No.: 980172SA

Rig Type: CME-75
Boring Type: Hollow Stem Auger
Surface Elevation: N/A

Depth (feet)	Graphic Log	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0		Brown SILTY SAND (SM-Dry)					
15		15.0 Brown WELL GRADED SAND (SW-Dry) with Trace Cobbles					
20		21.9 Auger Refusal on Cobbles					
25							
30							

PRELIMINARY

Boring Date: 3-25-98
Field Engineer/Technician: K. Gravel
Driller: J. Carter
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Dry		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 4

Storm Water Detention Basin

43th Ave. & Southern

Phoenix, Arizona

Project No.: 980172SA

TABULATION OF TEST DATA

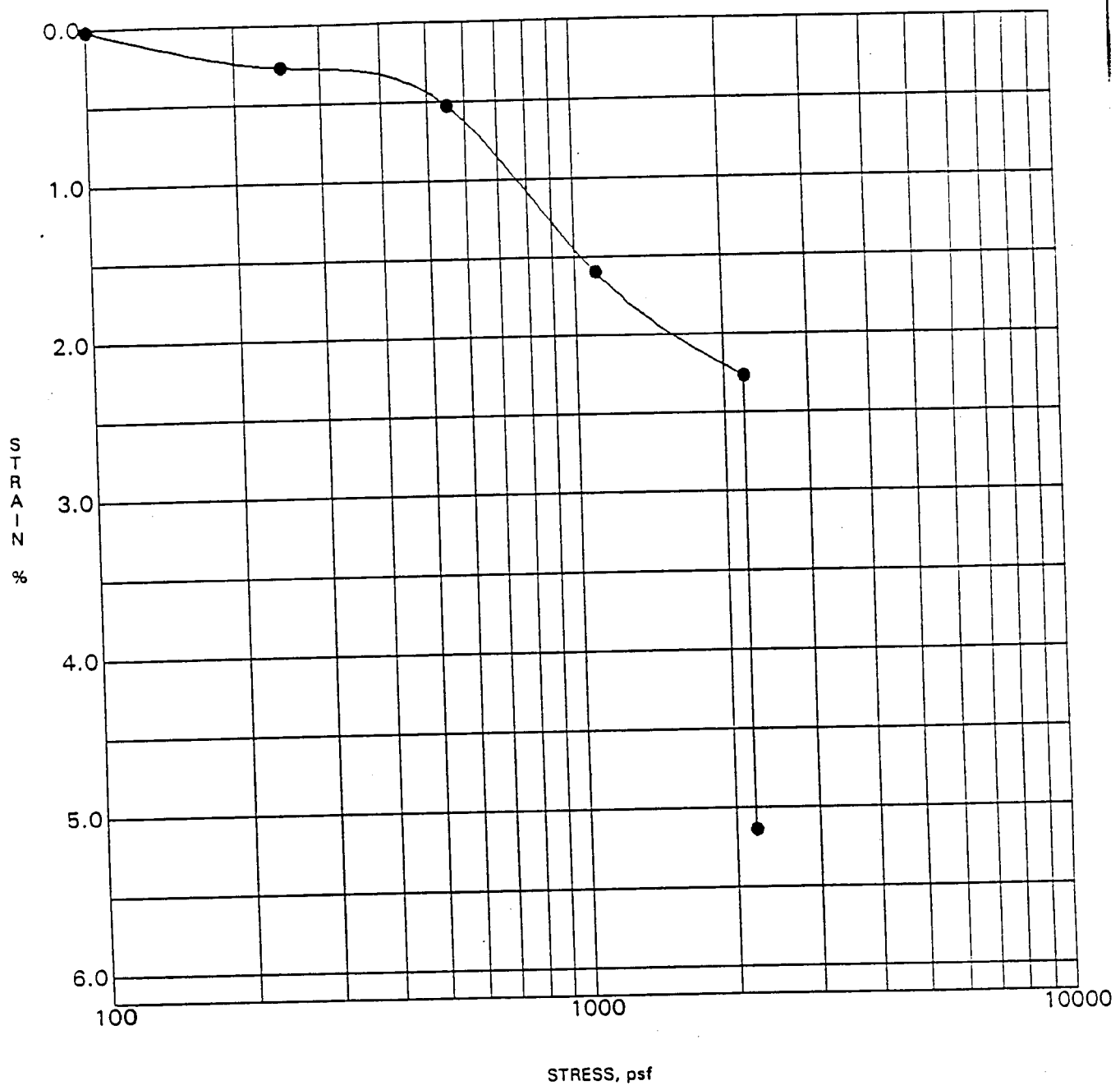
SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	DEPTH OF SAMPLE TIP	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B- 1	RS-1	RS	2.0	9.4	101.7	85.9	99	100	100	100	23	23	NP	ML	SILT
B- 2	RS-1	RS	2.0	12.9	85.7	93.3	100	100	100	100	33	21	12	CL	LEAN CLAY
B- 3	BS-2	BULK	4.5	--	--	69.2	94	98	99	100	24	20	4	CL-ML	SANDY SILTY CLAY
B- 3	S-5	SPT	16.0	--	--	30.3	56	64	70	100	22	20	2	SM	SILTY SAND with GRAVEL

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

Flood Detention Basin
43rd Ave & Southern SEC
Phoenix, Arizona
Proje[redacted]. 9[redacted]2S[redacted]

SPEEDIE AND ASSOCIATES

CONSOLIDATION TEST



BORING B- 2

SAMPLE No. RS-1

Sample inundated at end of test at 2200 psf

PROJECT Flood Detention Basin - 43rd Ave & Southern SEC

JOB NO. 980172SA

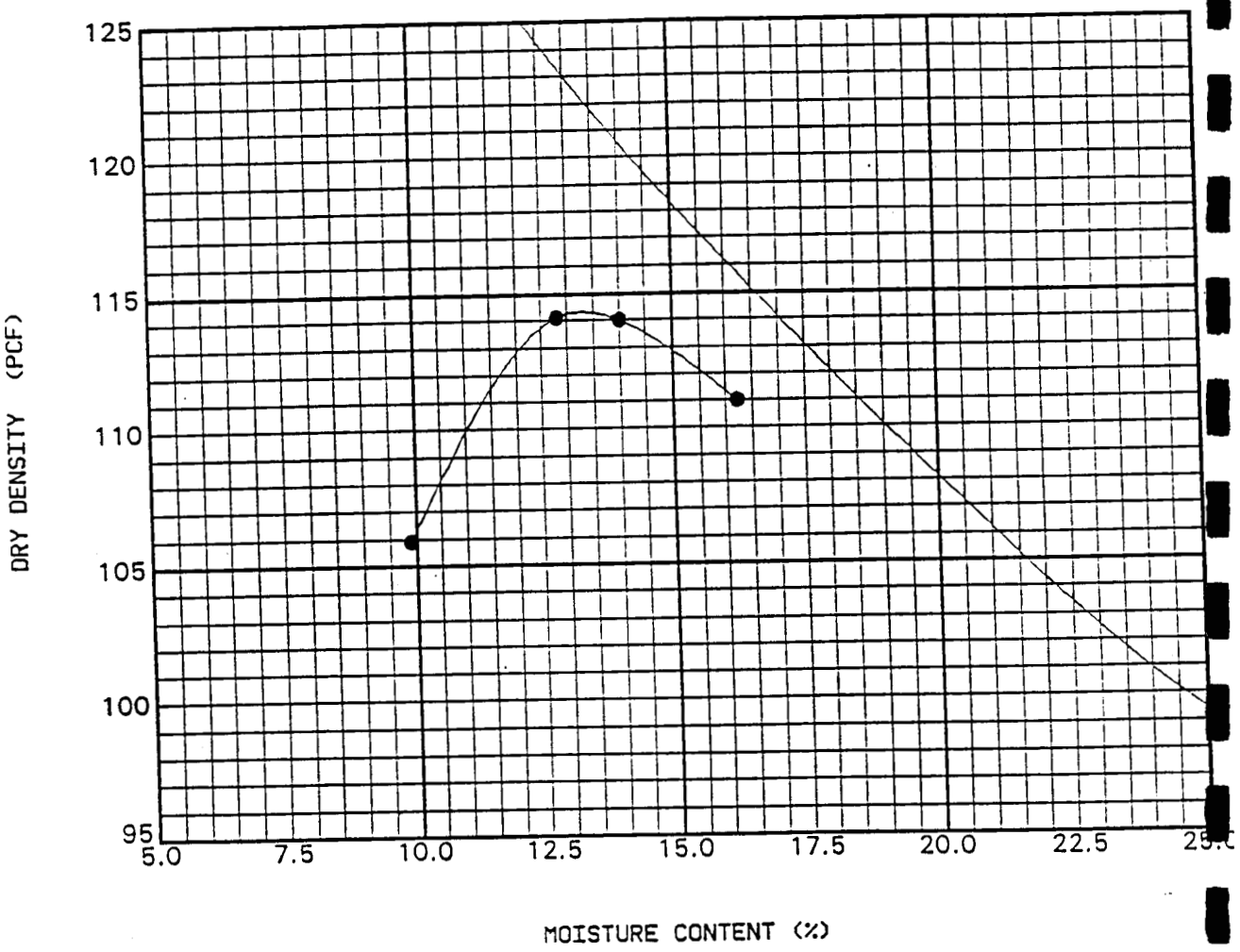
DATE 3/12/98

SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: Flood Detention Basin
PROJECT NO.: 980172SA
LOCATION: 43rd Ave & Southern SEC
DATE: 3/12/98
BORING NO.: B- 3
SAMPLE NO.: BS-2
SAMPLE DEPTH: 4.50
METHOD OF COMPACTION: ASTM D698A
LIQUID LIMIT: 24
PLASTIC LIMIT: 20
PLASTICITY INDEX: 4
CLASSIFICATION: CL-ML
ASTM SOIL DESCRIPTION: SANDY SILTY CLAY

MAXIMUM DRY DENSITY: 114.5 PCF
OPTIMUM MOISTURE CONTENT: 13.4 %



SPEEDIE AND ASSOCIATES

SWELL TEST DATA

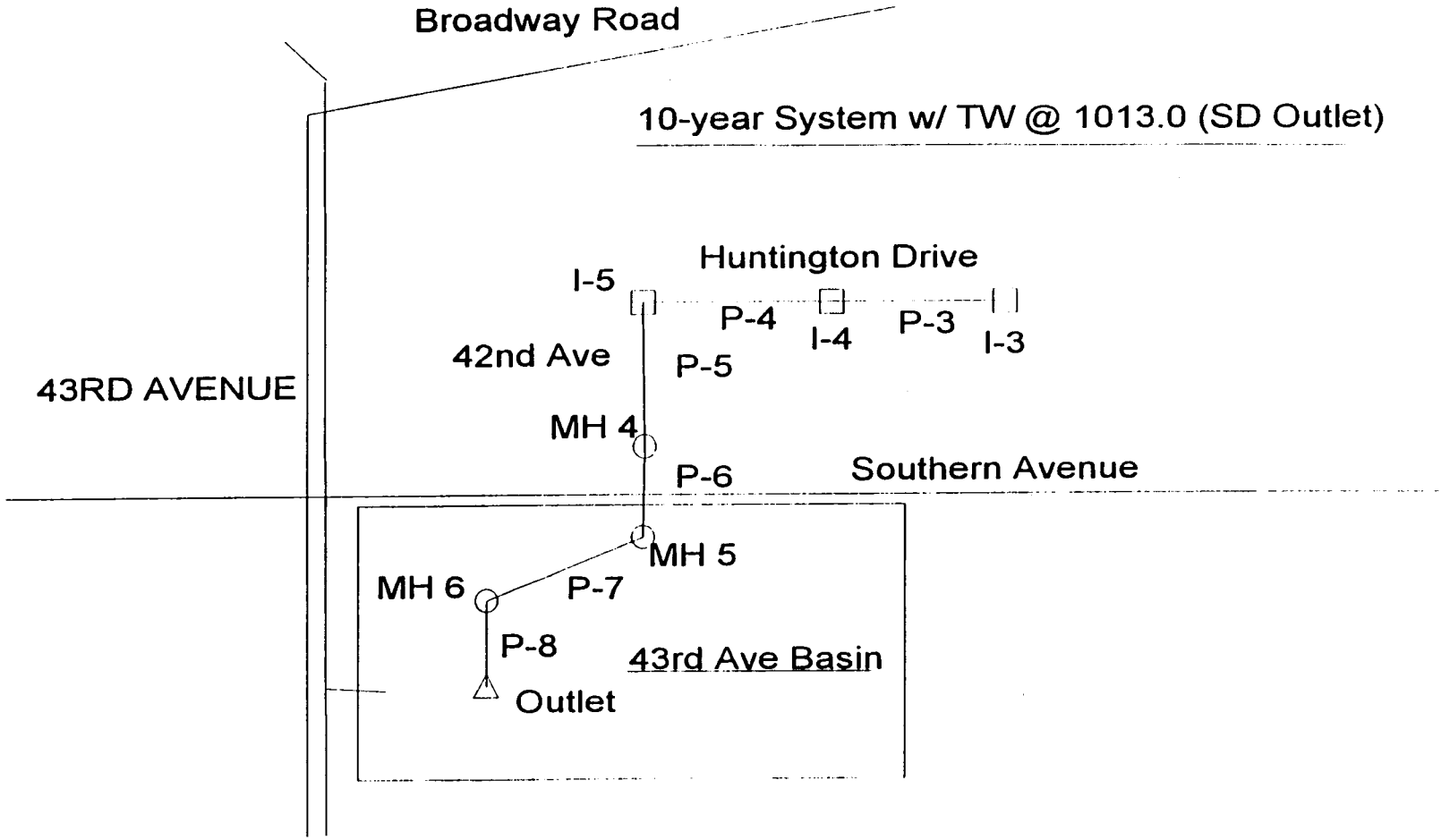
BORING or TEST PIT No.	SAMPLE DEPTH, ft	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE (%)	PERCENT COMPACTION	INITIAL DEGREE of SATURATION (%)	FINAL DEGREE of SATURATION (%)	TOTAL SWELL (%)
B- 3 BS-2	4.5	108.7	12.0	94.9	61.2	97.0	3.2

PERCENT COMPACTION BASED ON A MAXIMUM DRY DENSITY OF 114.5 pcf @ 13.4 % MOISTURE

Flood Detention Basin
43rd Ave & Southern SEC
Phoenix, Arizona
Project No. 980172SA

SPEEDIE AND ASSOCIATES

PHASE III - 43rd Ave & Huntington Drive SD Exists



43rd Basin Collection System

Pipe	Discharge (cfs)	Vel (ft/s)	U.S. Node	D.S. Node	# of Sections	Section Size	Length (ft)	U.S. HGL (ft)	U.S. Ground Elev (ft)	U.S. Invert Elev (ft)	D.S. HGL (ft)	D.S. Ground Elev (ft)	D.S. Invert Elev (ft)
P-3	123.00	5.18	I-3	I-4	1	66 inch	540.00	1,022.21	1,023.00	1,011.14	1,021.48	1,021.50	1,010.60
P-4	123.00	5.18	I-4	I-5	1	66 inch	660.00	1,021.23	1,021.50	1,010.60	1,020.35	1,021.00	1,009.80
P-5	123.00	5.18	I-5	MH 4	1	66 inch	198.00	1,020.02	1,021.00	1,009.80	1,019.75	1,022.60	1,009.06
P-6	123.00	12.53	MH 4	MH 5	2	30 inch	120.00	1,017.31	1,022.60	1,003.40	1,014.61	1,021.00	1,003.28
P-7	123.00	5.18	MH 5	MH 6	1	66 inch	623.00	1,014.20	1,021.00	1,003.28	1,013.36	1,021.00	1,002.76
P-8	123.00	5.18	MH 6	Outlet	1	66 inch	82.00	1,013.11	1,021.00	1,002.76	1,013.00	1,023.10	1,002.66

```
------------------ Beginning Calculation Cycle ------------------
Discharge: 123.00 cfs  at node I-3
Discharge: 123.00 cfs  at node I-4
Discharge: 123.00 cfs  at node I-5
Discharge: 123.00 cfs  at node MH 4
Discharge: 123.00 cfs  at node MH 5
Discharge: 123.00 cfs  at node MH 6
Discharge: 123.00 cfs  at node Outlet
Beginning iteration 1
Discharge: 123.00 cfs  at node I-3
Discharge: 123.00 cfs  at node I-4
Discharge: 123.00 cfs  at node I-5
Discharge: 123.00 cfs  at node MH 4
Discharge: 123.00 cfs  at node MH 5
Discharge: 123.00 cfs  at node MH 6
Discharge: 123.00 cfs  at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error:  0.0
** Warning: Design constraints not met.
Warning: No Duration data exists in IDF Table
Information: P-8 Surcharged condition
Information: P-7 Surcharged condition
Violation: P-7 does not meet minimum slope constraint.
Information: P-6 Surcharged condition
Information: P-5 Surcharged condition
Information: P-4 Surcharged condition
Information: P-3 Surcharged condition
--------------------- Calculations Complete ---------------------

** Analysis Options **
Friction method:  Manning's Formula
Hydraulic Grade Convergence Test:  0.001000
Maximum Network Traversals:  5
Number of Flow Profile Steps:  5
Discharge Convergence Test:  0.001000
Maximum Design Passes:  3
```

---------- Network Quick View ----------

				Hydraulic Grade	
Label	Length	Size	Discharge	Upstream	Downstream
P-3	540.00	66 inch	123.00	1,022.21	1,021.48
P-4	660.00	66 inch	123.00	1,021.23	1,020.35
P-7	623.00	66 inch	123.00	1,014.20	1,013.36
P-5	198.00	66 inch	123.00	1,020.02	1,019.75
P-6	120.00	30 inch	123.00	1,017.31	1,014.61
P-8	82.00	66 inch	123.00	1,013.11	1,013.00

		Elevations	
Label	Discharge	Ground	Upstream HGL	Downstream HGL
I-3	123.00	1,023.00	1,022.23	1,022.21
I-5	123.00	1,021.00	1,020.35	1,020.02
MH 5	123.00	1,021.00	1,014.61	1,014.20
I-4	123.00	1,021.50	1,021.48	1,021.23
MH 6	123.00	1,021.00	1,013.36	1,013.11
MH 4	123.00	1,022.60	1,019.75	1,017.31
Outlet	123.00	1,023.10	1,013.00	1,013.00

Elapsed: 0 minute(s) 1 second(s)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

IN COOPERATION WITH THE CITY OF PHOENIX

PLANS FOR THE CONSTRUCTION OF

43RD AVENUE DETENTION BASIN

FCD PROJECT NO. 1170230

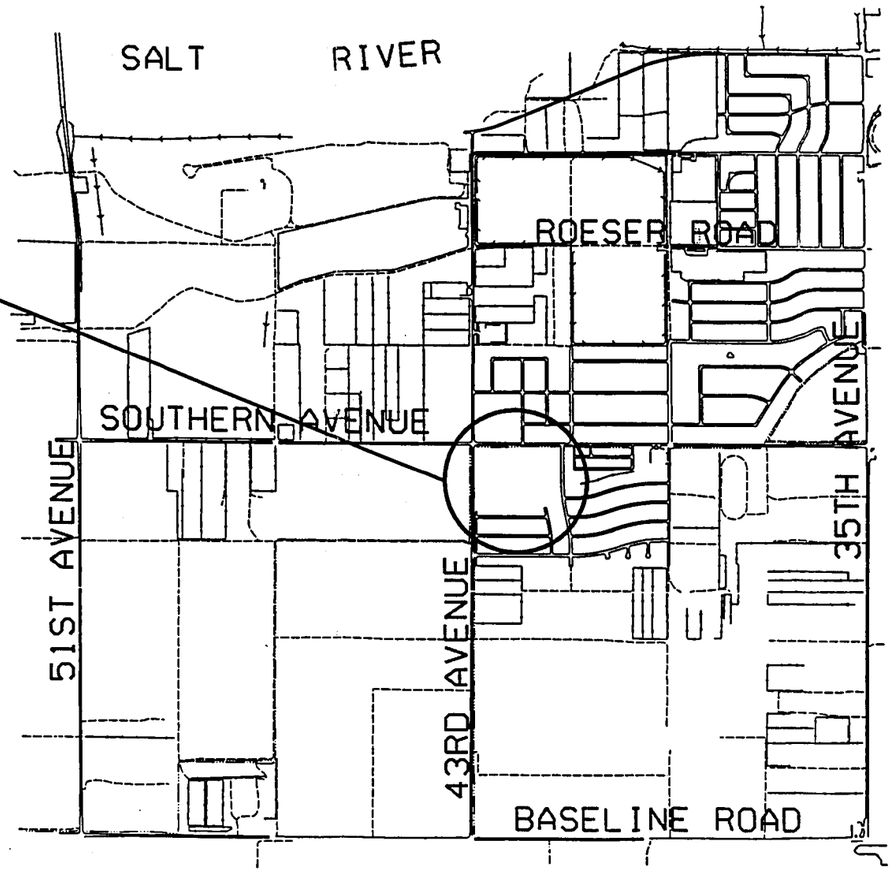
FCD CONTRACT NO. 99-04

100% SUBMITTAL

PRELIMINARY

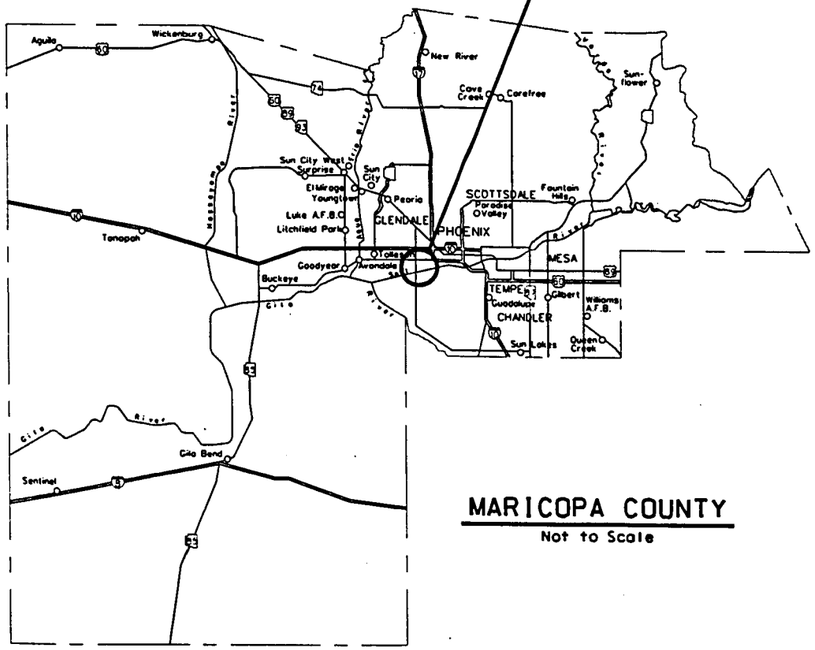
NOT FOR

CONSTRUCTION



VICINITY MAP

Not to Scale



MARICOPA COUNTY

Not to Scale

APPROVALS:

MARICOPA COUNTY
ENVIRONMENTAL SERVICES
DEPARTMENT — DATE

CITY OF PHOENIX
STREET TRANSPORTATION DEPARTMENT — DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ISSUED FOR PUBLIC BIDDING BY:

CHIEF ENGINEER AND
GENERAL MANAGER

BOARD OF DIRECTORS OF
THE FLOOD CONTROL DISTRICT

FULTON BROCK - CHAIRMAN

DISTRICT 1	FULTON BROCK
DISTRICT 2	DON STAPLEY
DISTRICT 3	ANDY KUNASEK
DISTRICT 4	JAN BREWER
DISTRICT 5	MARY ROSE WILCOX

dgn\phase3\43p3cov.dgn Mar. 10, 1999 08:11:57

LEGEND

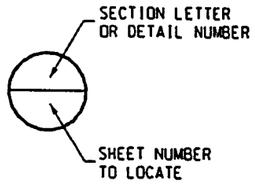
- BENCHMARK
- EXIST. SURVEY MONUMENT
- EXIST. SURVEY MONUMENT
- EXIST. & PROPOSED COMBINED CURB & GUTTER - MAG DET. 220 TYPE "A"
- EXIST. CONCRETE SIDEWALK - COP STD. DET. P-1230
- EXISTING DITCH
- IRR — EXISTING IRRIGATION LINE (NOTE - PRIVATE, SALT RIVER OR R.I.D.)
- EXISTING IRRIGATION STRUCTURE
- EXISTING IRRIGATION STANDPIPE
- 12" W — EXISTING WATER LINE / SIZE
- EXISTING WATER METER & BOX
- EXISTING FIRE HYDRANT
- NEW OR RELOCATED FIRE HYDRANT BY CONTRACTOR
- EXISTING WATER VALVE OPERATING NUT ELEVATION
- 24" S — EXISTING SEWER LINE / SIZE
- EXISTING MANHOLE
- NEW MANHOLE
- CATCH BASIN, GUTTER INLET (LENGTH TO SCALE)
- CATCH BASIN, CURB INLET (LENGTH TO SCALE)
- CATCH BASIN, CURB & GUTTER INLET (LENGTH TO SCALE)
- 78" SD — EXISTING STORM DRAIN / SIZE
- NEW PIPE FOR STORM DRAIN OR IRRIGATION LINE
- CATV — EXISTING UNDERGROUND CABLE TELEVISION
- E — EXISTING UNDERGROUND ELECTRIC
- 4D — EXISTING UNDERGROUND TELEPHONE DUCTS (SPECIFY NUMBER)
- 2" G — EXISTING GAS LINE / SIZE
- T — EXISTING UNDERGROUND TELEPHONE CABLE
- EXISTING STREET SIGN
- EXISTING TRAFFIC SIGN
- EXISTING UTILITY POLE
- EXISTING WIRE FENCE
- EXISTING WOOD FENCE
- EXISTING CHAIN LINK FENCE
- P — MAIL BOX
- DOWN ANCHOR
- STREET LIGHT
- EASEMENT LINE
- EXISTING OR NEW R/W LINE
- PAVEMENT CENTER LINE AND OR MONUMENT LINE (℄ AND / OR ℄)
- 2 — BORING HOLE / NUMBER (SEE SPECIAL PROVISIONS)
- TELEPHONE RISER
- WM — WATER SERVICE BOX
- MST — MID SPAN TAP (OH UTILITIES)
- WV — WATER VAULT
- D — STORM MANHOLE
- T — TRAFFIC SIGNAL BOX
- TREE
- STOP — STOP SIGN
- P — MAILBOX
- GATE W/POSTS

ABREVIATIONS

CSTR	CONSTRUCTION
DESC	DESCRIPTION
EQ	EQUAL
FOC	FIBRE OPTIC CABLE
G	GUTTER ELEVATION
OHE	OVERHEAD ELECTRIC
P	PAVEMENT ELEVATION
PG	PAGE
P/L	PROPERTY LINE
℄	PLATE CENTERLINE
PRV	PRIVATE
SPG	SPACING
UGT	UNDERGROUND TELE CABLE
TBM	TEMPORARY BENCHMARK
TC	TOP OF CURB ELEVATION
TW	TOP OF WALL

STRUCTURAL NOTES:

1. ALL CONSTRUCTION SHALL CONFORM TO MAG STANDARDS DETAILS. SPECIFICATIONS. DATED 1992. INCLUDING ALL REVISIONS THRU 1996.
2. DESIGN IS IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES. DIVISION 1. 15TH EDITION. 1992.
3. REINFORCING STEEL SHALL CONFORM TO ASTM SPECIFICATION A615. GRADE 60.
4. STRESSES - fs = 24.000 PSI - GRADE 60 REINFORCING STEEL.
5. ALL REINFORCING STEEL PLACEMENT DIMENSIONS SHALL BE TO CENTER OF BARS UNLESS OTHERWISE NOTED.
6. ALL REINFORCING STEEL SHALL HAVE 2" CLEAR COVER UNLESS OTHERWISE NOTED.
7. STRUCTURAL STEEL SHALL CONFORM TO ASTM SPECIFICATION A36.
8. ALL WELDING SHALL CONFORM TO THE REQUIREMENTS OF THE AMERICAN WELDING SOCIETY. STRUCTURAL WELDING CODE. REVISED 1996.
9. DIMENSIONS SHALL NOT BE SCALED FROM DRAWINGS.
10. CHAMFER ALL EXPOSED CORNERS 3/4" UNLESS OTHERWISE NOTED.
11. CONCRETE COMPRESSIVE STRENGTH SHALL BE 3.000 PSI MAG. CLASS A UNLESS NOTED OTHERWISE.



GENERAL NOTES:

1. ALL CONSTRUCTION TO BE PERFORMED ACCORDING TO APPLICABLE MAG STANDARD DETAILS AND MAG SPECIFICATIONS. DATED 1998 AND THE CITY OF PHOENIX ADDITIONS AND DELETIONS THROUGH 1996.
2. FACILITIES WHICH ARE NOT SPECIFICALLY LOCATED WITH ACTUAL HORIZONTAL AND VERTICAL CONTROLS ARE APPROXIMATE AND TO THE BEST AVAILABLE INFORMATION.
3. EXISTING UTILITIES AND OTHER FACILITIES HAVE BEEN PLACED ON THE PLANS FROM FIELD SURVEYS, EXISTING MAPS AND OTHER CURRENT PLANS WITHIN THE AREA OF THIS PROJECT. THE CONTRACTOR WILL DETERMINE THE EXACT LOCATION AND/OR ELEVATION OF EXISTING UTILITIES WHICH PERTAIN TO AND AFFECT THE CONSTRUCTION OF THIS PROJECT.
4. TWO (2) WORKING DAYS PRIOR TO EXCAVATING, THE CONTRACTOR SHALL CALL FOR BLUE STAKES AT THE BLUE STAKE CENTER (PHONE: 602-263-1100).
5. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS PRIOR TO CONSTRUCTION.
6. THE FLOOD CONTROL DISTRICT OR CITY OF PHOENIX IS NOT RESPONSIBLE FOR LIABILITY ACCRUED DUE TO DELAYS AND/OR DAMAGE TO UTILITIES IN CONJUNCTION WITH THIS CONSTRUCTION.
7. ANY WORK PERFORMED WITHOUT THE APPROVAL OF THE FLOOD CONTROL DISTRICT AND/OR THE ENGINEER AND ALL WORK AND MATERIALS NOT IN CONFORMANCE WITH THE SPECIFICATIONS IS SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.
8. THE ENGINEER WILL DETERMINE THE NUMBER AND LOCATION OF THE REQUIRED COMPACTION TESTS FOR STRUCTURE BACKFILL.
9. TRAFFIC CONTROL SHALL BE MAINTAINED IN ACCORDANCE WITH M.A.G. SPECIFICATION 401, PART VI OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (1988 EDITION INCLUDING REVISION 3 DATED SEPTEMBER 3, 1993).
10. CONTRACTOR SHALL REPLACE PAVEMENT TO THE EXISTING GRADES SHOWN ON THE PLANS.
11. EXACT POINT OF MATCHING TERMINATION AND OVERLAY WILL BE DETERMINED IN THE FIELD BY THE ENGINEER.
12. NO JOB WILL BE CONSIDERED COMPLETED UNTIL CURBS, PAVEMENT AND SIDEWALKS HAVE BEEN SWEPT CLEAN OF ALL DIRT AND DEBRIS.
13. PRIOR TO FINAL APPROVAL AND ACCEPTANCE OF THE WORK, THE CONTRACTOR WILL BE REQUIRED TO CLEAN ADJACENT (OFF-PROJECT) ROADWAYS USED DURING THE COURSE OF CONSTRUCTION.

INDEX OF SHEETS

UTILITY NOTIFICATION

PHONE NO.	COMPANY	CONTACT
--- --- ----	------	--- ----

PROJECT BENCHMARKS

BRASS CAP
INSTERSECTION 43RD AVE & SOUTHERN AVE
EL =1020.84

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

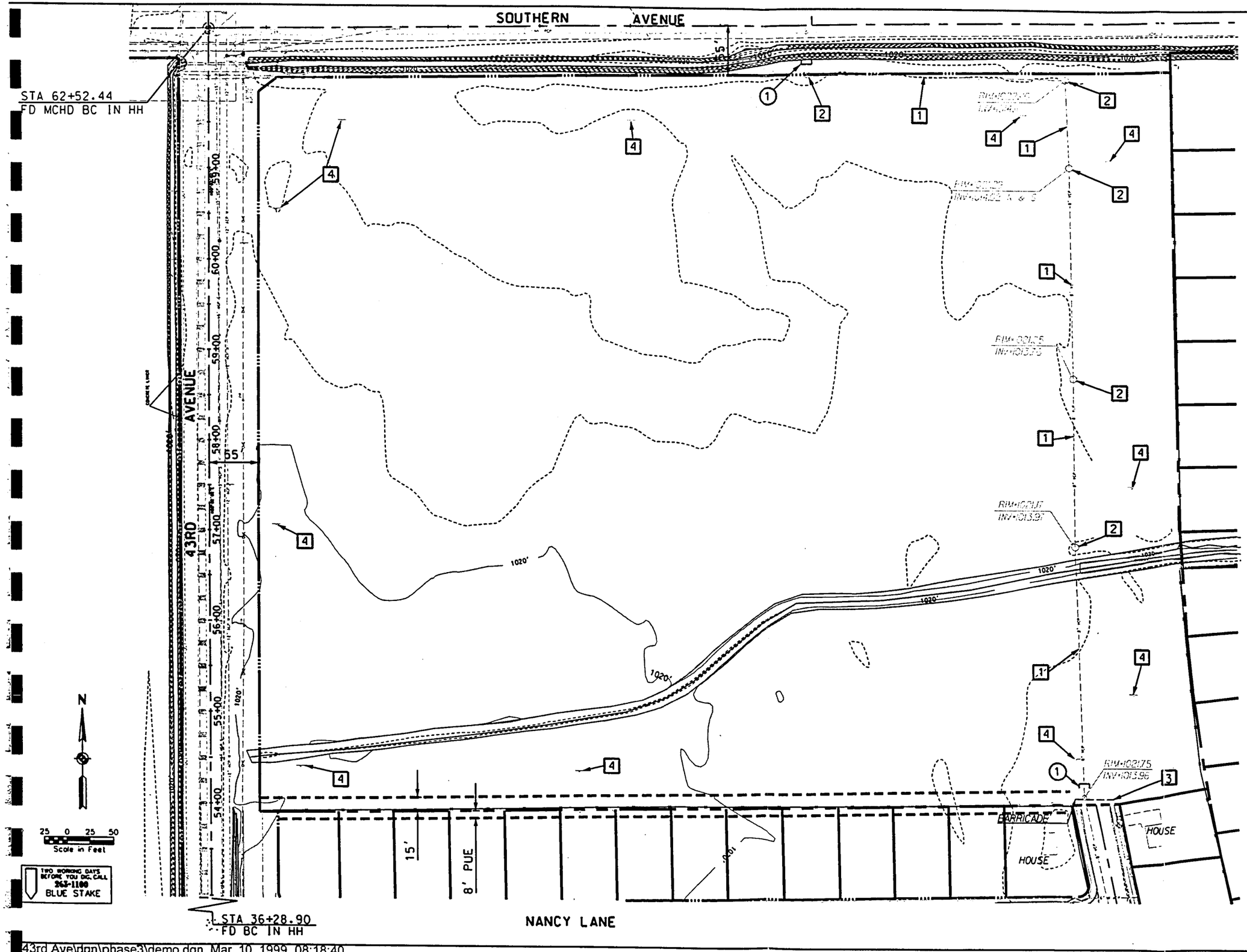
43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

	BY	DATE
DESIGNED	JRR	12/30/9
DRAWN	FC	12/30/9
CHECKED	MAL	

PRELIMINARY NOT FOR CONSTRUCTION

GENERAL NOTES

SHEET 0 2 2



REMOVE

1. REMOVE EXISTING SANITARY SEWER. 1071 LF.
2. REMOVE SEWER MANHOLE. 5 EA.
3. REMOVE BARRICADE (NPI).
4. REMOVE SIGNS & SALVAGE (NPI).

CONSTRUCTION

1. INSTALL SEWER PLUG PER MAG STD DET 427. 2 EACH

SEE SHT 7 FOR SEWER RELOCATION.

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

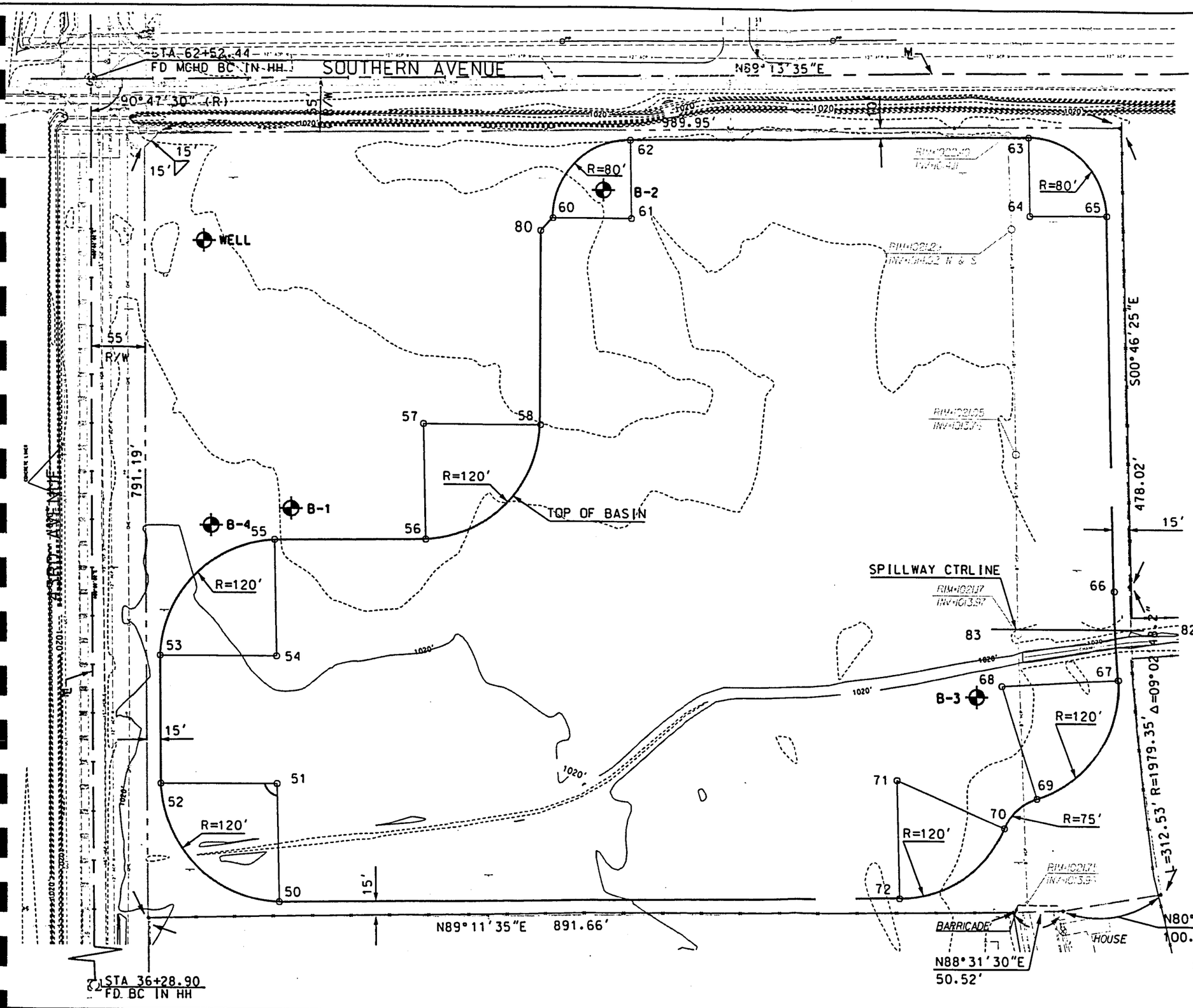
PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	JRR	07/27/9
DRAWN	FC	07/27/9
CHECKED	MAL	07/27/9

DEMOLITION PLAN

SHEET O 3 2

43rd Ave\dgn\phase3\demo.dgn Mar. 10, 1999 08:18:40



PT NO.	NORTHING	EASTING
1	10266.74	6060.64
2	7628.90	5000.00
3	10252.44	5001.56
32	9467.39	5988.16
50	9408.91	5192.82
51	9528.90	5191.13
52	9528.97	5071.13
53	9660.02	5071.21
54	9659.95	5191.21
55	9779.94	5189.59
56	9782.03	5344.98
57	9902.02	5343.36
58	9901.95	5463.36
60	10114.97	5476.48
61	10114.92	5556.48
62	10194.91	5555.40
63	10200.49	5966.55
64	10120.50	5967.61
65	10121.58	6047.60
66	9733.57	6052.84
67	9641.71	6056.20
68	9634.56	5936.41
69	9519.93	5971.89
70	9489.54	5937.81
71	9537.87	5827.98
72	9417.88	5829.67
80	10101.77	5463.48
82	9687.07	6104.42
83	9681.24	5904.50

LEGEND

SOIL BORING LOCATION
(SEE SPECIAL PROVISIONS)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

	BY	DATE
DESIGNED	JRR	12/30/9
DRAWN	FC	12/30/9
CHECKED	MAL	

PRELIMINARY NOT FOR CONSTRUCTION

GEOMETRIC LAYOUT

SHEET 0 4 2

dgn\phase3\geometry.dgn Mar. 10, 1999 08:21:45

STA 62+52.44
FD MCHD BC IN HH

PT NO.	FINISHED GRADE ELEVATION
50	1022.3
51	1002.8
52	1022.2
53	1022.4
54	1002.7
55	1022.8
56	1023.1
58	1023.3
60	1023.1
61	1012.5
62	1023.0
63	1023.0
64	1012.5
65	1023.1
66	1023.6
67	1023.7
68	1003.8
69	1023.7
70	1023.7
71	1003.7
72	1022.0
80	1023.1

SOUTHERN AVENUE

43RD AVENUE

55' RW

406.9'

420'

345'

350'

55' RW

10'

SEE SHEET 16

15' MAINTENANCE ACCESS RAMP

20:1

5:1

R=60'

MAINTENANCE ACCESS RAMP

FG 1003.1

FG 1004.9

PEDESTRIAN RAMP

10'

15'

66

R=30'

Sta 56+30

15'

℄ LOW FLOW CHANNEL

FG 1003.6

R=22.5'

MAINTENANCE ACCESS RAMP

45'

8" SS

SEE SHEET 15

STA 36+28.90
FD BC IN HH

▲ BENCHMARK
BRASS CAP
INTERSECTION OF 43RD AVE
& SOUTHERN AVE
EL 1020.87

N

5 0 25 50
Scale in Feet

TWO WORKING DAYS BEFORE YOU DIG, CALL 263-1100 BLUE STAKE

43rd Ave\dgn\phase3\bsntop.dgn Mar. 10, 1999 08:16:14

REMOVE

[1] REMOVE PIPE PLUG (NPI).

CONSTRUCT

INSTALL NEW STORM SEWER PIPE

NO.	STATION TO STATION	DIAMETER INCHES	LENGTH FEET
(1)	56+30	72	81

(2) CONSTRUCT OUTLET STRUCTURE (SEE SHEET 11 & 12) 60 CY

(3) INSTALL 2" DIA INSTRUMENTATION CONDUIT W/THREADED END CAP. (SEE SHEET 11 & 12) 116 LF

(4) CONSTRUCT INLET SPILLWAY. (SEE SHEET 8, 9 & 10)

(5) INSTALL STEEL HANDRAIL. 322 LF (SEE SHEET 9 & 10)

(6) PLACE DUMPED RIPRAP. 457 CY. (SEE SHEET 8)

(7) CONSTRUCT MASONARY FENCE. 1647 LF.

EXCAVATE DETENTION BASIN
223.279 CY

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

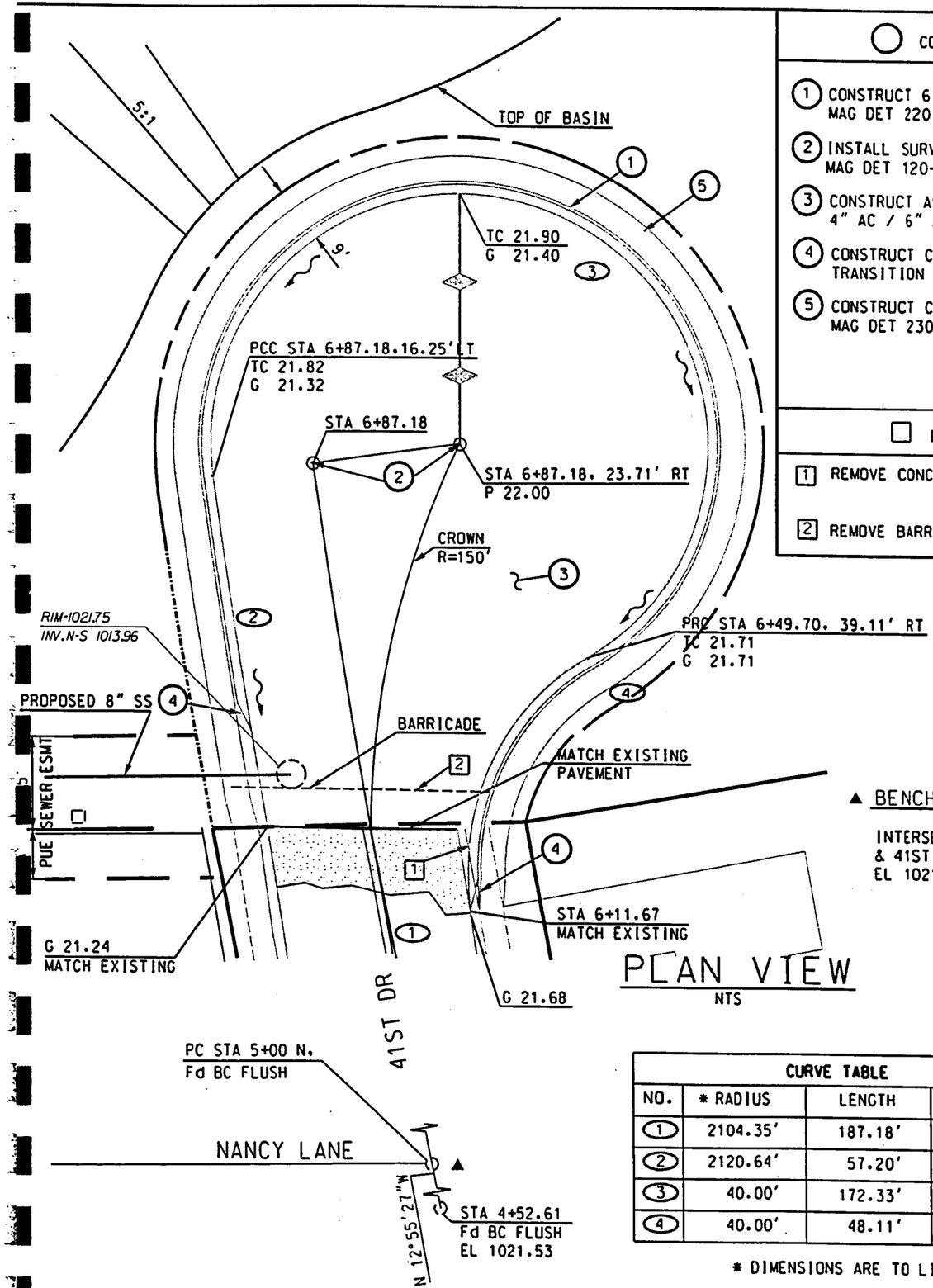
43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	JRR	01/29/99
DRAWN	FC	01/29/99
CHECKED	MAL	

BASIN GRADING PLAN

SHEET OF 5 2



PLAN VIEW
NTS

CONSTRUCT

1. CONSTRUCT 6" CONCRETE CURB & GUTTER MAG DET 220 TYPE A - 278 LF.
2. INSTALL SURVEY MONUMENT PER MAG DET 120-1-B - 2 EA.
3. CONSTRUCT ASPHALT PAVEMENT 4" AC / 6" ABC 707 S.Y.
4. CONSTRUCT CONCRETE CURB & GUTTER TRANSITION MAG DET 221.
5. CONSTRUCT CONCRETE SIDEWALK MAG DET 230. 1165 SF

REMOVE

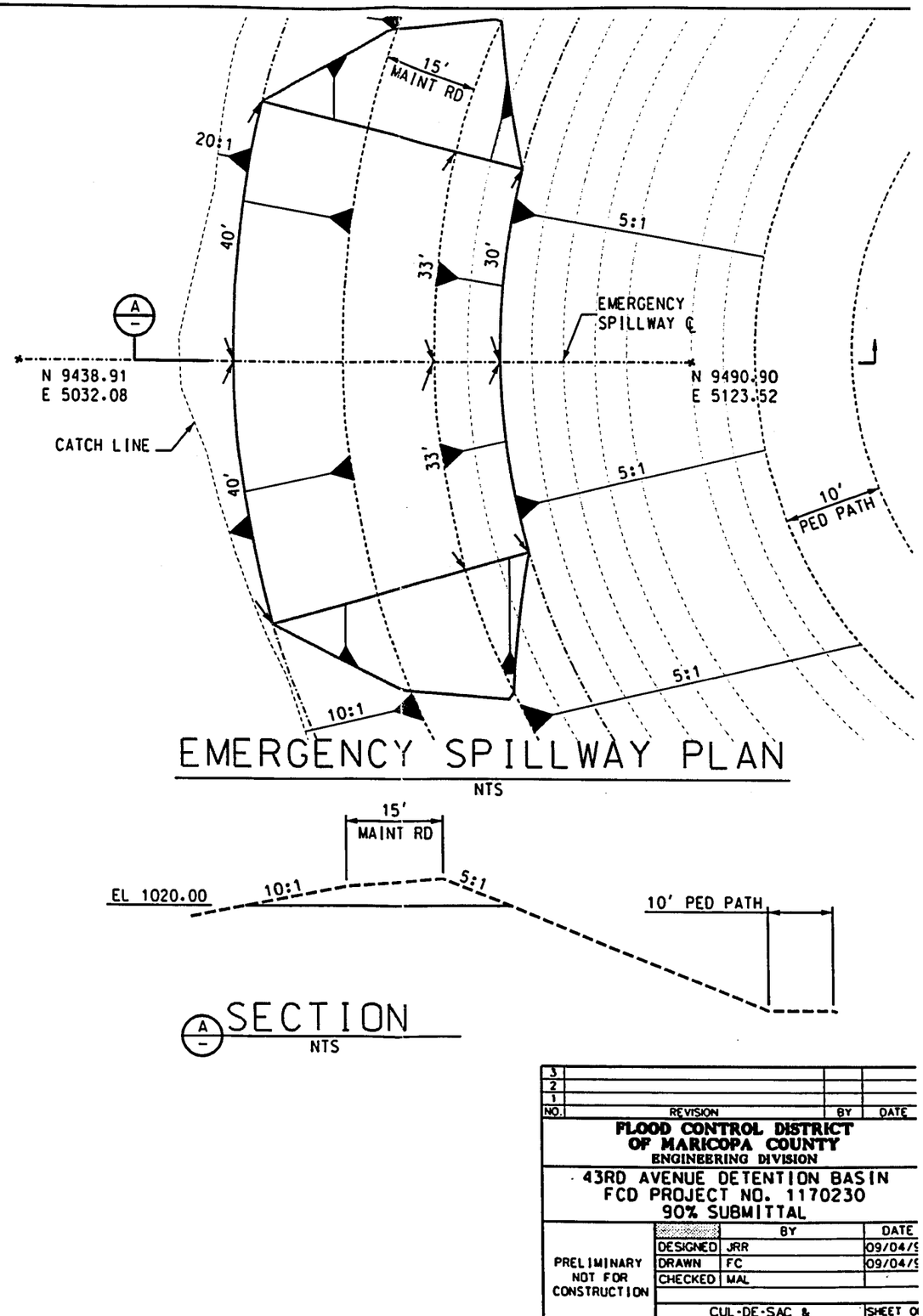
1. REMOVE CONCRETE CURB & GUTTER 14 LF.
2. REMOVE BARRICADE (NPI).

▲ BENCHMARK

INTERSECTION OF NANCY LANE & 41ST DRIVE
EL 1021.13

CURVE TABLE			
NO.	* RADIUS	LENGTH	DELTA
1	2104.35'	187.18'	5°05'46.6"
2	2120.64'	57.20'	1°32'43.8"
3	40.00'	172.33'	246°51'03.8"
4	40.00'	48.11'	68°54'24.8"

* DIMENSIONS ARE TO LIP OF GUTTER



EMERGENCY SPILLWAY PLAN
NTS

(A) SECTION
NTS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

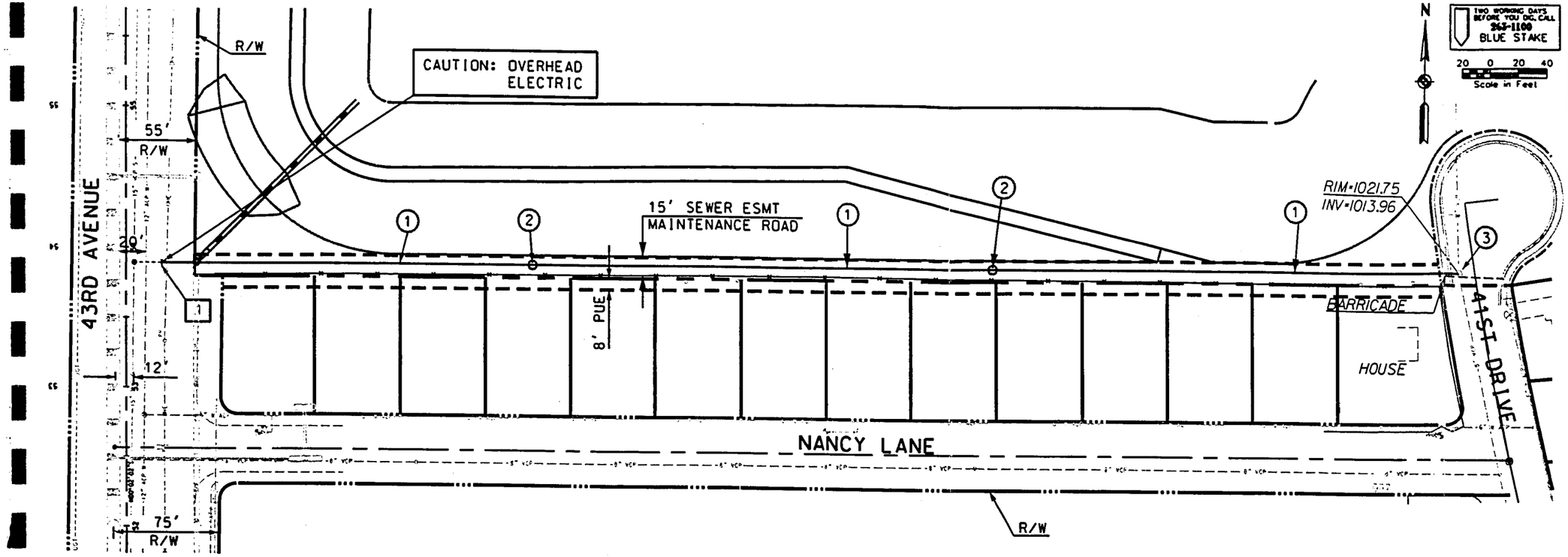
43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

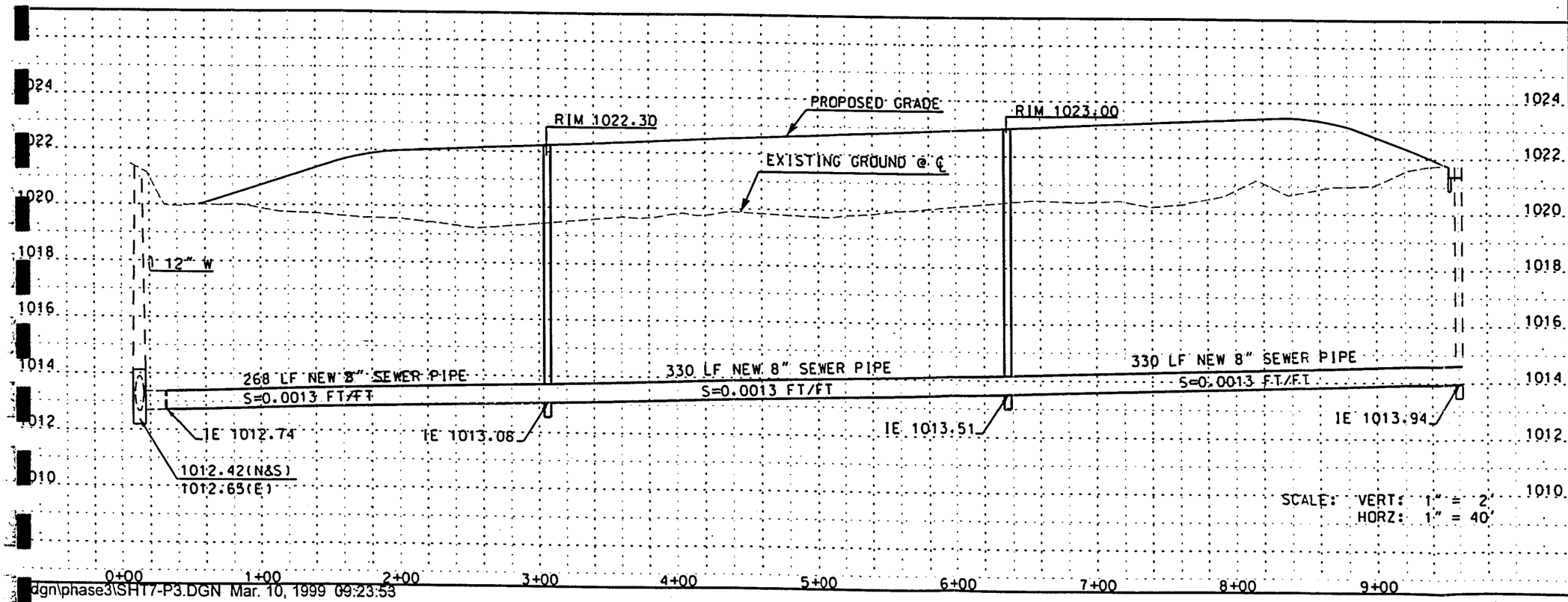
PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	JRR	09/04/9
DRAWN	FC	09/04/9
CHECKED	MAL	

CUL-DE-SAC & EMERGENCY SPILLWAY PLAN — SHEET 0 6 2

dgn\phase3\culsacpn.dgn Mar. 10, 1999 08:17:58





dgn\phase3\SHT7-P3.DGN Mar. 10, 1999 09:23:53

☐ REMOVE ☐

1. REMOVE SEWER PLUG (NPI).

○ CONSTRUCT ○

1. INSTALL 8" SANITARY SEWER. 928 LF
2. CONSTRUCT SEWER MANHOLE PER MAG STD DET 420. 2 EA.
3. MODIFY SEWER MANHOLE. 1 EA.

NO.	REVISION	BY	DATE
3			
2			
1			

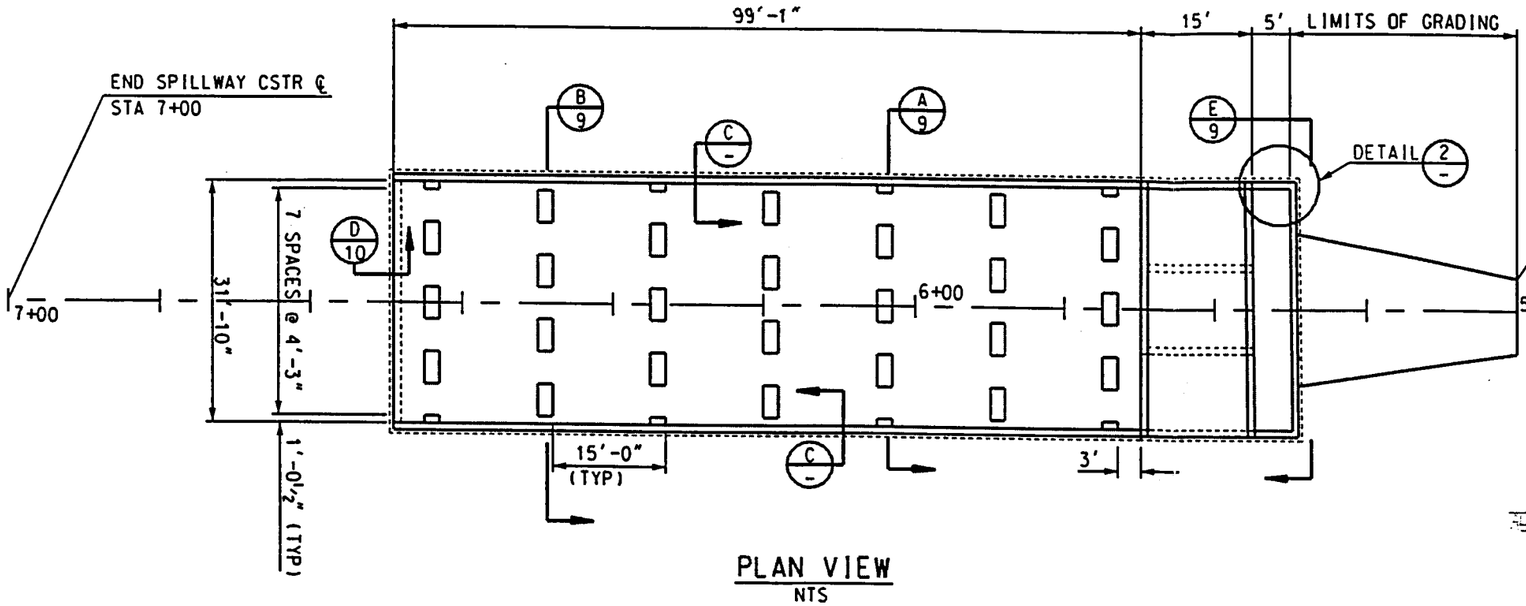
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE STORM DRAIN
BASELINE ROAD TO SOUTHERN AVENUE
FCD PROJECT NO. 1170230

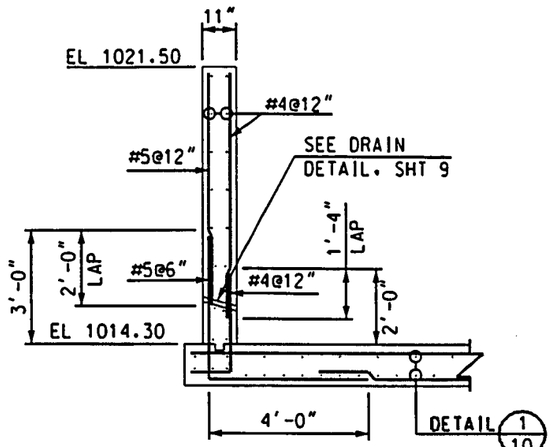
PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	MAL	08/03/
DRAWN	FC	08/03/
CHECKED	MAL	03/10/

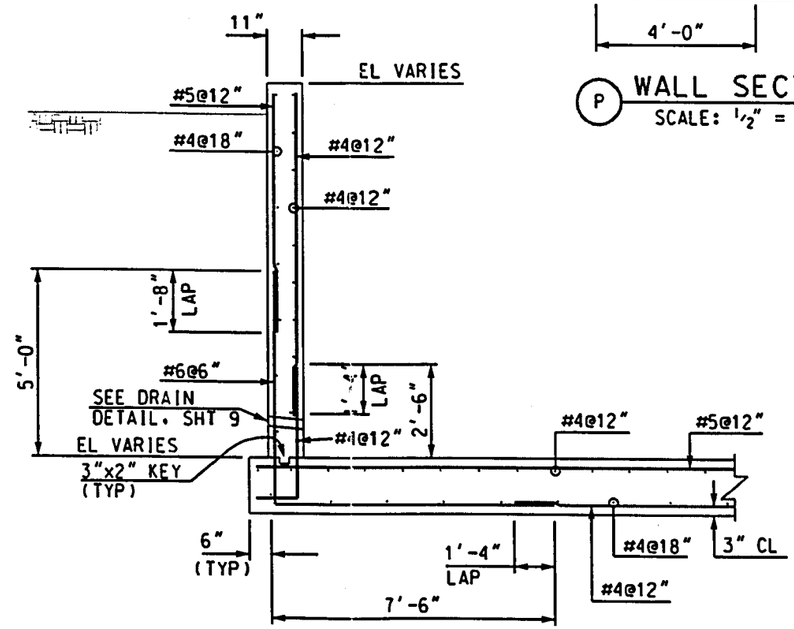
SANITATION SEWER PLAN — SHEET 0 7 2



PLAN VIEW
NTS



P WALL SECTION
SCALE: ½" = 1'-0"



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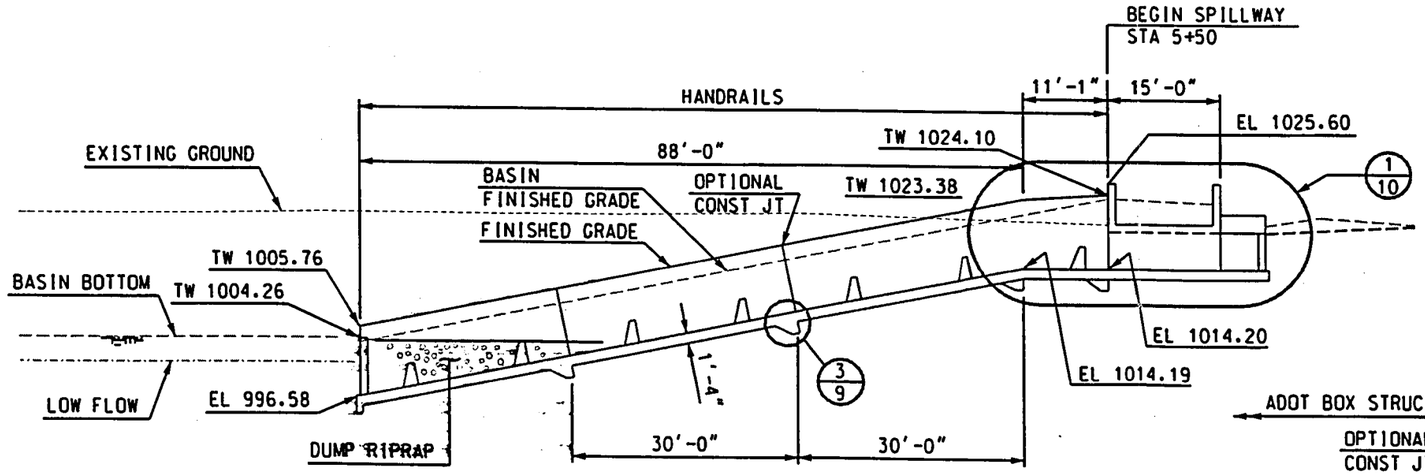
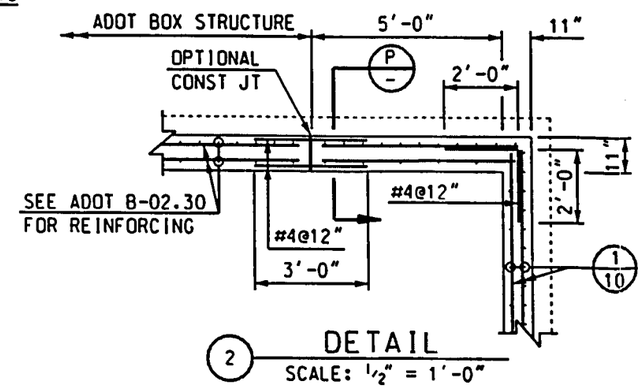


NORTH & SOUTH WALL ELEVATION
NTS



2 DETAIL
SCALE: ½" = 1'-0"

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

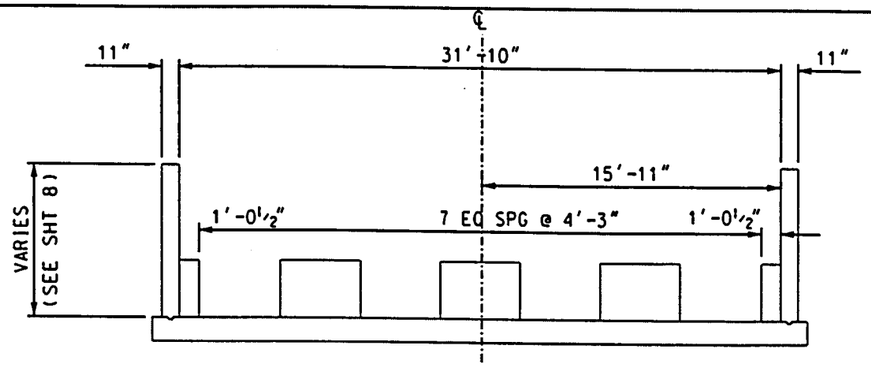
PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	KVH	02/18/9
DRAWN	FC	02/18/9
CHECKED	MAL	

SPILLWAY PLAN & ELEVATION

SHEET O
8 2

dgn\phase3\SPILWAY1.DGN Mar. 10, 1999 08:50:20



A/8 SECTION
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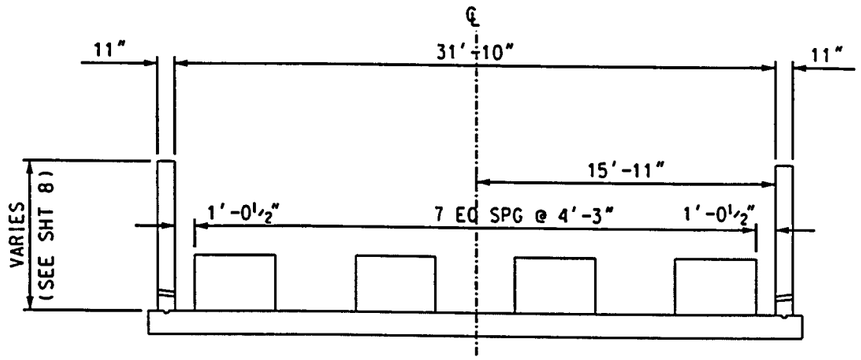
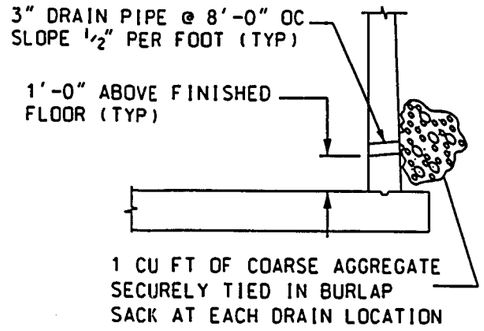
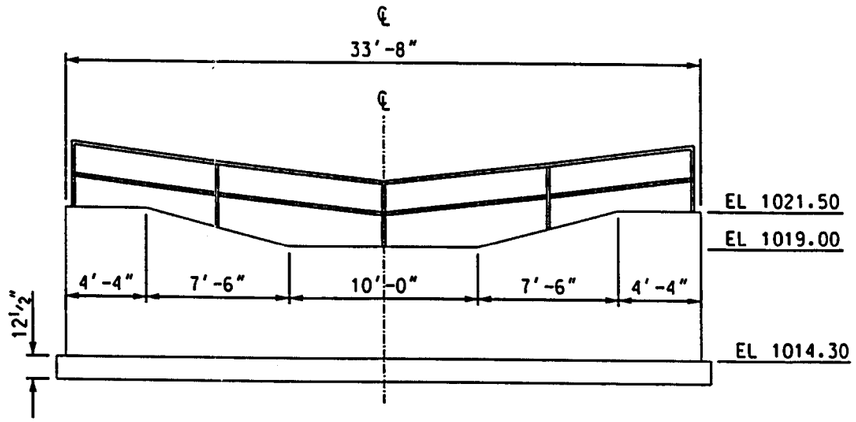


B/8 SECTION
SCALE: ¼" = 1'-0



DRAIN DETAIL
NTS



E/8 SECTION
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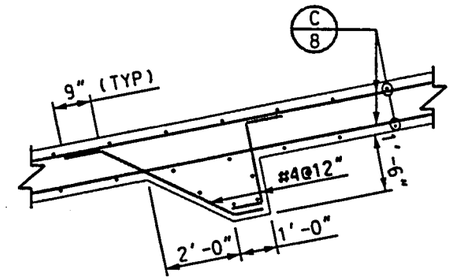

3/8 DETAIL
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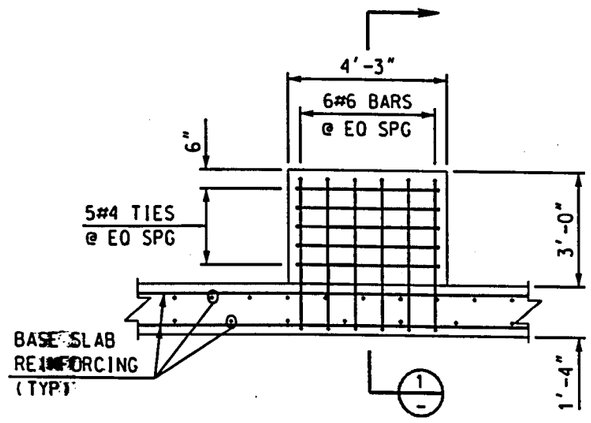

MIDDLE BLOCK DETAIL
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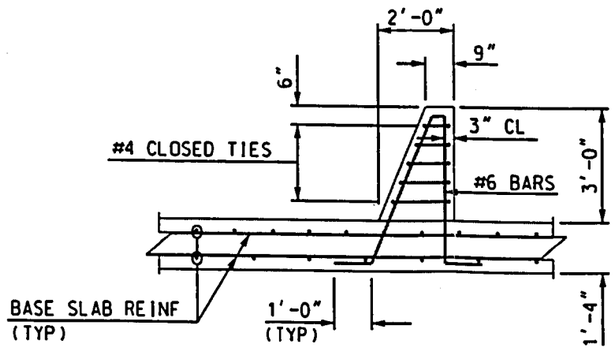

1 SECTION
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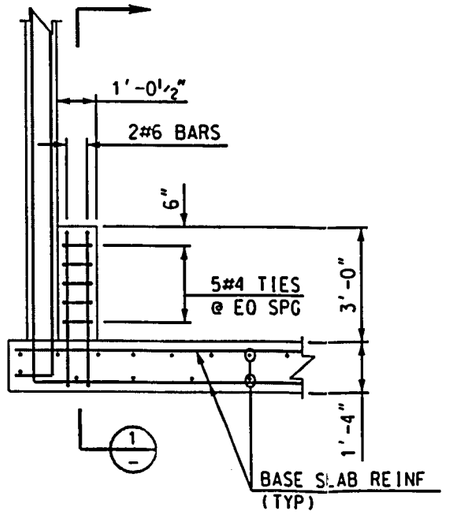


END BLOCK DETAIL
SCALE: ½" = 1'-0

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

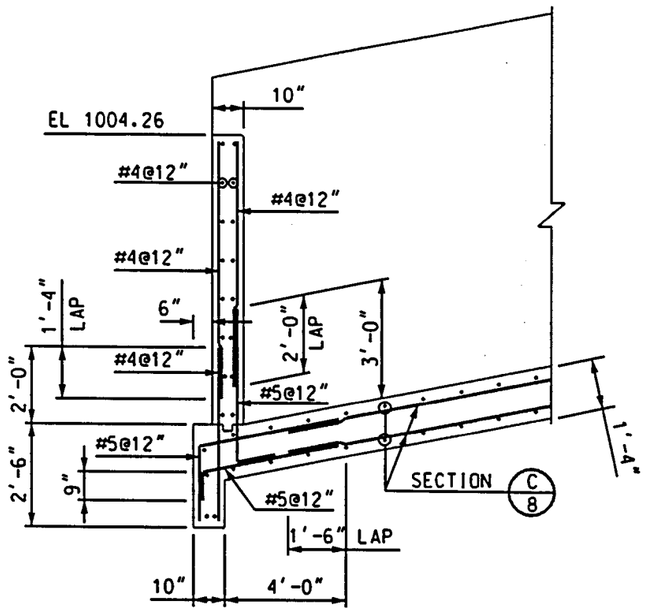
43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

	BY	DATE
DESIGNED	KVH	12/30/9
DRAWN	FC	12/30/9
CHECKED	MAL	

PRELIMINARY
NOT FOR
CONSTRUCTION

SPILLWAY DETAILS

SHEET OF
9 2



D/8 SECTION
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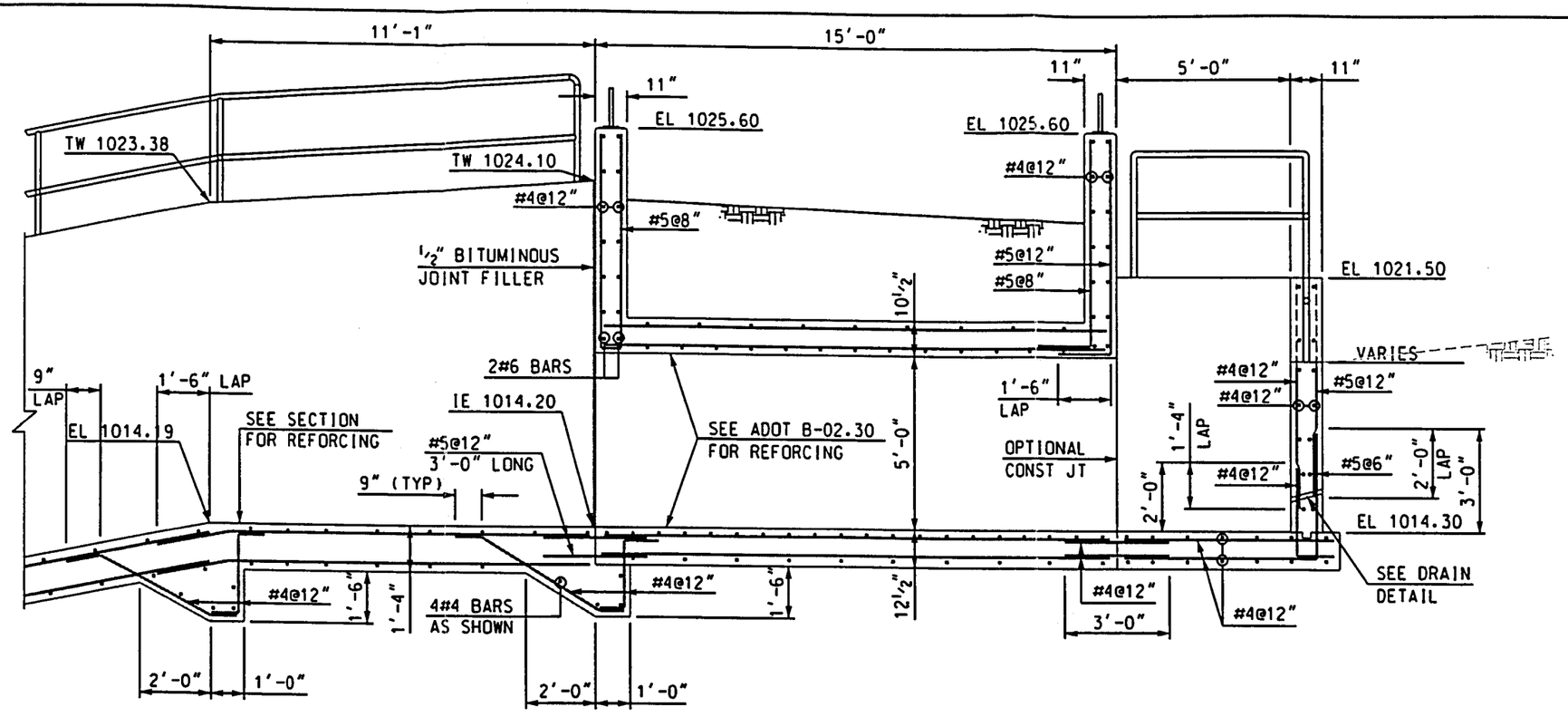
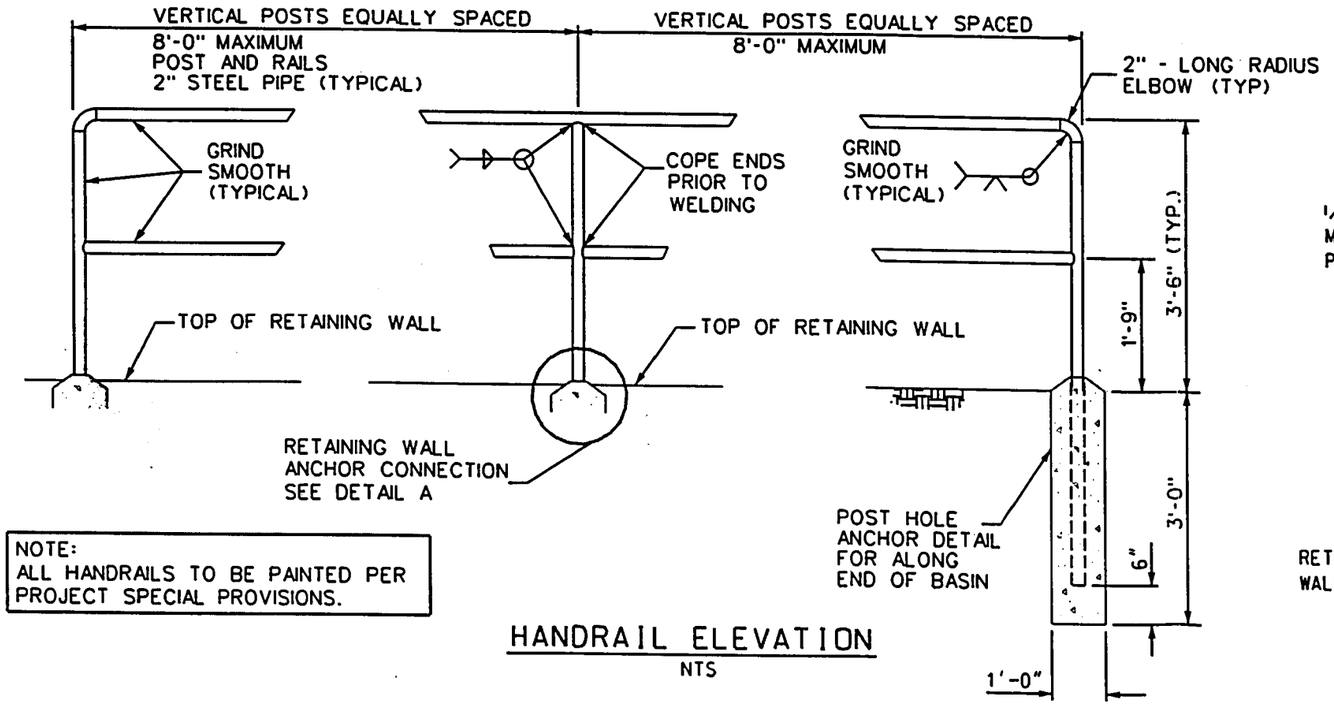
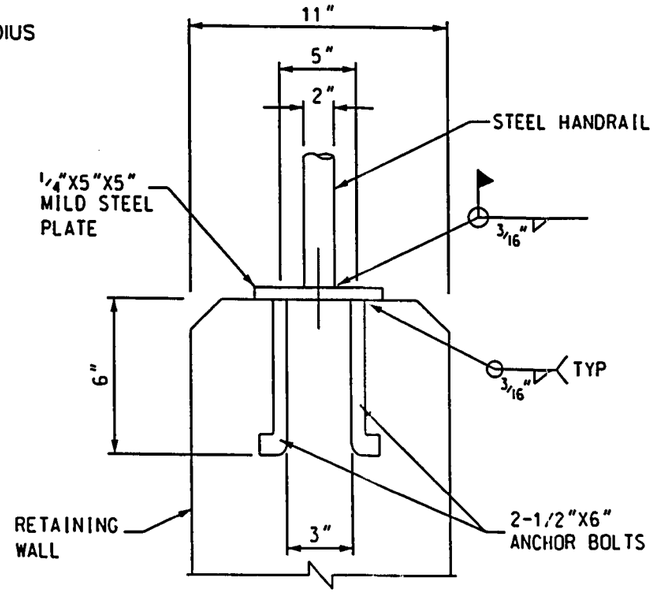


1/8 DETAIL
NTS



NOTE:
ALL HANDRAILS TO BE PAINTED PER PROJECT SPECIAL PROVISIONS.

HANDRAIL ELEVATION
NTS



A DETAIL
NTS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

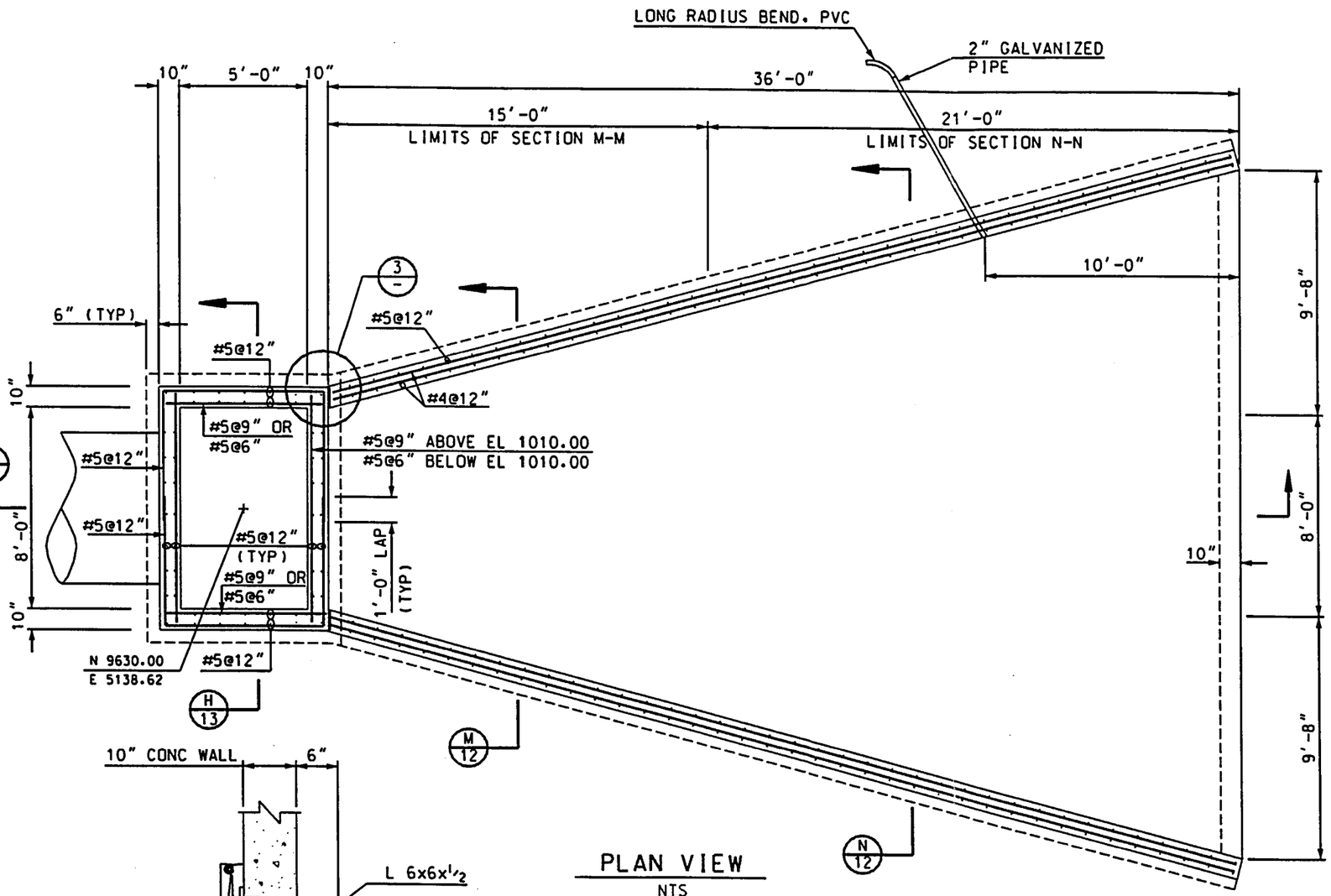
43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	KVH	02/18/9
DRAWN	FC	02/18/9
CHECKED	MAL	

SPILLWAY WALL DETAILS

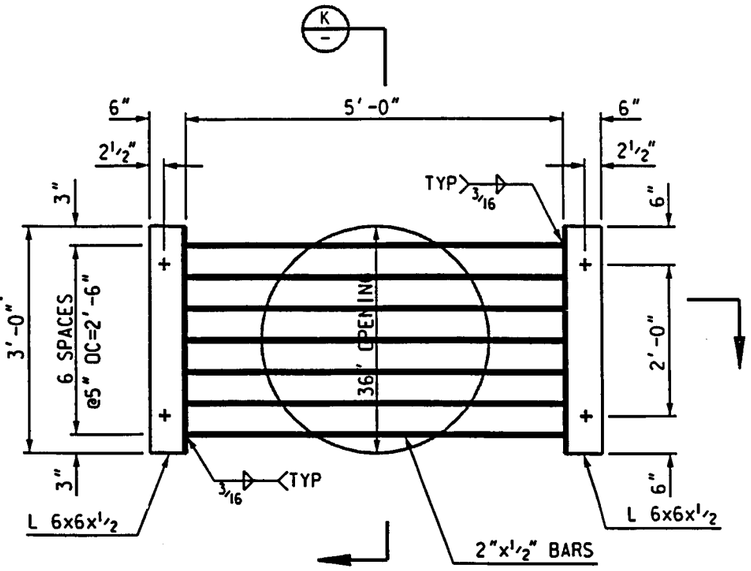
SHEET OF 10 2



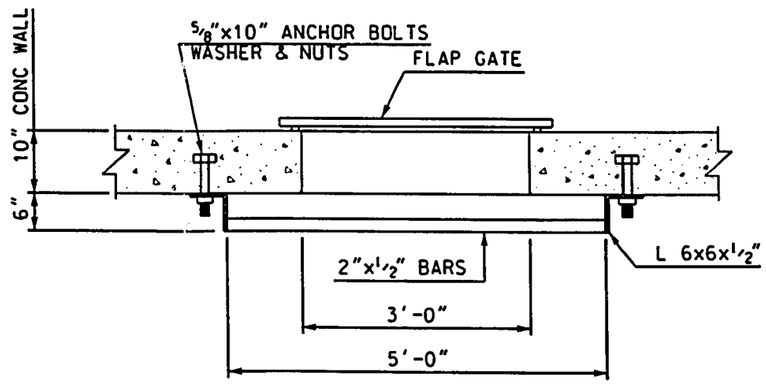
PLAN VIEW
NTS

K SECTION
NTS

3 DETAIL
SCALE: 3/4" = 1'-0"



ELEVATION
ACCESS BARRIER/TRASH RACK
NTS



L SECTION
NTS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

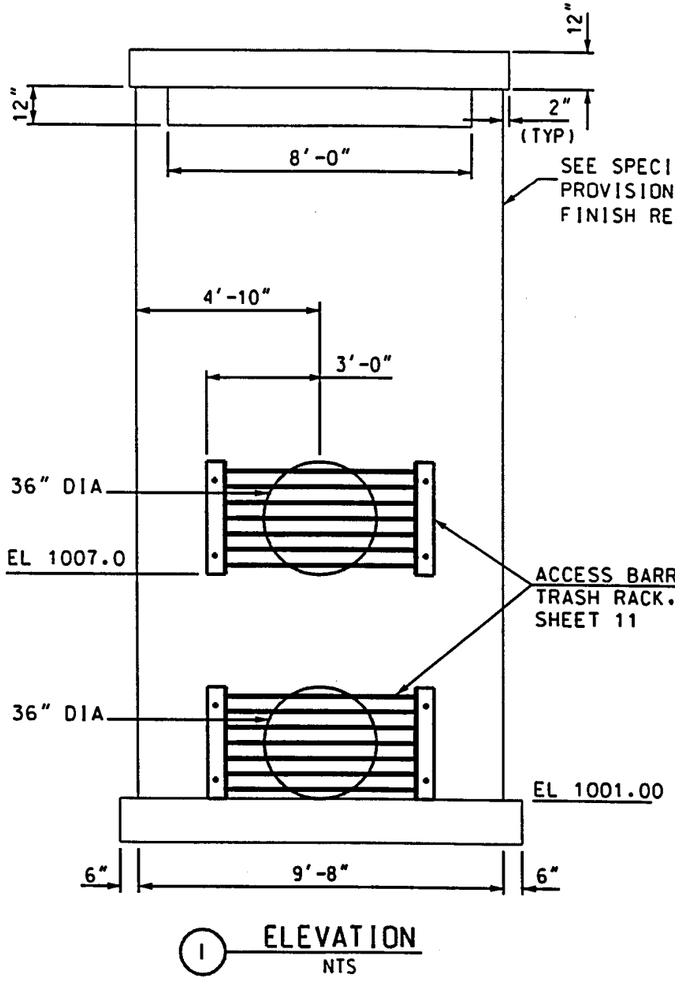
PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	KVH	02/26/9
DRAWN	FC	02/26/9
CHECKED	MAL	

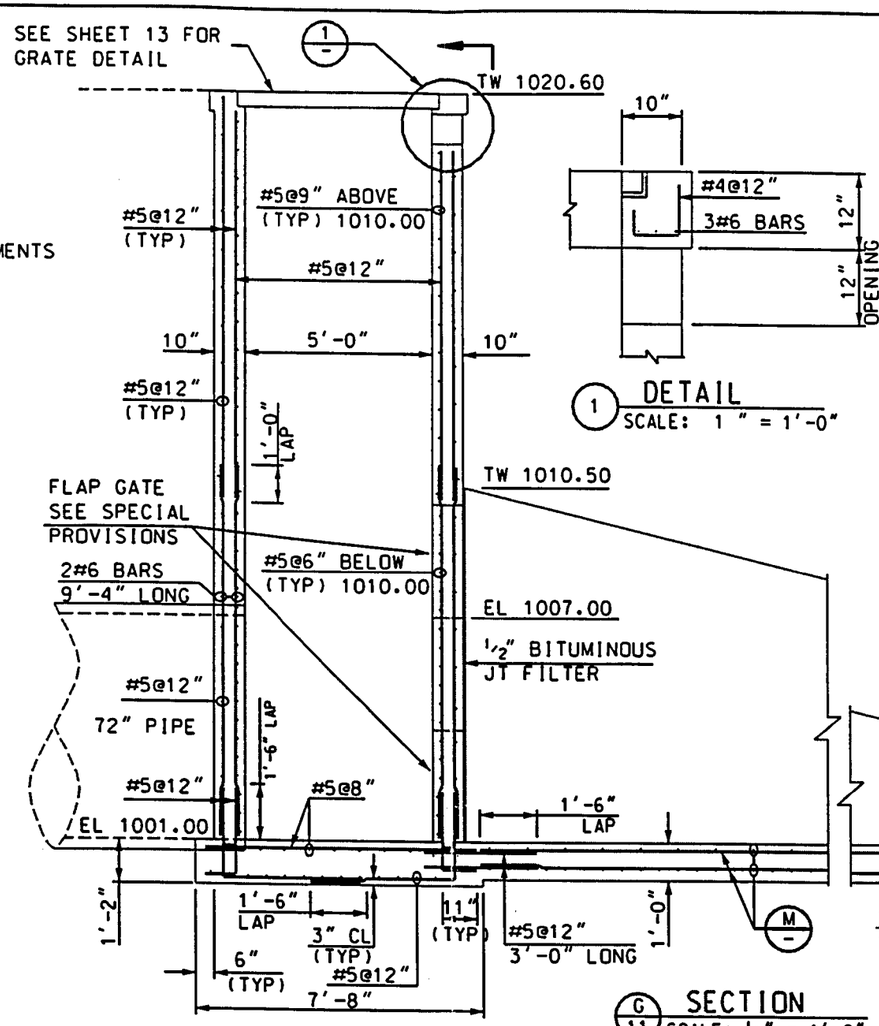
OUTLET STRUCTURE PLAN

SHEET OF 11 2

43rd Ave\dgn\phase3\outdtl.dgn Mar. 10, 1999 08:44:20

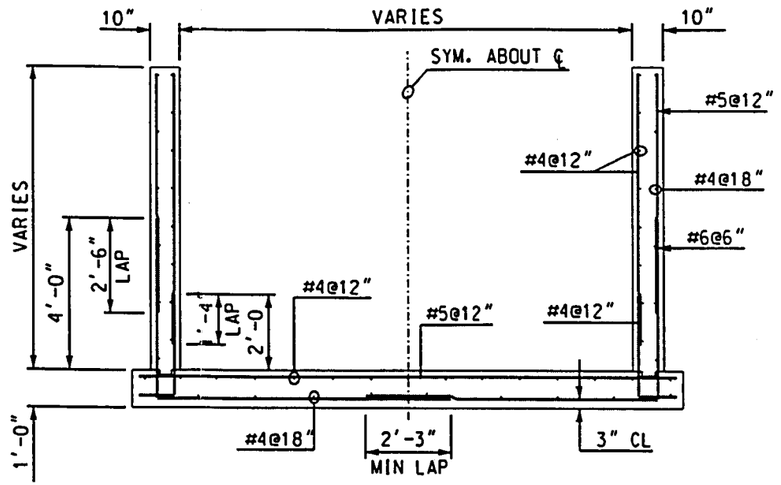


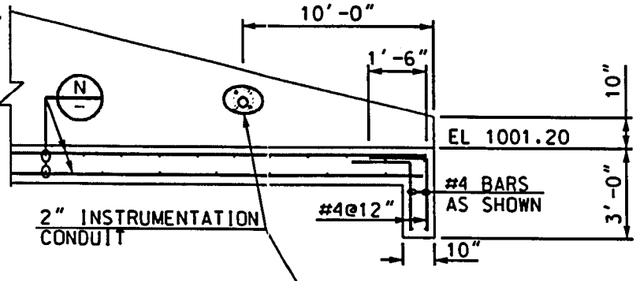
I ELEVATION
NTS



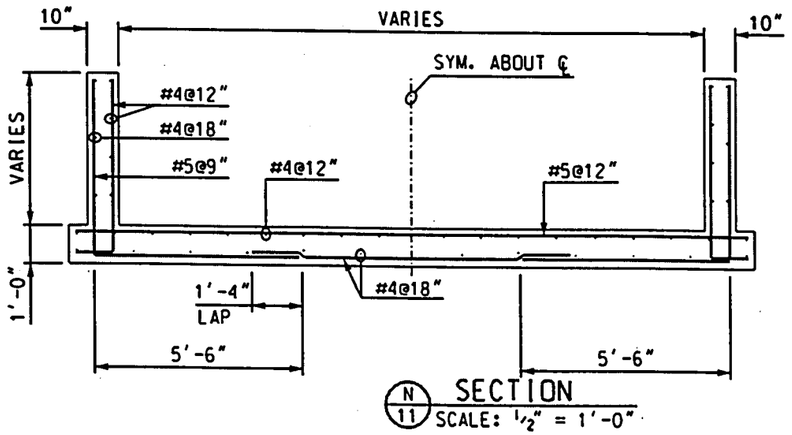
1 DETAIL
SCALE: 1 " = 1'-0"

M/11 SECTION
SCALE: 1/2" = 1'-0"





G/11 SECTION
SCALE: 1/2" = 1'-0"



N/11 SECTION
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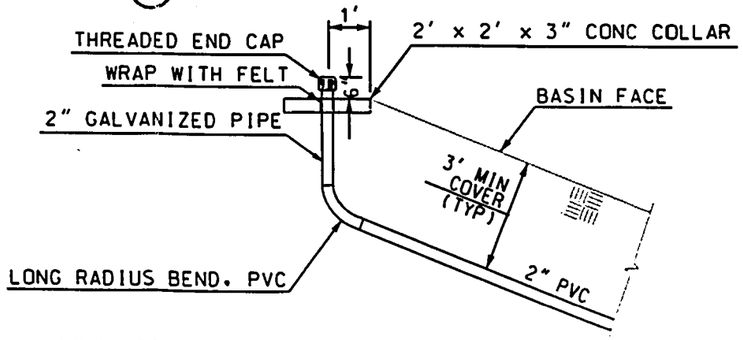


NOTE:PROVIDE COUPLINGS AND ADAPTERS AS NECESSARY

INSTRUMENTATION CONDUIT
ELEVATION DETAIL
NTS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

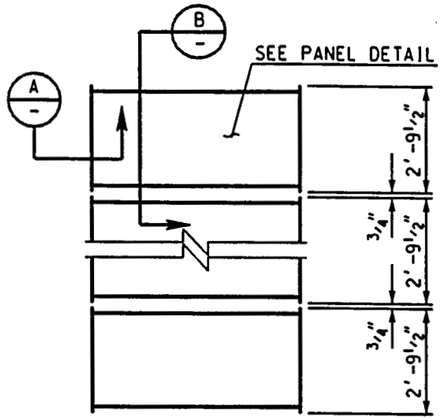
PRELIMINARY
NOT FOR
CONSTRUCTION

	BY	DATE
DESIGNED	KVH	03/01/99
DRAWN	FC	03/01/99
CHECKED	MAL	

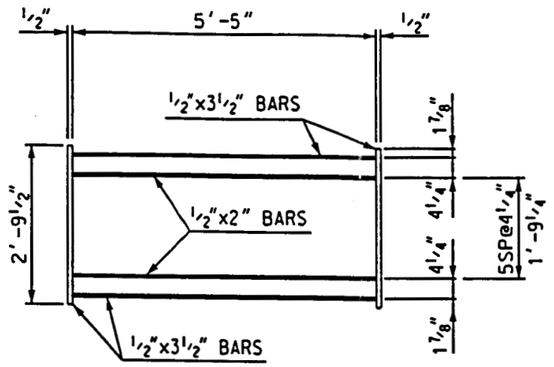
OUTLET STRUCTURE DETAIL

SHEET 0F
12 2

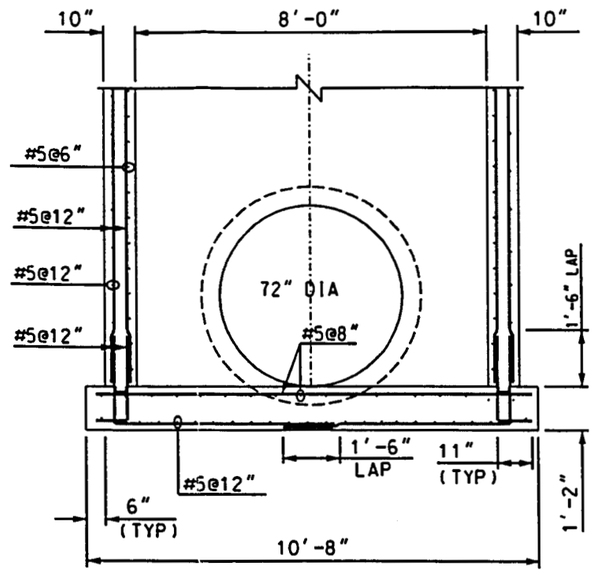
dgn\phase3\outdtl2.dgn Mar. 10, 1999 08:46:22



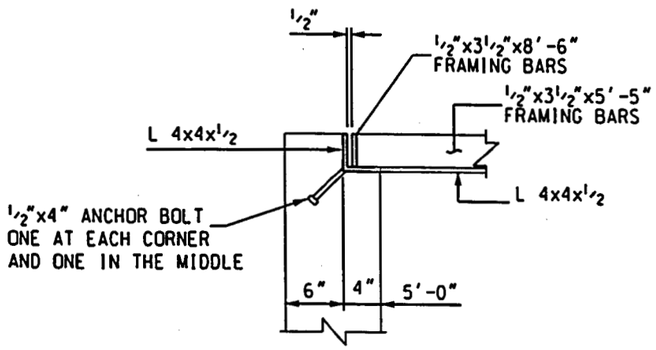
PLAN VIEW OF PANELS
NTS



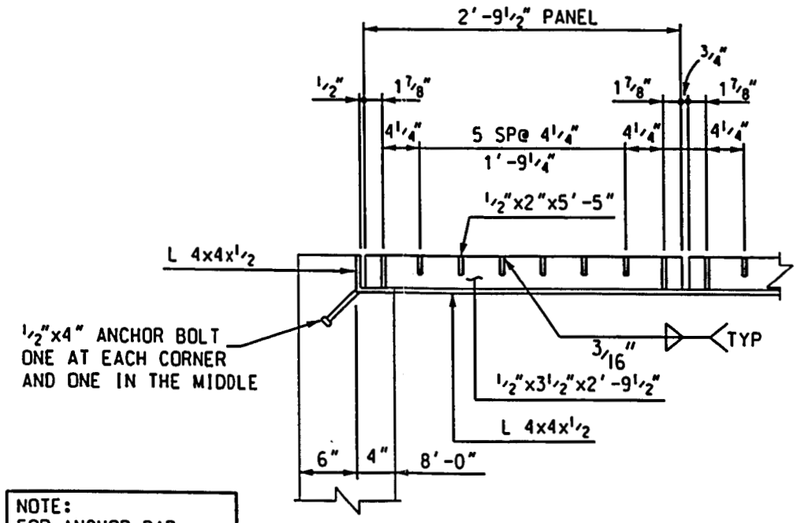
PANEL DETAIL
NTS



H 11 SECTION
SCALE: 1/2" = 1'-0"



A SECTION
SCALE: 1 1/2" = 1'-0"



NOTE:
FOR ANCHOR BAR
& MISC. DETAILS
SEE MAG. DET. 540-1

B SECTION
SCALE: 1 1/2" = 1'-0"

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

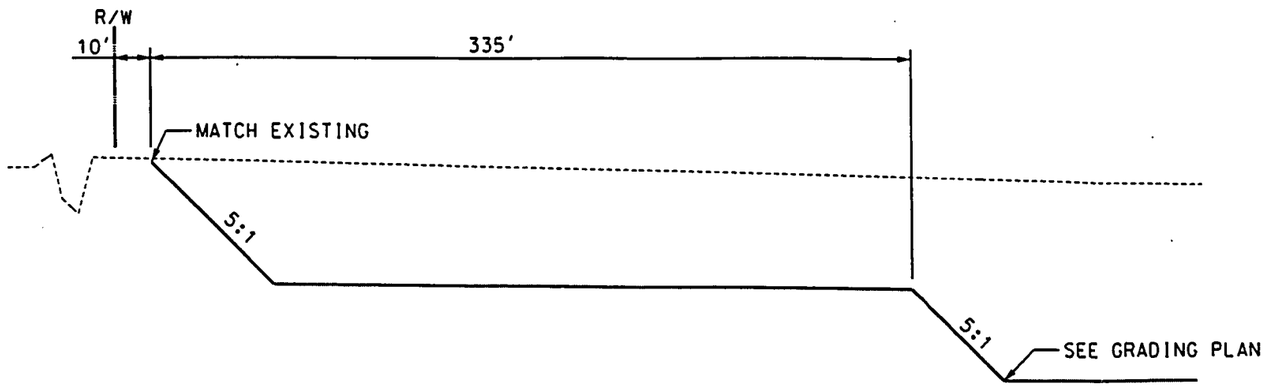
43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

	BY	DATE
DESIGNED	KVH	03/02/9
DRAWN	FC	03/02/9
CHECKED	MAL	

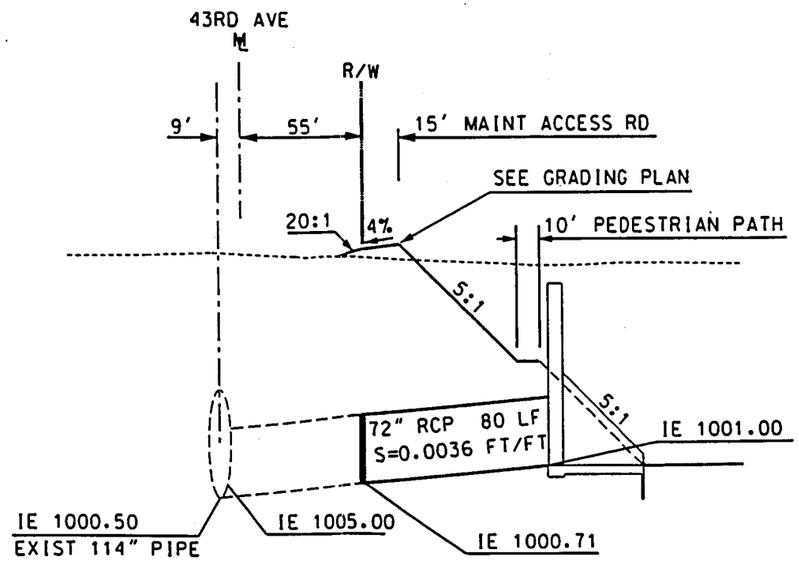
PRELIMINARY NOT FOR CONSTRUCTION

OUTLET GRATE DETAIL

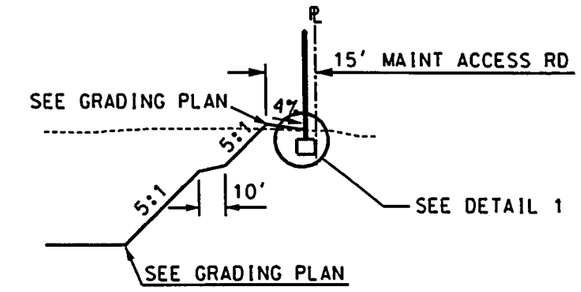
SHEET OF 13 2



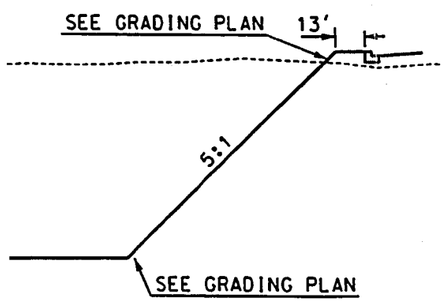
A/5 SECTION
NTS



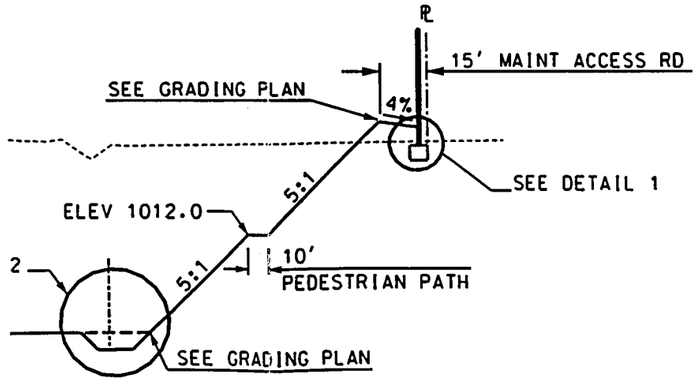
E/5 SECTION



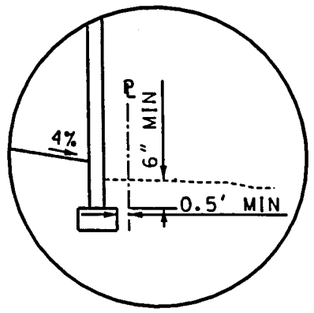
B/5 SECTION
NTS



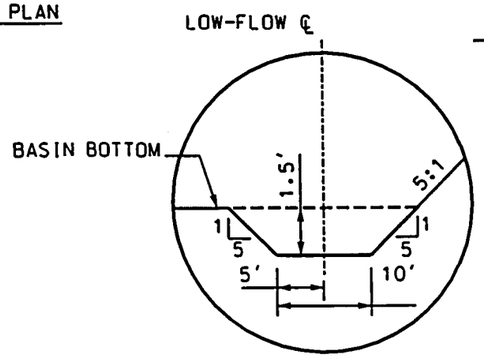
C/5 SECTION
NTS



D/5 SECTION



DETAIL 1



DETAIL 2

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

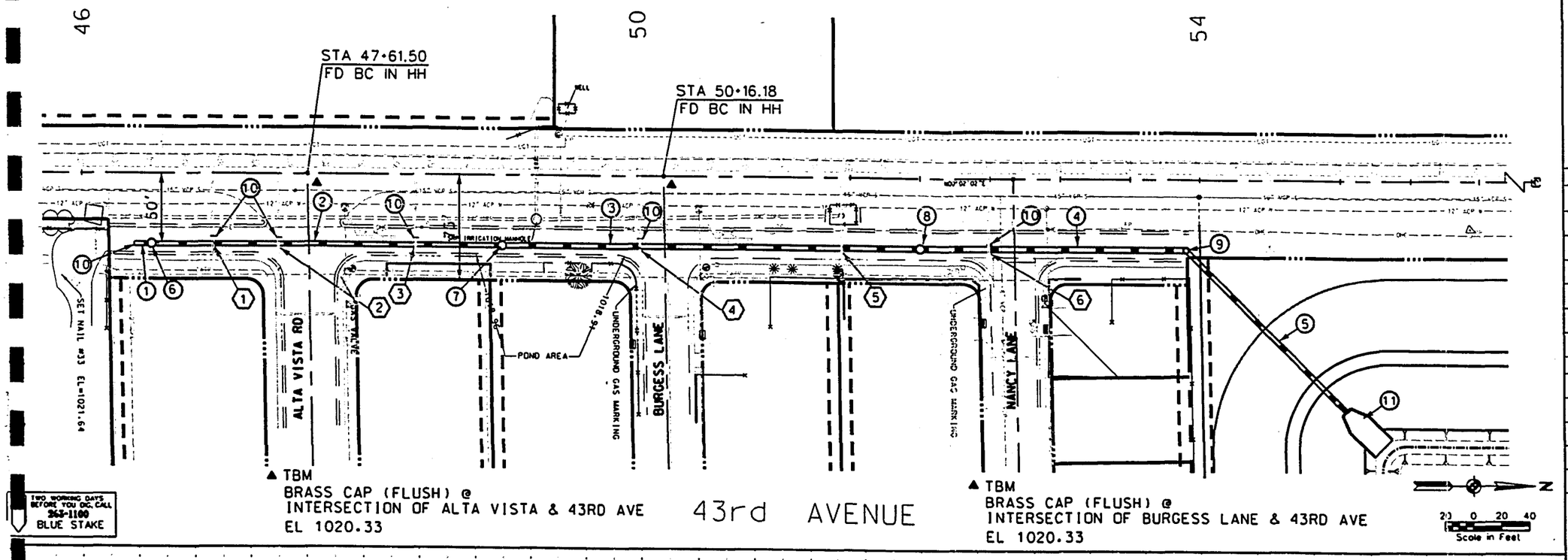
PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	JRR	12/30/9
DRAWN	SRN	12/30/9
CHECKED	JRR	

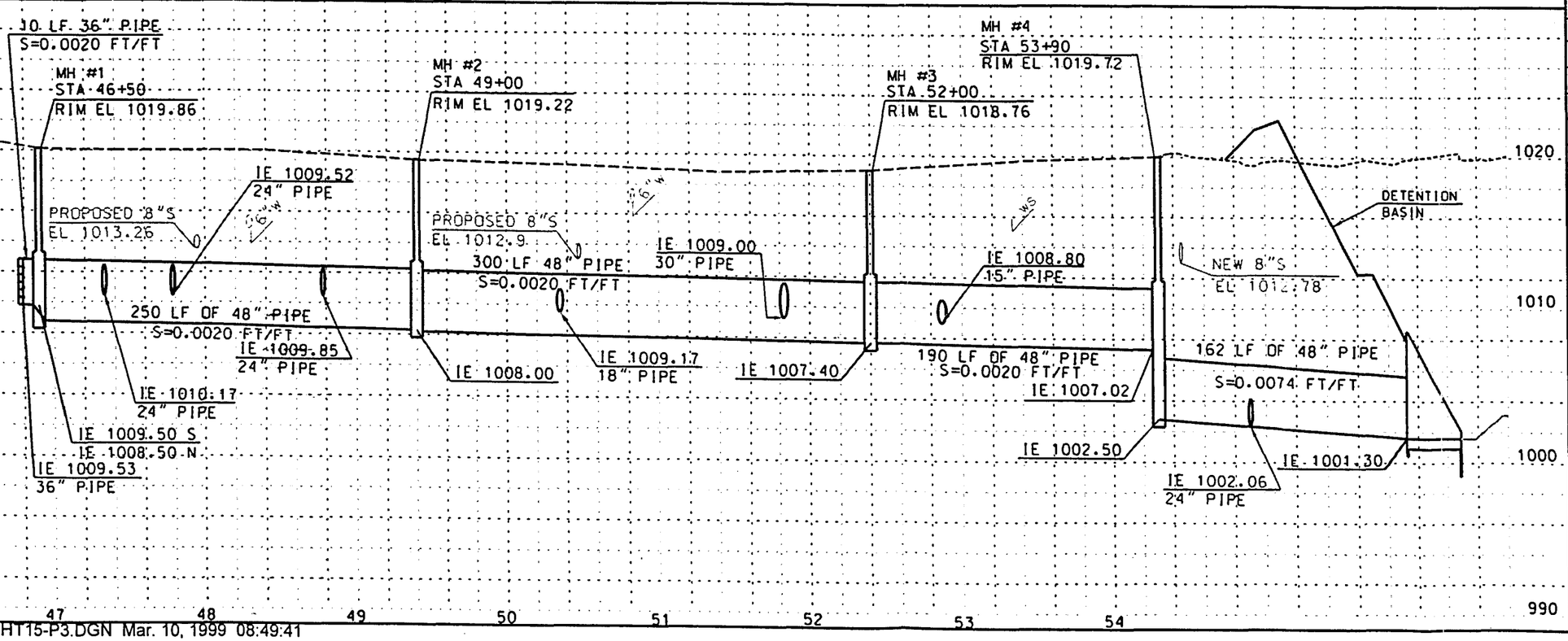
BASIN CROSS SECTIONS

SHEET 0 14 2

dgn\phase3\BXSEC-P3.DGN Mar. 10, 1999 09:25:07



TWO WORKING DAYS BEFORE YOU DIG CALL 263-1100 BLUE STAKE



gn\phase3\SHT15-P3.DGN Mar. 10, 1999 08:49:41

☐ REMOVE ☐

○ CONSTRUCT ○

INSTALL NEW STORM DRAIN PIPE

NO.	STATION TO STATION	DIAMETER INCHES	LENGTH FEET
(1)	46+40 TO 46+50	36"	10
(2)	46+50 TO 49+00	48"	250
(3)	49+00 TO 52+00	48"	300
(4)	52+00 TO 53+90	48"	190
(5)	53+90 TO 54+98. 158' RT	48"	162

INSTALL NEW STORM DRAIN MANHOLE

NO.	STATION	BASE DETAIL	SHAFT DETAIL
(6)	46+50	MAG DET 520	MAG DET 522
(7)	49+00	MAG DET 520	MAG DET 522
(8)	52+00	MAG DET 520	MAG DET 522
(9)	53+90	MAG DET 520	MAG DET 522

(10) INSTALL PIPE PLUG - (NPI)

(11) CONSTRUCT SOUTH INLET STRUCTURE (SEE SHEET 18) 18 CY

NEW CONNECTOR PIPE, AND FITTING

NO.	STATION	SIZE & LENGTH	TEE
(1)	46+93.20 RT	24"x2' RCP	48"x24"
(2)	47+39.30 RT	24"x2' RCP	48"x24"
(3)	48+38 RT	24"x4' RCP	48"x24"
(4)	49+98 RT	18"x2' RCP	48"x18"
(5)	51+43.50 RT	30"x3' RCP	48"x30"
(6)	52+47 RT	15"x2' RCP	48"x15"

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

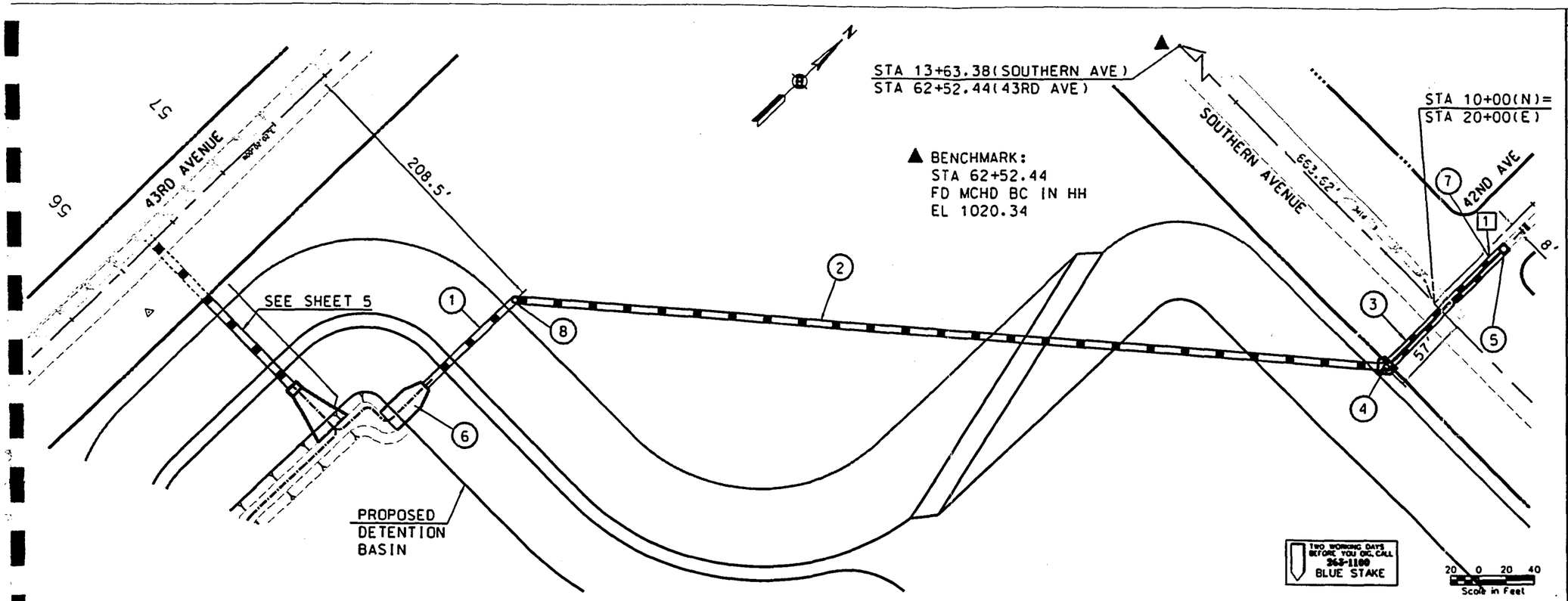
43RD AVENUE STORM DRAIN
BASELINE ROAD TO SOUTHERN AVENUE
FCD PROJECT NO. 1170230

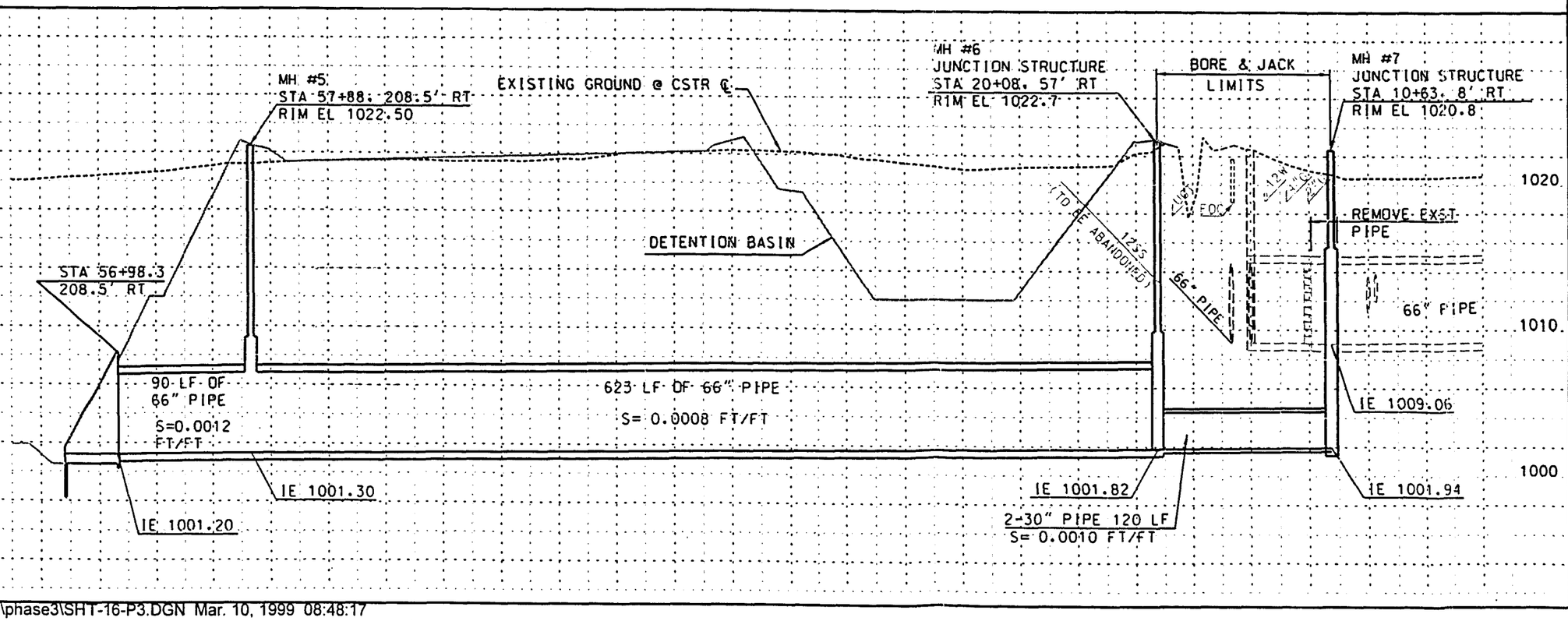
PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	MAL	01/29/9
DRAWN	FC	01/29/9
CHECKED	MAL	03/10/9

STORM DRAIN PLAN & PROFILE

SHEET O 15 2





☐ REMOVE ☐

1	REMOVE PIPE	12 LF

○ CONSTRUCT ○

INSTALL NEW STORM DRAIN PIPE

NO.	STATION TO STATION	DIAMETER INCHES	LENGTH FEET
(1)	57+06 TO 57+88	66	82
(2)	57+88 TO 62+04.9	66	629
*(3)	9+43 TO 10+63	30	240

INSTALL NEW STORM SEWER MANHOLE

NO.	STATION	BASE DETAIL	SHAFT DETAIL
(4)	20+08	DET 1	MAG DET 522
(5)	10+63	DET 2	MAG DET 522

(6) CONSTRUCT NORTH INLET STRUCTURE (SEE SHEET 18) 26 CY

(7) INSTALL PIPE PLUG PER MAG STD DET 427 1 EACH

(8) INSTALL 66" PREFABRICATED BEND. STA 57+88. W/MAG DET 522. 1 EACH

* BORE & JACK

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE STORM DRAIN
BASELINE ROAD TO SOUTHERN AVENUE
FCD PROJECT NO. 1170230

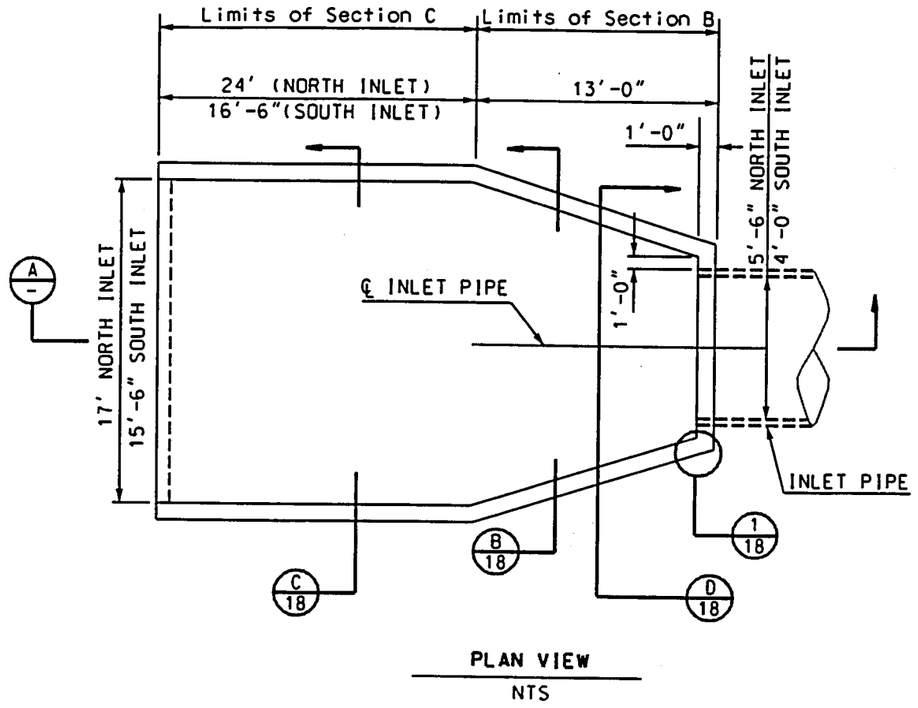
PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	MAL	01/29/9
DRAWN	FC	01/29/9
CHECKED	MAL	03/10/9

STORM DRAIN PLAN & PROFILE

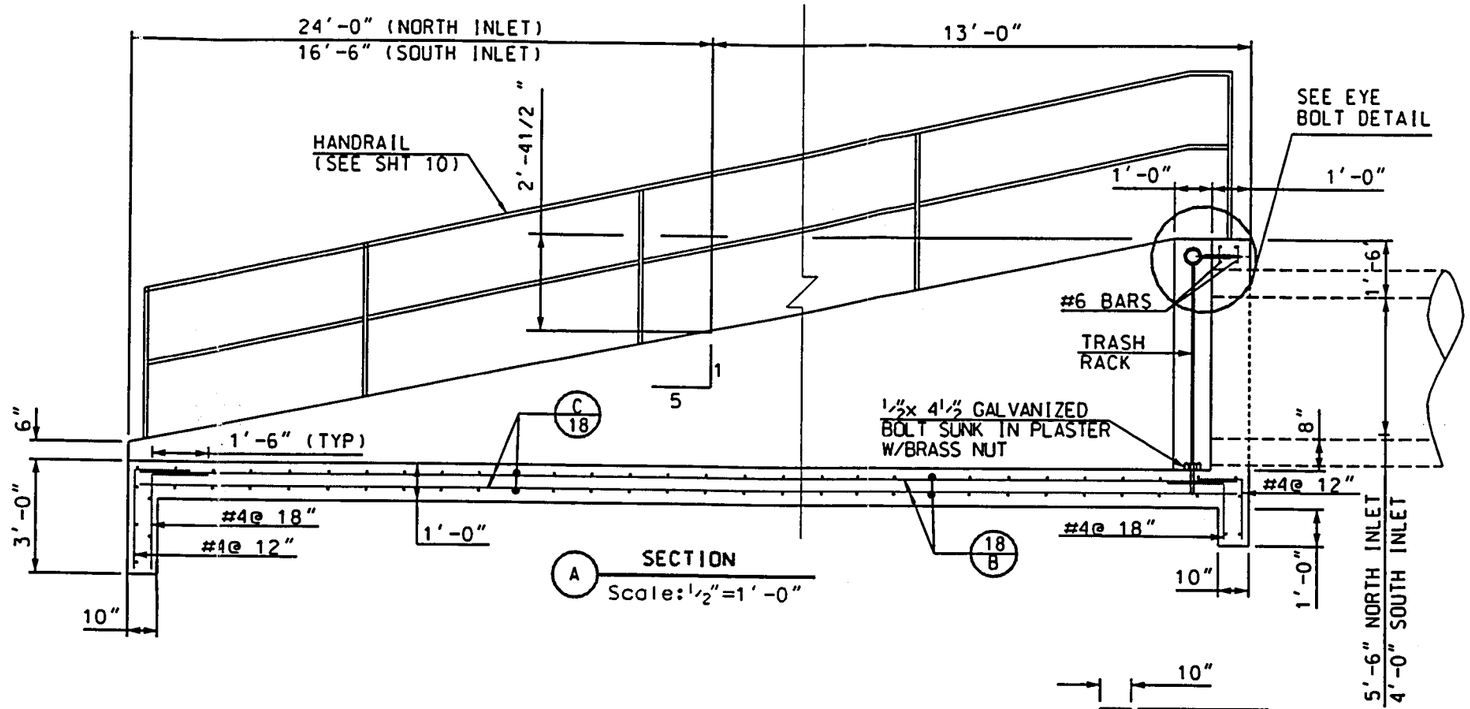
SHEET 0 16 26

gn\phase3\SHT-16-P3.DGN Mar. 10, 1999 08:48:17



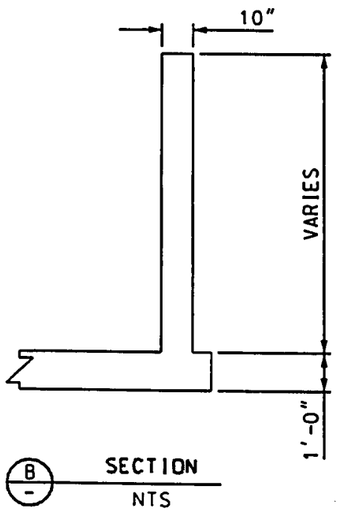
PLAN VIEW

NTS



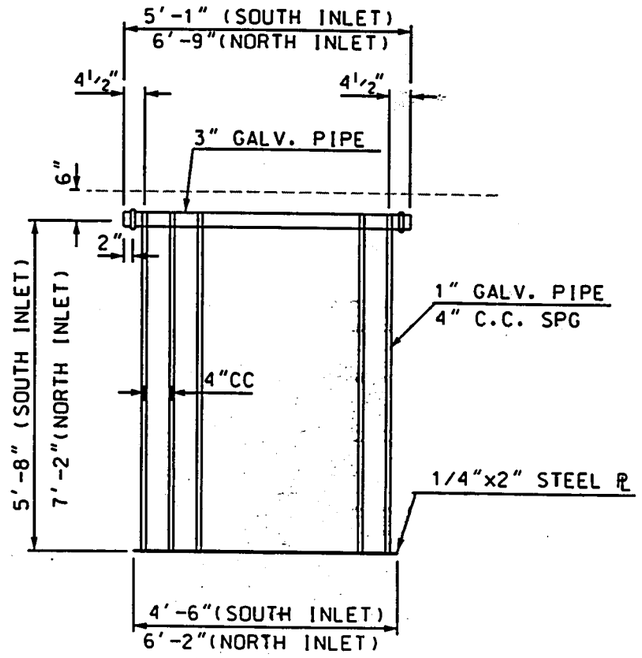
A SECTION

Scale: 1/2"=1'-0"



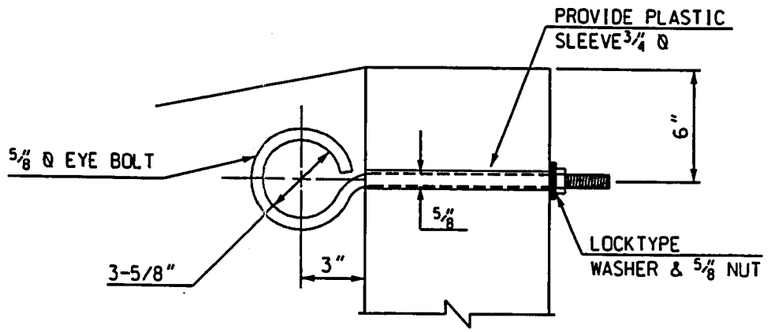
B SECTION

NTS



PANEL DETAIL

NTS



EYE BOLT DETAIL

NTS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

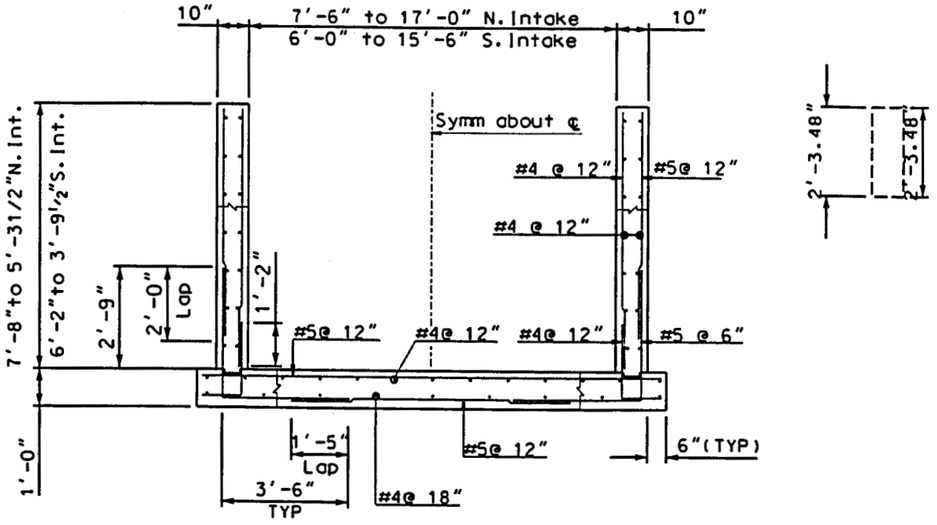
43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

PRELIMINARY NOT FOR CONSTRUCTION

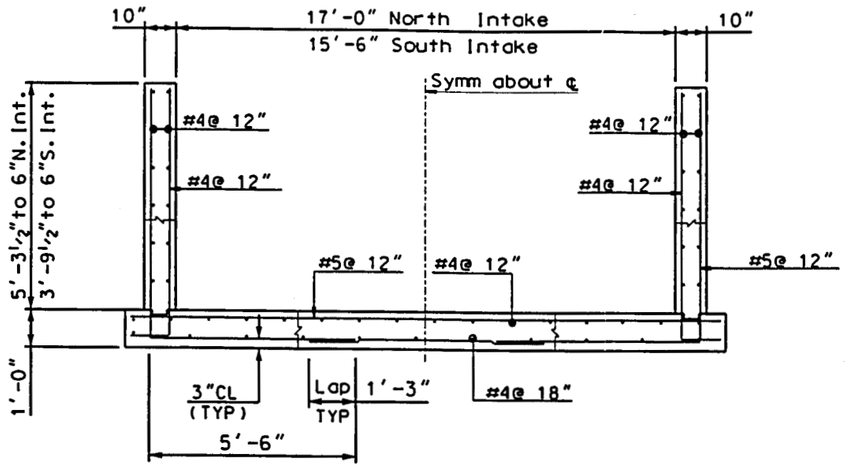
	BY	DATE
DESIGNED	KVH	09/09/9
DRAWN	MMM	09/09/9
CHECKED	MAL	

NORTH & SOUTH INLET STRUCTURES

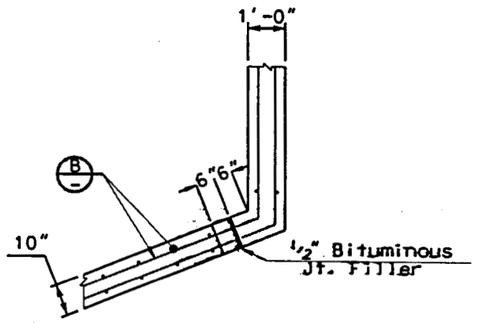
SHEET 0 17 2



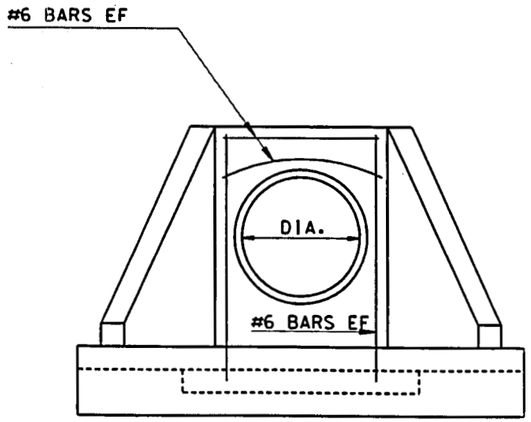
B / 17 SECTION
Scale: ½"= 1'-0"



C / 17 SECTION
Scale: ½"= 1'-0"



1 / 17 DETAIL
Scale: ½"= 1'-0"



D / 17 ELEVATION
NTS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

PRELIMINARY
NOT FOR
CONSTRUCTION

	BY	DATE
DESIGNED	KVH	12/30/9
DRAWN	MMM	12/30/9
CHECKED	MAL	

North & South
Inlet Sructures

SHEET 0
18 2

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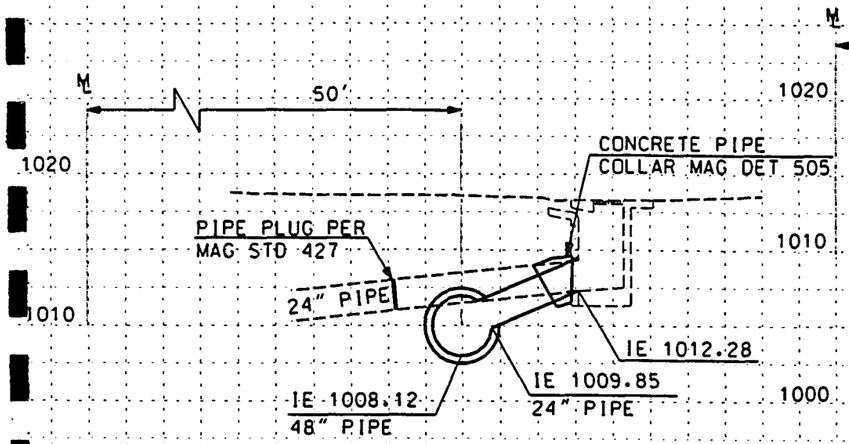
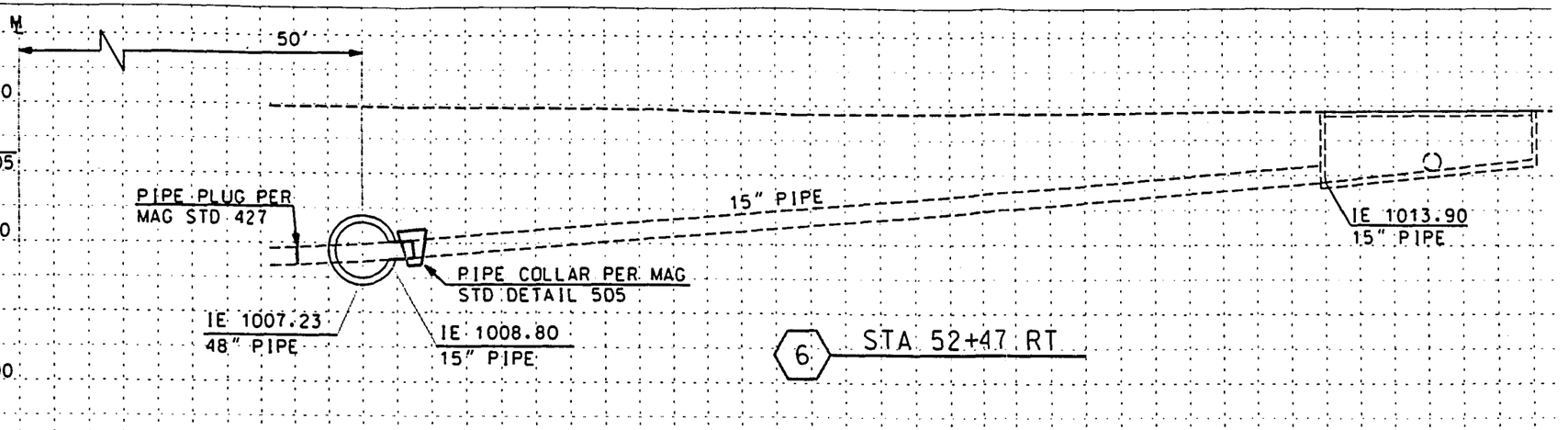
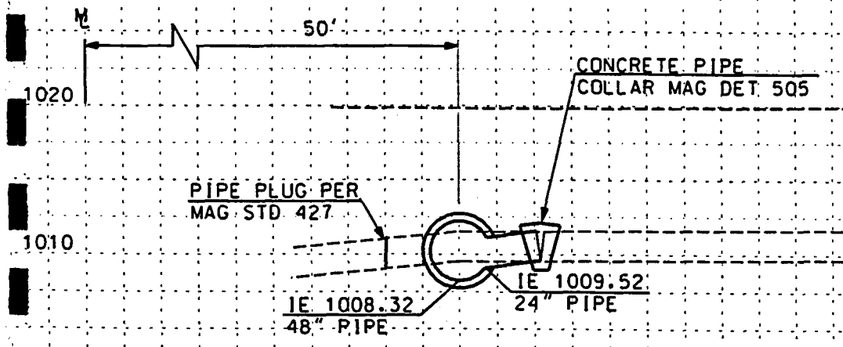
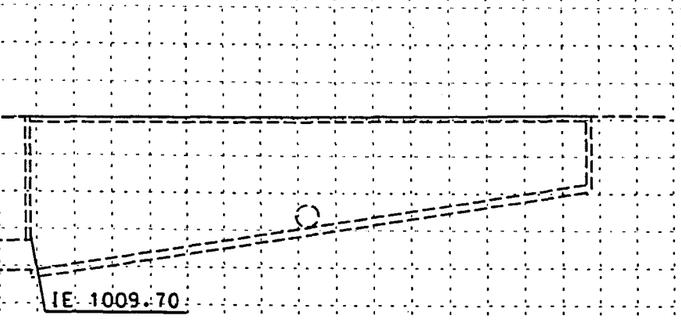


3 STA 48+38 RT

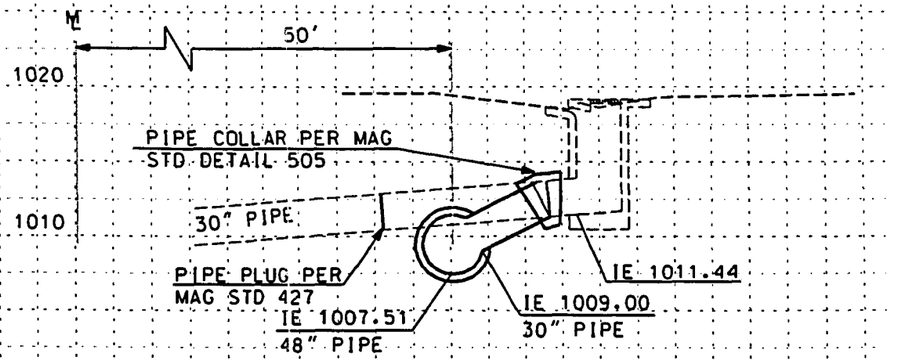


6 STA 52+47 RT

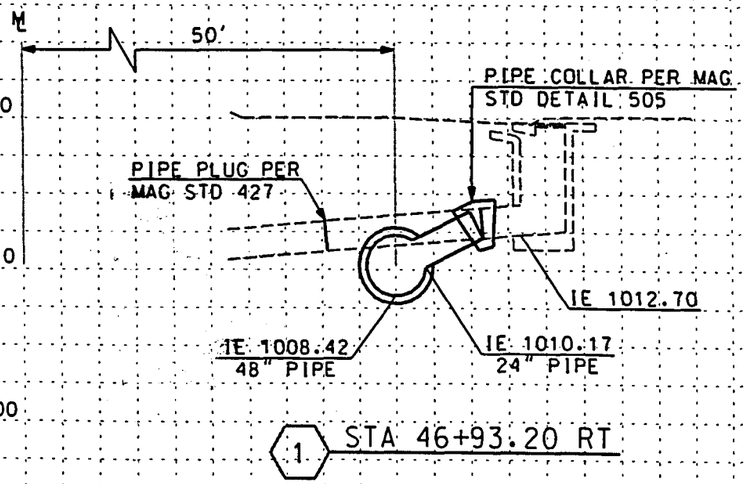




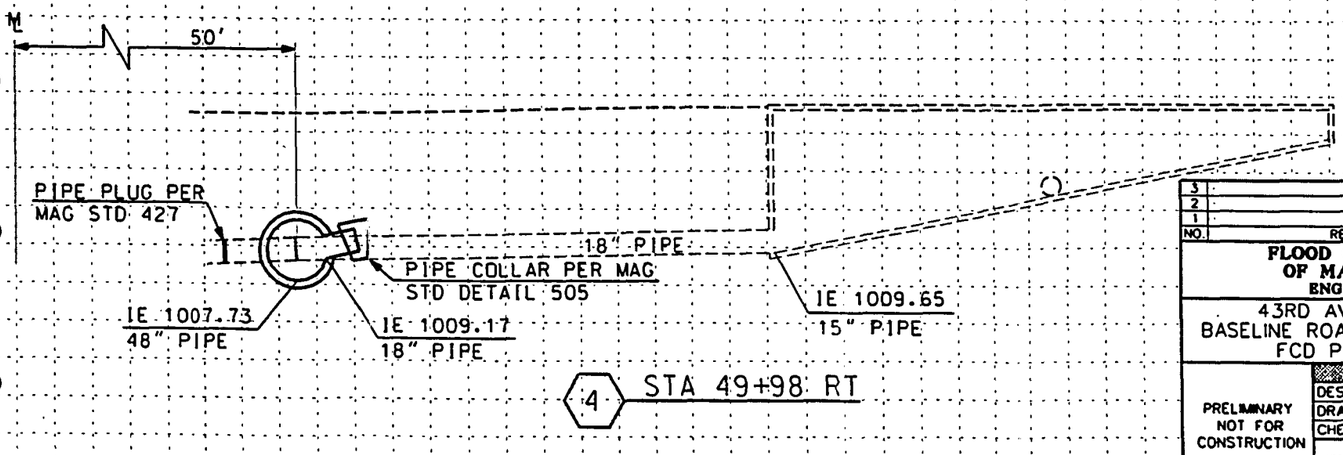
2 STA 47+39.30 RT



5 STA 51+43.50 RT



1 STA 46+93.20 RT



4 STA 49+98 RT

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE STORM DRAIN
BASELINE ROAD TO SOUTHERN AVENUE
FCD PROJECT NO. 117021

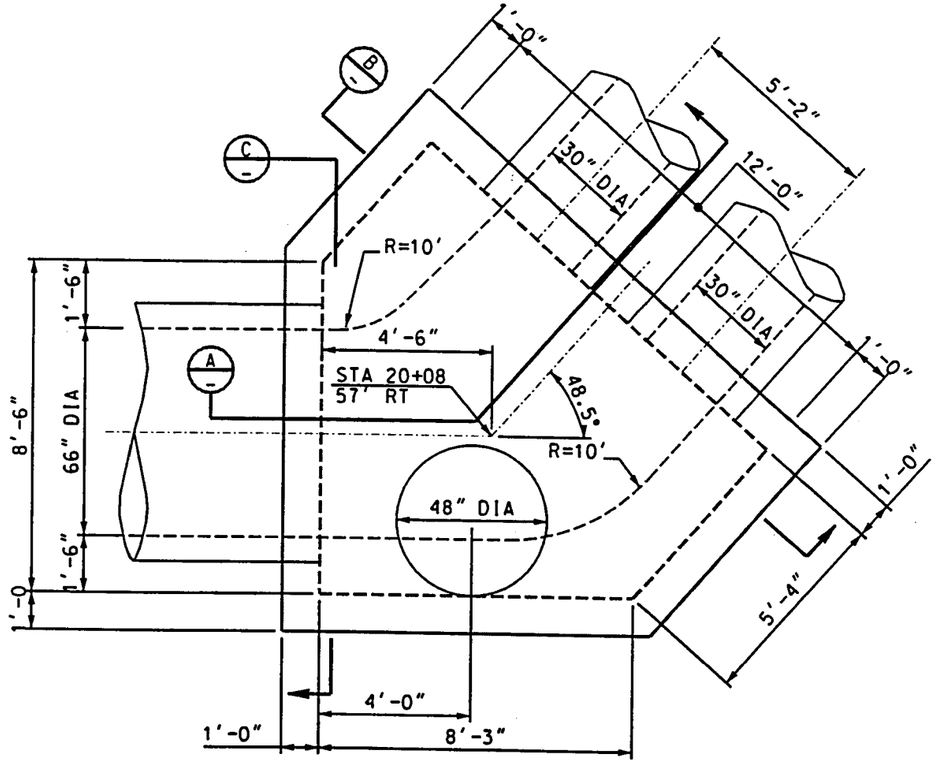
PRELIMINARY
NOT FOR
CONSTRUCTION

	BY	DATE
DESIGNED	MAL	11/18/9
DRAWN	FC	11/18/9
CHECKED	MAL	11/18/9

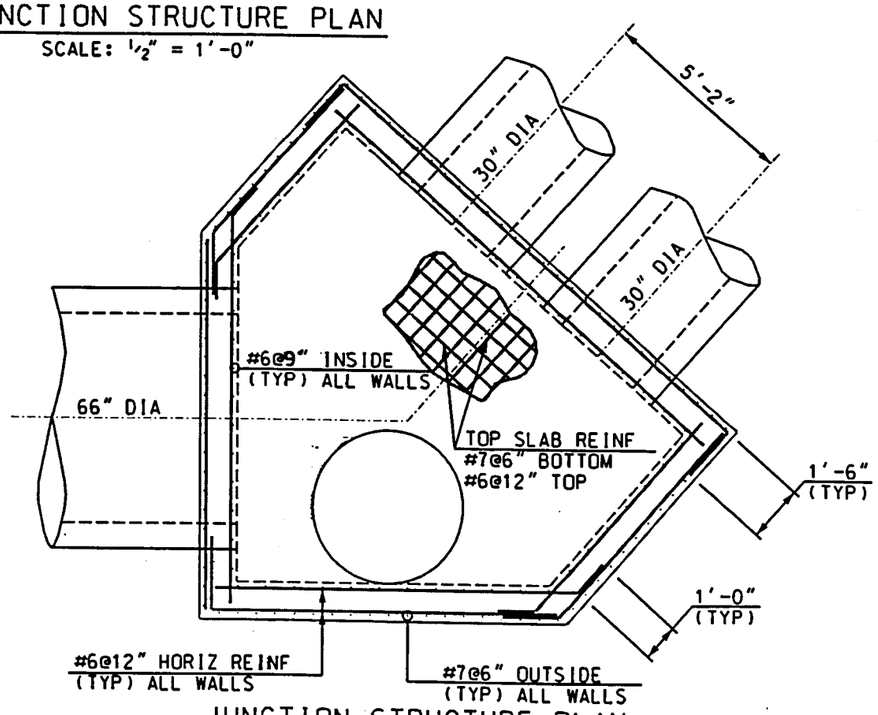
COLLECTOR PIPE PROFILE

SHEET C
19 2

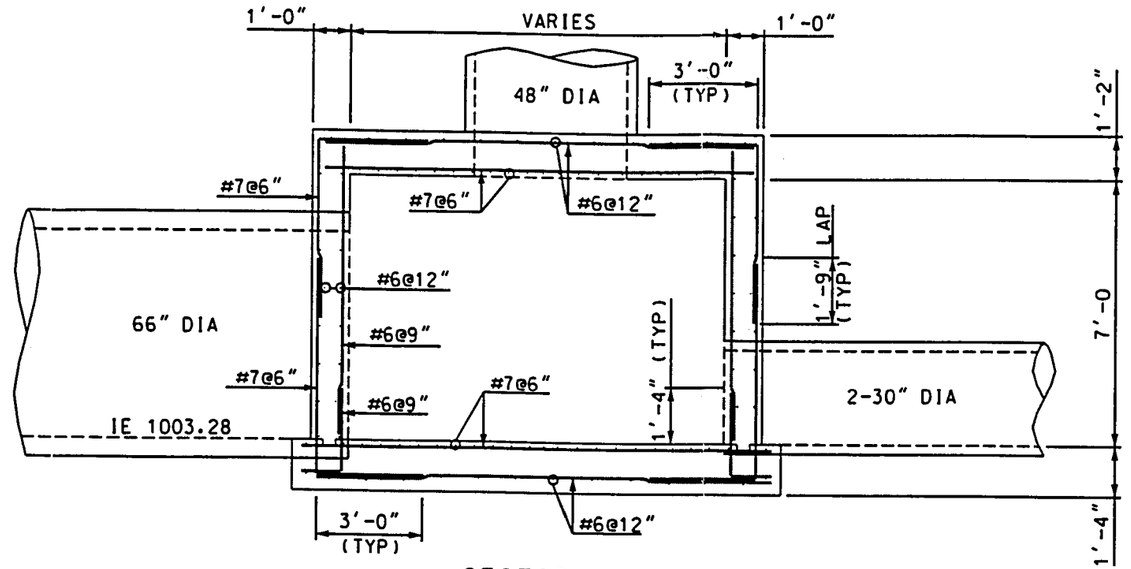
dgn\phase3\XSHT19-P3.DGN Mar. 10, 1999 09:15:33



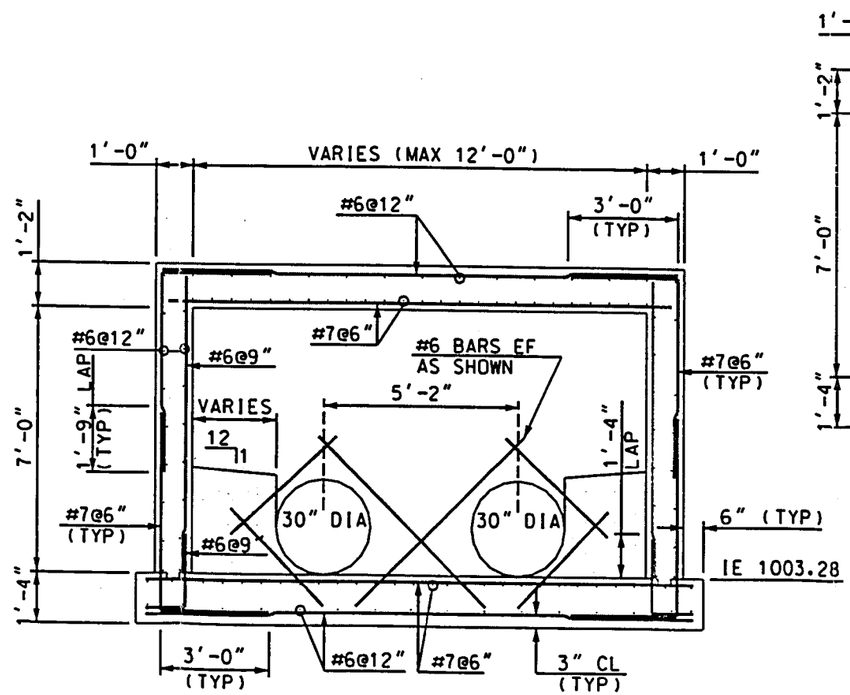
JUNCTION STRUCTURE PLAN
SCALE: 1/2" = 1'-0"



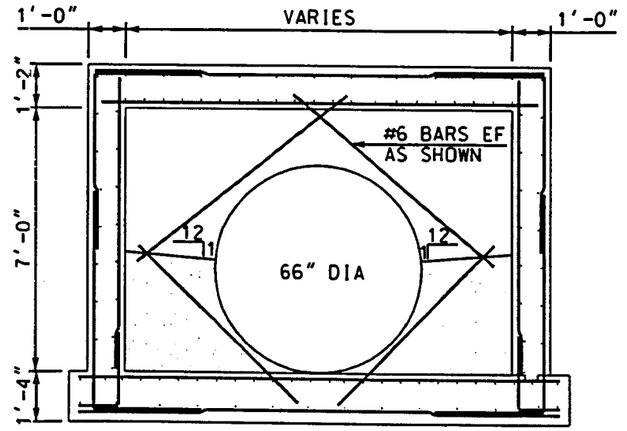
JUNCTION STRUCTURE PLAN
SCALE: 1/2" = 1'-0"



SECTION A
SCALE: 1/2" = 1'-0"



SECTION B
SCALE: 1/2" = 1'-0"



NOTE: SAME REINFORCING AS SECTION B

SECTION C
SCALE: 1/2" = 1'-0"

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	KVH	02/10/9
DRAWN	FC	02/10/9
CHECKED	MAL	

DETAIL 1
JUNCTION STRUCTURE DETAIL

SHEET 0
20 2

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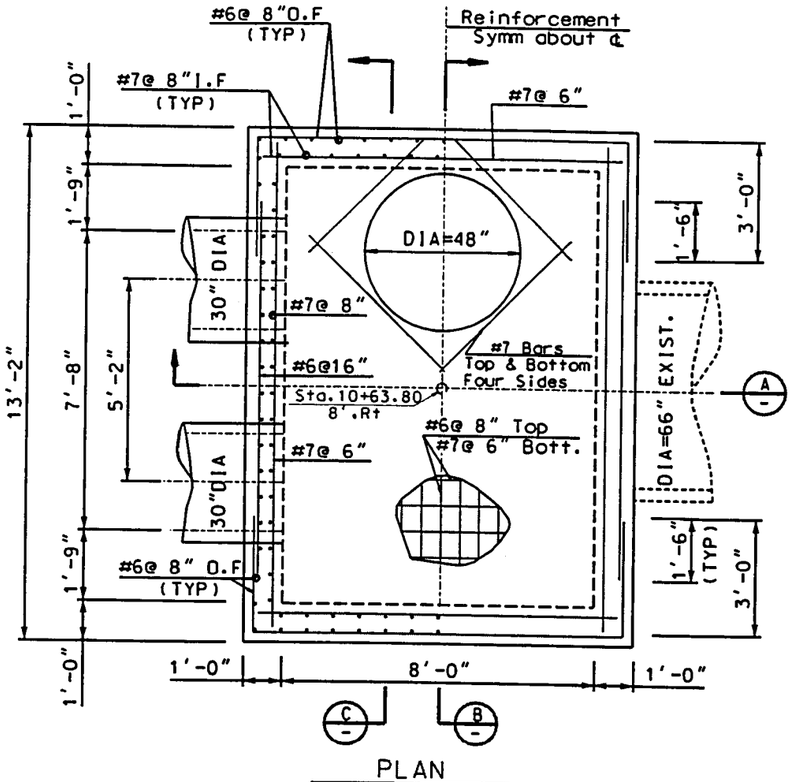
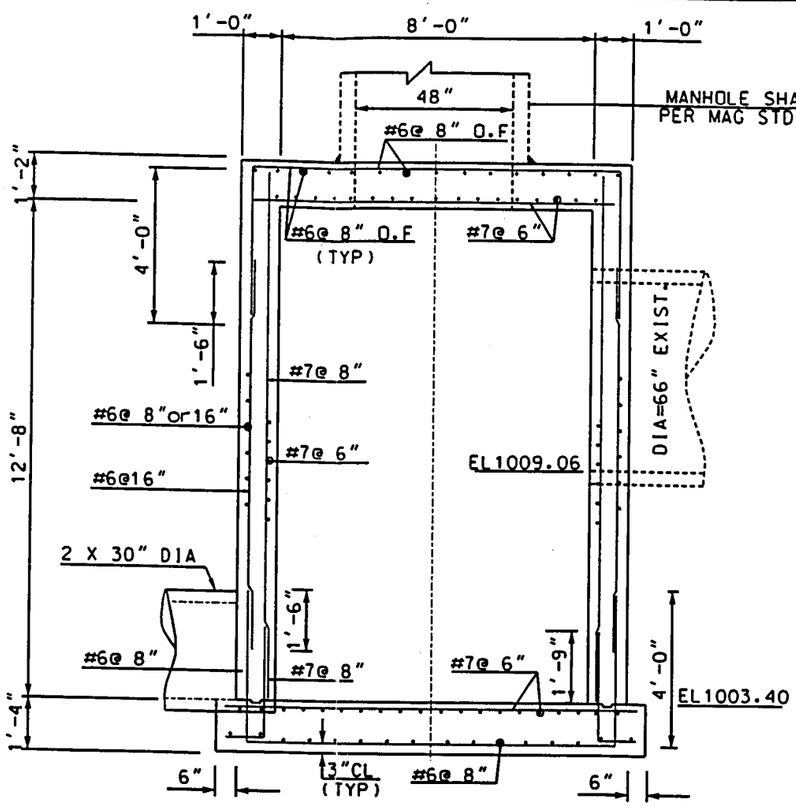


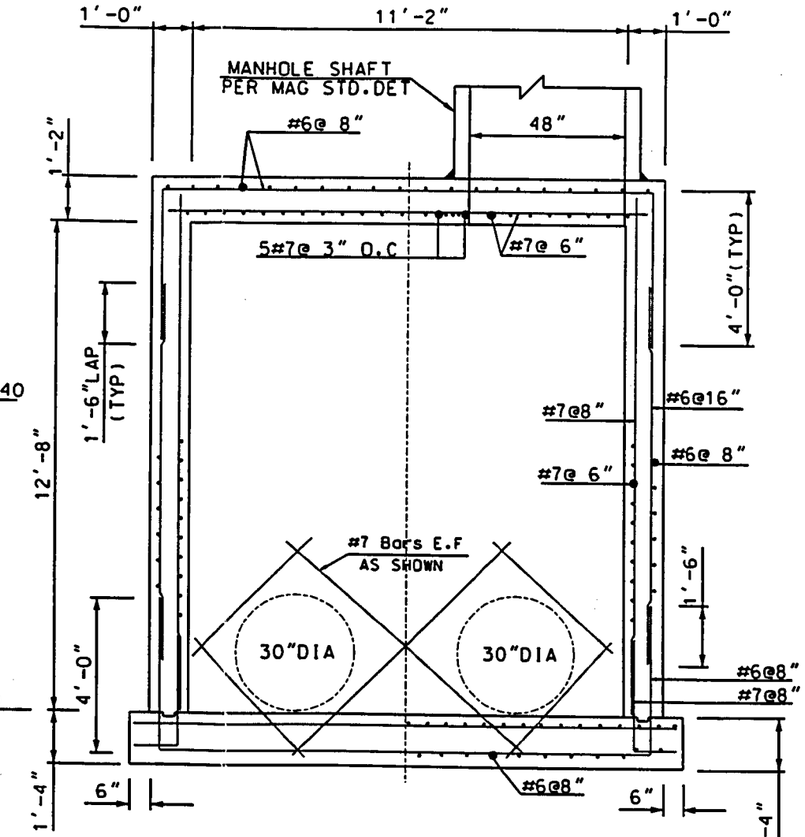
PLAN

SCALE: 1/2"=1'-0"



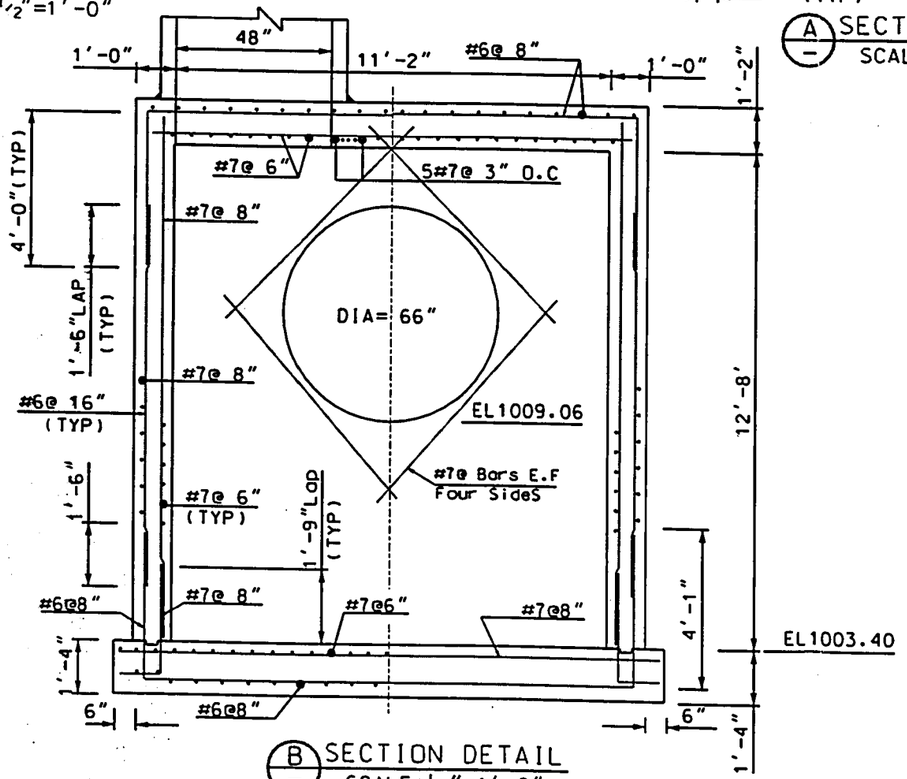
A SECTION DETAIL

SCALE: 1/2"=1'-0"



C SECTION DETAIL

SCALE: 1/2"=1'-0"



B SECTION DETAIL

SCALE: 1/2"=1'-0"

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE DETENTION BASIN
FCD PROJECT NO. 1170230
90% SUBMITTAL

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	KVH	12/30/9
DRAWN	MMM	12/30/9
CHECKED	MAL	

DETAIL 2
JUNCTION BOX DETAIL

SHEET 0
21 2

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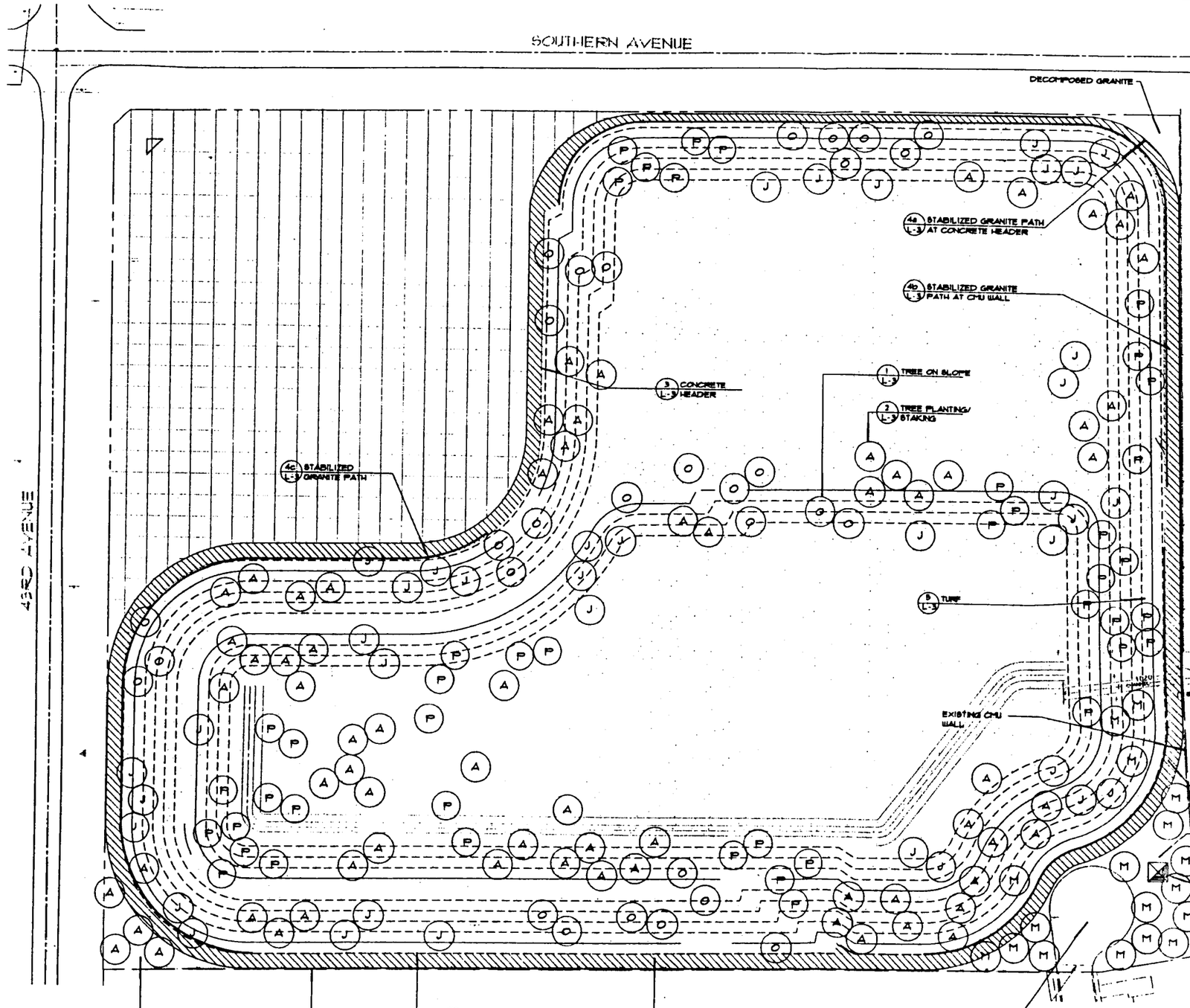

LANDSCAPE LEGEND

SYM.	BOT. NAME	COMMON NAME	SIZE	QTY.	UNIT
O	BAUHINIA VARIEGATA	ORCHID TREE	15 GALLON UNLESS NOTED	30	EA.
A	FRAXINUS VELUTINA	ARIZONA ASH	15 GALLON UNLESS NOTED	70	EA.
P	PISTACIA CHINENSIS	CHINESE PISTACHE	15 GALLON UNLESS NOTED	44	EA.
M	PROSOPIS VELUTINA	VELVET MESQUITE	15 GALLON UNLESS NOTED	18	EA.
J	QUERCUS BUCKLEYI	RED OAK	15 GALLON UNLESS NOTED	38	EA.
	CYNODON DACTYLON	COMMON BERMUDA	SEED	16	AC.
	NATIVE GRASS & WILDFLOWER SEED MIX		SEED	4	AC.
	STABILIZED DECOMPOSED GRANITE (3" DEPTH)		1/4" MINUS	382000	SF
	DECOMPOSED GRANITE (2" DEPTH)		3/8" MINUS HUALAPAI RED	190110	SF
	CONCRETE HEADER			3225	LF

LANDSCAPE NOTES

1. PRIOR TO COMMENCEMENT OF ANY WORK, THE CONTRACTOR SHALL VERIFY LOCATIONS AND DEPTHS OF UNDERGROUND INSTALLATIONS THAT MAY BE AFFECTED BY HIS WORK AND HE SHALL BE RESPONSIBLE FOR DAMAGES TO SUCH INSTALLATIONS CAUSED AS A RESULT OF HIS LANDSCAPE INSTALLATION.

2. ALL AREAS SHALL BE SPRAYED WITH A PRE-EMERGENT HERBICIDE PRIOR TO PLACEMENT OF DECOMPOSED GRANITE. IMMEDIATELY AFTER PLACEMENT OF DECOMPOSED GRANITE CONTRACTOR TO APPLY SECOND APPLICATION OF PRE-EMERGENT.

3. ENGINEER RESERVES THE RIGHT TO REJECT ANY PLANT MATERIAL HE DEEMS UNACCEPTABLE.

4. ALL TREE LOCATIONS TO BE STAKED AND APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.

5. SUBSTITUTION SHALL NOT BE ALLOWED UNLESS AUTHORIZED IN WRITING BY THE ENGINEER.

6. ALL TREE AND SHRUB PLANTINGS SHALL BE BACKFILLED WITH A SOIL MIX COMPRISED OF FOUR PARTS SCREENED NATIVE SOIL BY VOLUME. 1 PART FOREST MULCH BY VOLUME. 12 oz. SOIL SULPHUR AND 4 oz. ACTIVATED CHARCOAL.

LOGAN SIMPSON DESIGN INC
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NO.	REVISION	BY	DATE
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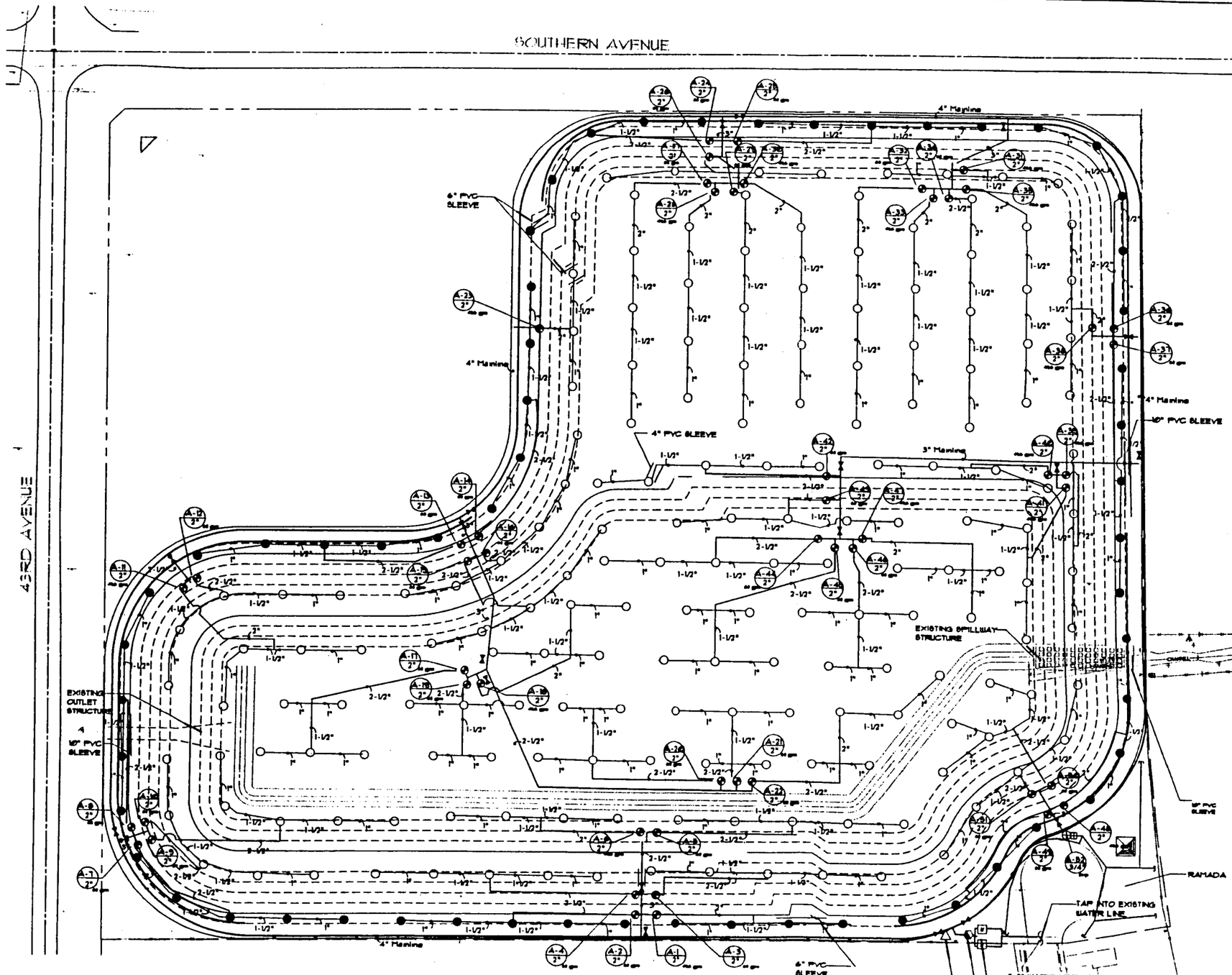
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE STORM DRAIN
BASELINE ROAD TO SOUTHERN AVENUE
FCD PROJECT NO. 117022

	BY	DATE
DESIGNED	JB	3/99
DRAWN	BAR	3/99
CHECKED	SEL	3/99

LANDSCAPE PLAN

SHEET OF 22 26



IRRIGATION LEGEND

SYM.	BRAND	MODEL #	DESCRIPTION
	FEBCO	825 YD	3" REDUCED PRESSURE BACKFLOW PREVENTER
	NIBCO	T-113-RR	GATE VALVE
	RAINBIRD	PEB	CONTROL VALVE
	RAINBIRD	SEE DETAILS, SHT 5	DRIP VALVE ASSEMBLY
	RAINBIRD	PSI-L30-X RBY-100-200MX	PRESSURE REGULATOR/ WYE STRAINER
	BOUSMITH	ML720	MULTI OUTLET EMITTER(2.0 gph)
	RAINBIRD	F4-PC-66-14	TURF ROTOR (PART CIRCLE)(12.4 pgm)
	RAINBIRD	F4-66-14	TURF ROTOR (FULL CIRCLE)(12.4 gpm)
	RAINBIRD	ESP	IRRIGATION CONTROLLER
	PEPCO		FLUSH END CAP
			4" SCH. 40 PVC MAINLINE
			SCH. 40 PVC LATERAL
			SCH. 40 PVC SLEEVE

IRRIGATION NOTES

1. THE SYSTEM DESIGN ASSUMES A MINIMUM WATER PRESSURE OF 75 PSI AT THE METER. VERIFY PRESSURE PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES.

2. ALL PIPING THAT CROSSES BENEATH MAINTENANCE PATH IS TO BE PLACED IN A PVC SHCDULE 40 SLEEVE. SIZES INDICATED ON PLANS.

3. LOCATE ALL UNDERGROUND UTILITIES AND DRAINAGE STRUCTURES PRIOR TO CONSTRUCTION.

4. IRRIGATION PIPE AND COMPONENETS ARE SHOWN DIAGRAMMATICALLY AND OUTSIDE OF PLANTING AREA FOR CLARITY. INSTALL IRRIGATION PIPE IN PLANTING AREAS AND INSTALL ALL IRRIGATION COMPONENTS IN LANDSCAPE AREAS.

5. ALL DRIP LATERALS ARE TO BE 3/4" SCH 40 PVC. ALL OTHER PIPING SIZED AS SHOWN ON THE PLANS.

6. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UNDERGROUND UTILITIES THAT MAY BE AFFECTED BY WORK AND SHALL BE RESPONSIBLE FOR DAMAGES TO SUCH INSTALLATIONS CAUSED AS A RESULT OF THEIR WORK.

7. COORDINATE IRRIGATION WORK WITH PLANTING PLANS TO AVOID CONFLICTING LOCATIONS BETWEEN PIPING AND PLANT PITS.

8. IF IT BECOMES NECESSARY TO RELOCATE OR ALTER VALVES, PIPING, ETC. DUE TO CHANGE IN SITE CONDITIONS, CONTRACTOR SHALL OBTAIN WRITTEN APPROVAL FROM THE ENGINEER PRIOR TO STARING THESE REVISIONS.

LOGAN SIMPSON DESIGN INC
200 South Mill Avenue, Suite 200
Tempe, Arizona 85281
PHONE 000-000-0000
FAX 000-000-0000

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE STORM DRAIN
BASELINE ROAD TO SOUTHERN AVENUE
FCD PROJECT NO. 117022

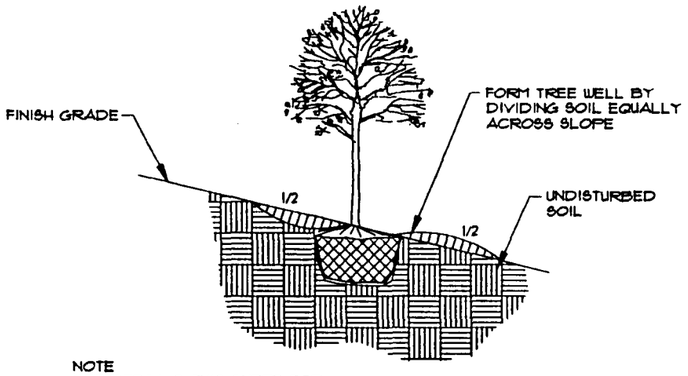
	BY	DATE
DESIGNED	JB	3/99
DRAWN	BAR	3/99
CHECKED	SEL	3/99

IRRIGATION PLAN

SHEET OF 23 26

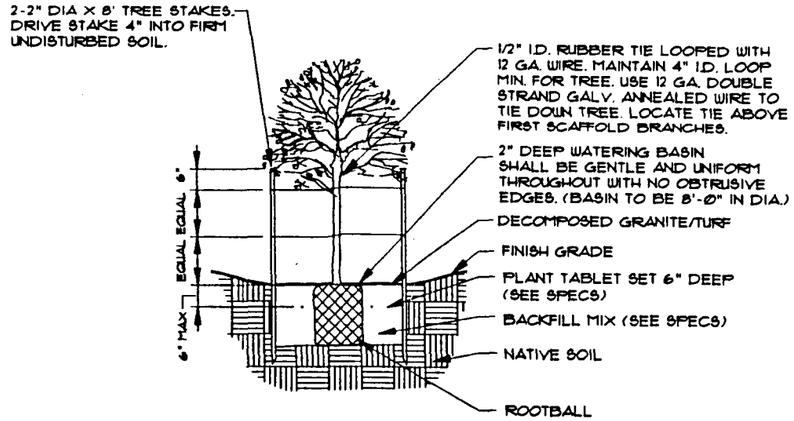
Two working days before you dig CALL FOR THE BLUE STAKERS 263-1100 (Bus Trans Number) CALL COLLECT

REGISTERED LANDSCAPE ARCHITECT 21437 STEVEN E. LOHDE ARIZONA U.S.A.

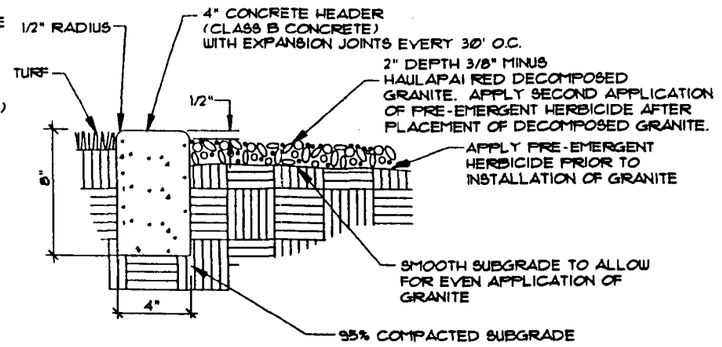


NOTE
SEE DETAIL 2, THIS SHEET, FOR STAKING AND PLANTING REQUIREMENTS.

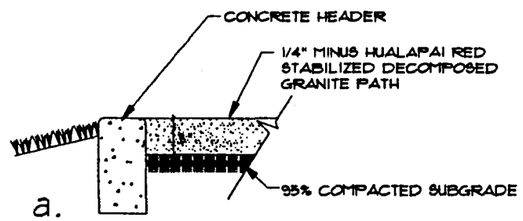
1 TREE PLANTING ON SLOPE — NTS

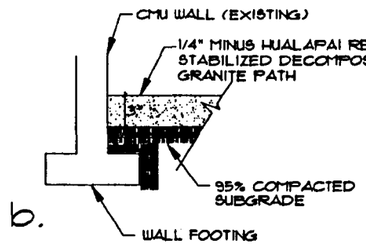


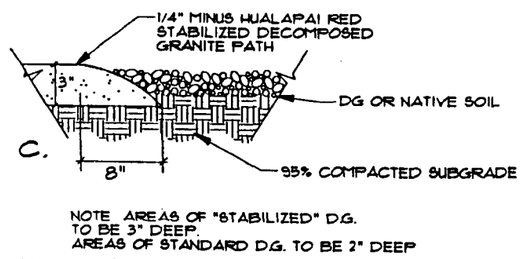
2 TREE PLANTING / STAKING — NTS



3 CONCRETE HEADER/DECOMPOSED GRANITE — NTS



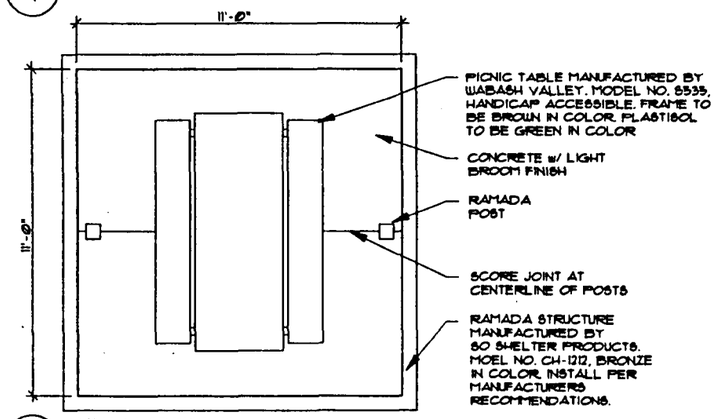




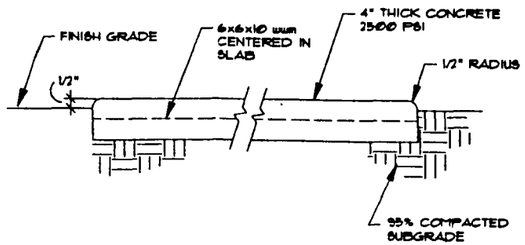
NOTE AREAS OF "STABILIZED" D.G. TO BE 3" DEEP.
AREAS OF STANDARD D.G. TO BE 2" DEEP

4 STABILIZED DECOMPOSED GRANITE PATH @ CONCRETE HEADER, CMU WALL, DECOMPOSED GRANITE/NATIVE SOIL — NTS

5 TURF — NTS



6 RAMADA STRUCTURE — NTS



7 CONCRETE SLAB — NTS

LOGAN SIMPSON DESIGN INC
200 South Mill Avenue, Suite 200
Tempe, Arizona 85281
602.838.8870
FAX 602.966.9800

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

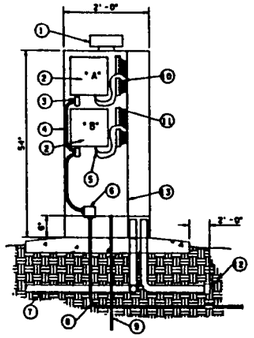
43RD AVENUE STORM DRAIN
BASELINE ROAD TO SOUTHERN AVENUE
FCD PROJECT NO. 117022

	BY	DATE
DESIGNED	JB	3/99
DRAWN	BAR	3/99
CHECKED	SEL	3/99

LANDSCAPE DETAILS

SHEET OF 24 26

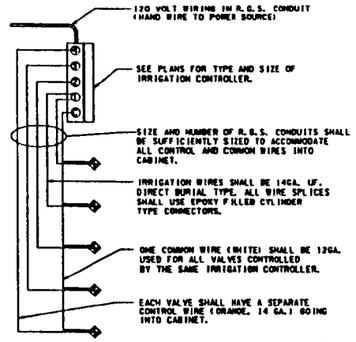
① VENT W/BUILT-IN FAN.
② IRR. CONTROLLER.
③ JUNCTION BOX
④ 1/2" FLEXIBLE CONDUIT
⑤ PRE-INSTALLED CABLE HARNESS.
⑥ 20A SINGLE POLE CIRCUIT BREAKER.
⑦ R.G.S. CONDUIT FOR IRR. CONTROL WIRING
⑧ 1" R.G.S. CONDUIT FOR POWER SOURCE.
⑨ GROUNDING ROD.
⑩ CONTROL WIRING
⑪ TERMINAL STRIPS.
⑫ BUSHING.
⑬ 6" X 12" WIRING GUTTER.



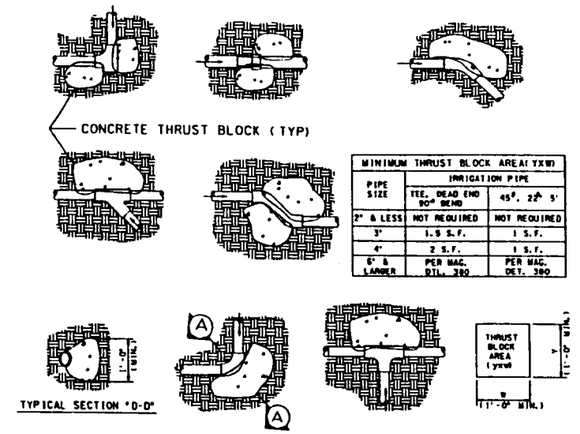
ENCLOSURE NOTES FOR IRRIGATION CONTROLLER

- PRE-FABRICATED 10 GA. VANDAL RESISTANT SECURITY ENCLOSURE, 24" WIDE, 18" DEEP, 84" HIGH.
- MOUNT ENCLOSURE ON A 4" THICK, MAG CLASS "B" CONCRETE SLAB. PROVIDE 1'-0" WIDE WORKING STRIP ON ALL 4 SIDES.
- TOP OF CONCRETE SLAB 1" ABOVE FIN. GRADE.
- MOUNT CONTROLLERS & TERMINAL STRIP TO PLY-WOOD BACKBOARD. PROVIDE OPENINGS IN BACK BOARD FOR CONTROL WIRING.
- INSTALL 8' X 5/8" DIA. COPPER CLAMP GROUND ROD. THERMAL WELD #4 BARE CU. TO ENCLOSURE AND ROD.
- ALL R.G.S. IN CONTACT WITH EARTH SHALL BE TAPED WITH SCOTCH WRAP #50, MIN. THICKNESS = 40 MILS.
- STUB OUT ALL CONDUIT FOR CONTROL WIRING 2" BEYOND CONCRETE SLAB. BUSHINGS TYPICAL FOR ALL CONDUIT.
- TAPE CONTROL WIRING INTO NEAT BUNDLES. PROVIDE SLACK IN WIRE BUNDLES.
- Enclosure to be painted Beige in color. Color to be approved by Engineer.
- provide a total of three, 2" PVC Conduit sweeps in enclosure.
- Irrigation cabinet must be equipped with fan for temperature control.

① IRRIGATION CONTROLLER — nts



② CONTROLLER WIRING DIAGRAM — nts

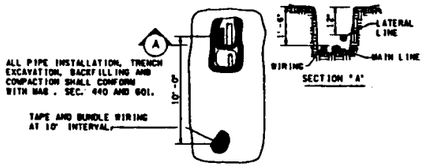


MINIMUM THRUST BLOCK AREA (YxW)		
PIPE SIZE	IRRIGATION PIPE	
	TEE, DEAD END 90° BEND	45°, 22½° 5'
2" & LESS	NOT REQUIRED	NOT REQUIRED
3"	1.5 S.F.	1 S.F.
4"	2 S.F.	1 S.F.
6" & LARGER	PER MAG. DTL. 380	PER MAG. DET. 380

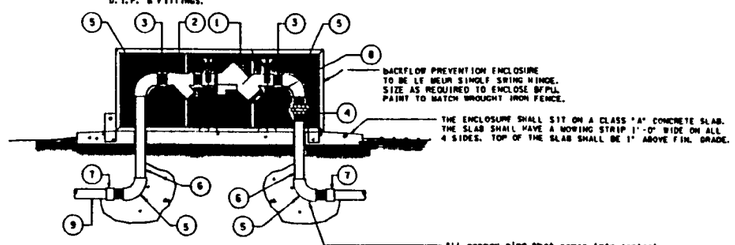
③ MAINLINE THRUST BLOCK — nts

NOTES:
1. REDUCED PRESSURE BACKFLOW PREVENTION UNIT.
2. BRONZE WYE STRAINER.
3. NIPPLES*
4. UNION*
5. 90 ELL * *
6. RISERS* (LENGTH AS REQUIRED)
7. SCHEDULE 80 PVC MALE ADAPTOR (MIPT X SLIP)
8. ADJUSTABLE PIPE SUPPORT (4" AND LARGER ASSEMBLIES)
9. SCH. 80 PVC TO METER.

* 3/4" THROUGH 2 1/2" RPBP USE TYPE 'K' COPPER. 3" THROUGH 12" RPBP USE FLANGED D.I.P. & FITTINGS.

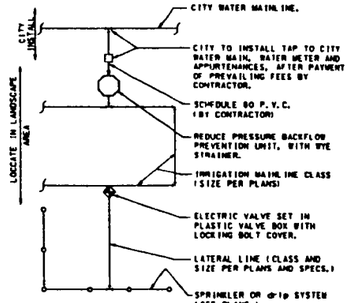


④ TRENCHING — nts



GENERAL NOTES:
1. ASSEMBLY SHALL BE APPROVED BY U.S.C. FOUNDATION FOR CROSS-CONNECTION AND HYDRAULIC RESEARCH.
2. CONTACT C.O.P. WATER & WASTEWATER DEPT. WATER QUALITY DIVISION FOR LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.

⑤ REDUCED PRESSURE B. F. P. U. AND SECURITY ENCLOSURE — nts



⑥ WATER SYSTEM SCHEMATIC — nts

LOGAN SIMPSON DESIGN INC
3198 South Mill Avenue, Suite 200
Tempe, Arizona 85282
(602) 967-1476
FAX (602) 966-9780

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

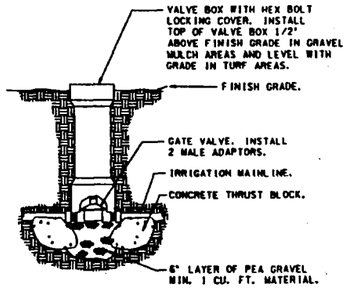
43RD AVENUE STORM DRAIN
BASELINE ROAD TO SOUTHERN AVENUE
FCD PROJECT NO. 117022

	BY	DATE
DESIGNED	JB	3/99
DRAWN	BAR	3/99
CHECKED	SEL	3/99

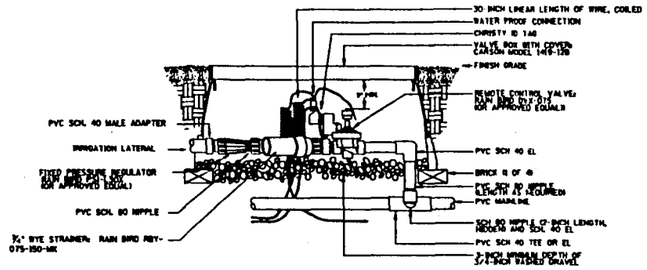
IRRIGATION DETAILS — SHEET OF 25 26

Two working days before you dig CALL FOR THE BLUE STAKES 263-1100 Blue Stake Center CALL ONLY!

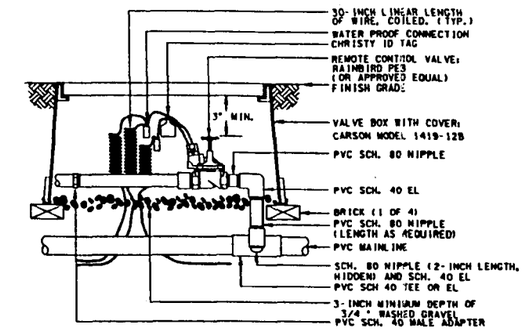
REGISTERED LANDSCAPE ARCHITECT 27437 STEVEN E. LOMITA ARIZONA U.S.A.



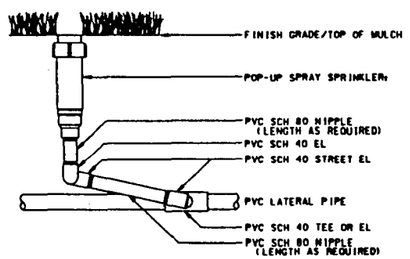
7 GATE VALVE nts



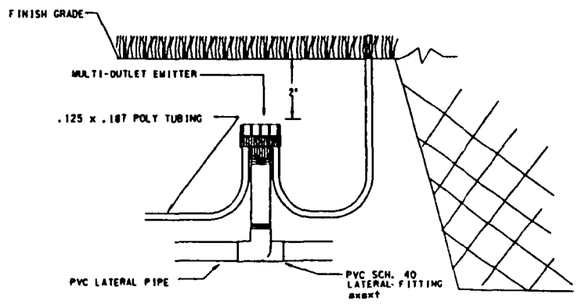
8 DRIP VALVE ASSEMBLY nts



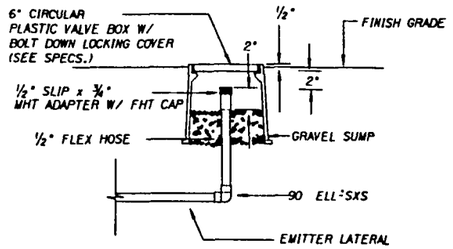
9 REMOTE CONTROL VALVE ASSEMBLY (TURF SYSTEM) nts



10 POP-UP ROTOR SWING JOINT ASSEMBLY nts



11 MULTI-OUTLET EMITTER ASSEMBLY nts



12 FLUSH END CAP nts

LOGAN SIMPSON DESIGN INC
300 South Mill Avenue Suite 300
Tempe, Arizona 85281
FAX

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

43RD AVENUE STORM DRAIN
BASELINE ROAD TO SOUTHERN AVENUE
FCD PROJECT NO. 117022

	BY	DATE
DESIGNED	JB	3/99
DRAWN	BAR	3/99
CHECKED	SEL	3/99

27437 STEVEN E. LOWDE 4-7-99

IRRIGATION DETAILS

SHEET OF 26 26