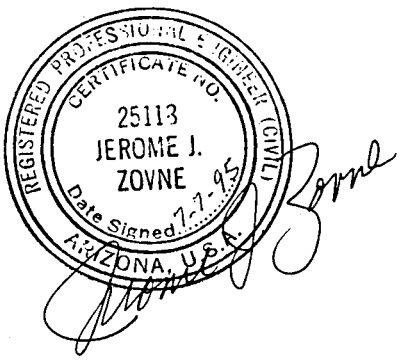
ALTERNATIVE STUDY

SOUTHEAST VALLEY REGIONAL DRAINAGE SYSTEM

PRICE and SANTAN FREEWAYS



Contract 88-24
Price Freeway
Management Consultant
TRACS No. H-2222-01D

Prepared for:
Arizona Department
of Transportation

Prepared by:
HDR Engineering, Inc.
Phoenix, Arizona

HDR

June 1995

ALTERNATIVES STUDY

SOUTHEAST VALLEY REGIONAL DRAINAGE SYSTEM

Price and Santan Freeways

Introduction

This report is summary of results of a feasibility study to revise the Price and Santan Freeway drainage outfall plan. The study was completed for Arizona Department of Transportation (ADOT) under existing Contract 88-24. The primary objective of the study is to respond to a request by the Gila River Indian Community (GRIC) to redirect the Price/Santan drainage to a new drainage corridor which would divert both the Gila Drain and storm water flows to the west. This would make it possible to abandon a portion of the existing Gila Drain corridor through the Lone Butte Industrial Park. Other aspects of the drainage system, such as water quality, were also investigated.

The study was initiated and coordinated by the Flood Control District of Maricopa County(FCDMC). The FCDMC has allocated funds to cost-share the construction of this drainage system with ADOT and the City of Chandler. The elements of this drainage outfall, which is referred to as the Southeast Valley Regional Drainage System, are shown on the next page. The SVRDS is part of the Price and Santan Freeway drainage system.

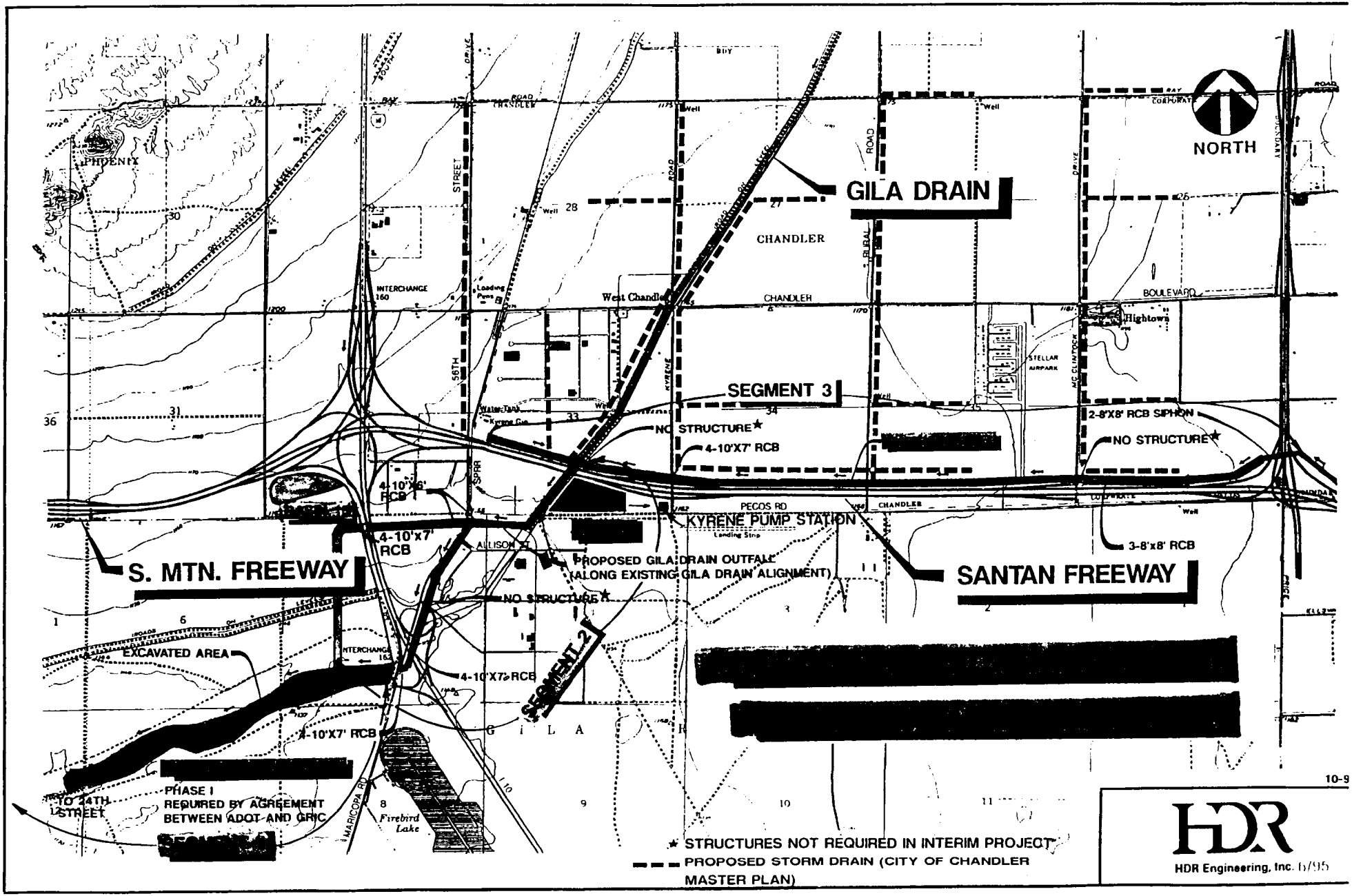
The report presents the alternatives that have been investigated and compares costs.

Objectives and Approach

The objectives of the study were as follows:

- Determine feasibility of alternatives to divert the Gila Drain westward along the Pecos Road alignment, across I-10 and then southward to the Gila Drain Floodway.
- Consider water quality issues in the plan.
- Investigate combinations of channels and basins to improve effectiveness and/or cost.
- Determine if the Santan/Gila Drain channel realignment can reduce the cost of facilities west of I-10 to the 48th alignment; namely Basin 15 of the South Mountain Freeway.

In 1992 HDR conducted a similar study known as the Santan-Gila Drain Outfall Interim Project. In that study, HDR analyzed the cost of a project primarily designed to provide an outlet for West Chandler storm water until the Price and Santan Freeways were constructed. The present study has a similar objective, but an expanded scope. The system is divided into three segments as shown on the next page and described in detail in a subsequent section. This segmentation allowed HDR to focus primarily on Segment 2 for the alternatives study. The Segment 1 and 3 drainage facilities remain as developed in the ADOT/HDR Price



10-9

HDR

HDR Engineering, Inc. 6/95

and Santan Freeway drainage reports entitled "Gila Drain Alternative Concept Drainage Report," February 1993 and "Gila Drain Floodway Master Plan Report, " February 1993, respectively.

The strategy of the study was first to verify that the Gila Drain outfall channel could be moved to the "west" alignments as shown in Exhibit 1. It was found that these alignments are technically feasible, but would be more expensive because they are inherently longer than the existing Gila Drain corridor. Also, the natural grades in the westerly direction oppose the channel slope west of I-10, thus making the channels wider and deeper than normal. A criteria that was maintained throughout the study was to use a maximum corridor width of 100 feet, which is the width of the existing Gila Drain right-of-way.

After verifying the technical feasibility of the new outlet corridors, the Segment 2 facilities were investigated to determine if there are combinations Basin B and Gila Drain outlet channel size that result in a lower cost or provide a better solution than the original plan.

Two basic configurations of Basin B were evaluated. The original plan (and still valid current plan) is to bypass Basin B inflows up to the maximum flow of about 1700 cfs that can be conveyed within existing 100-foot wide Gila Drain corridor. Only peak flows exceeding the channel capacity are diverted into the basin. This results in a minimum size of gravity-drained basin occupying about 37 acres of the 46-acre site. The cost of this alternative was evaluated for the new corridor options west of I-10.

The second configuration is a "flow-through" basin for which all drainage is routed through the basin. It requires an outflow spillway and enough storage volume to reduce the peak inflow to the desired peak design capacity of the Gila Drain outlet channel. This results in a larger and deeper basin which must be dewatering by pumping. Although it is larger than the bypass type, it detains all inflows up to the spillway crest elevation, thus offering the opportunity for improved water quality management and control. Since the freeway drainage plan already includes an on-site pump station currently located on the northeast corner of the Kyrene Road /Santan TI, it can easily be relocated to the southwest quadrant with no change either in function or cost to the on-site system. This would allow the station to be used to drain Basin B post-event at a relatively minor additional cost.

The segments are defined as follows:

Segment 1 This is the Gila Drain Floodway, which is a proposed natural channel approximately three miles long and 600 to 800 feet wide running westerly from Maricopa Road. One mile of the floodway has been excavated, as shown in Exhibit 1. Approximately 1,200,000 cubic yards(CY) remain to be removed from this corridor to complete the floodway excavation out to the 32nd Street extension.

The floodway is the subject of an agreement between the GRIC and ADOT in which ADOT will excavate the floodway in return for a permit to discharge Price and Santan Freeway drainage to the floodway (Note: the unit cost to excavate the floodway, $3.20 per CY, assumes a haul distance of several miles, and $0.20 is the GRIC royalty). The present study has not considered any modifications to the Gila Drain Floodway Master Plan.

Because the floodway is the defined outlet for the Price/Santan drainage system, impacts to the floodway of the various alternatives for Segment 2 were evaluated and are discussed in a later section of this report.

Segment 2 This segment is part of the SVRDS system from the Gila Drain Floodway at Maricopa Road to the Santan Freeway crossing of the Gila Drain. All of the alternatives are developed within this segment along the proposed new alignments as shown in Exhibit 1. The alignment of the channel west of I-10 is shown as three options. The first option is a corridor that is aligned along the west right-of-way line of I-10. The second option is an alignment that generally runs westerly along Pecos Road and then southerly to the Gila Drain Floodway approximately along the extension of 48th Street. The third option is to extend the alignment southwesterly to the 40th Street alignment. In general, alignments of the Gila Drain channel west of I-10 can follow any westerly to southwesterly path west of I-10 to about 48th Street. The least expensive corridor is along I-10.

Extending the channel straight west beyond 48th Street along the Pecos Road alignment is not practical unless the channel is angled southwesterly, as shown, to avoid excessive cuts. An alternative to this would be to direct the South Mountain drainage easterly to the "new" Gila Drain channel as shown in Exhibit 1. The drainage plan for Segment IV from ADOT/HDR's "South Mountain Freeway Drainage Concept Report", is attached for reference. This plan shows that the general direction of drainage flow is southerly to southeasterly from about 24th Street eastward to I-10. It is possible that the drainage presently discharging from South Mountain to GRIC tribal lands in this reach could be collected in a channel running easterly along Pecos Road and discharging into the new Gila Drain channel. A feasibility study of this was beyond the scope of this study because the South Mountain Freeway is not in ADOT's funded program at this time.

However, Basin 15 is a major detention basin in the southwest quadrant of the I-10/South Mountain /Santan interchange which is also shown in Exhibit 1. The potential impact of a reconfigured Basin 15 was evaluated mainly because partial construction of this interchange could effect drainage facilities west of I-10. It was found that Basin 15 could be downsized with virtually no impact on the Gila Drain channel west of I-10, which would be a cost reduction benefit to ADOT. Basin 15 is part of the South Mountain Freeway which not presently in the funded program, and therefore it cannot be included in the SVRDS project. Details of this study are discussed in a subsequent section.

Segment 2 includes the large (7-10'x7') box culvert at the Santan Freeway, Basin B, and the "Gila Drain" channel from Basin B to the Gila Drain Floodway. The study considered various configurations of Basin B and outlet channel using the various 100-foot wide corridor options. All alternatives include a Water Quality Basin as shown in Exhibit 2. This is discussed in a subsequent section.

Segment 3 This segment includes all of the drainage facilities north of the Santan Freeway from 56th Street east to the Price/Santan interchange, including the inverted siphon at the Price/Santan TI. The segment includes the main Santan Freeway collector channel running westward from Price Road to the Gila Drain, and a smaller lateral channel from 56th Street running eastward to the Gila Drain. The facilities included in this segment do not change for the various alternatives considered in Segment 2. More than half the total cost for this segment is to acquire the remaining freeway right-of-way from about Stellar Airpark east to the Price/Santan TI.

Water Quality

There are two water quality concerns. The first relates to the quality of the Gila Drain discharges and the second relates to the quality of storm water discharges. It is beyond the scope of this study to attempt to propose solutions to the water quality issues. Water quality of either of these discharges is not known at the present time, nor can the potential future federal, state or local regulations regarding control of these discharges be predicted. However, we have proposed a system whereby future discharges can be controlled

and regulated such that the water quality can be monitored and potentially treated if necessary to meet future requirements.

Gila Drain The Gila Drain is an irrigation return flow channel that ultimately discharges to the Gila River. It is the subject of an early 1900's agreement between GRIC and SRP. The entities involved in the SVRDS development directed HDR to consider a plan to divert the Gila Drain to the west and to combine the storm water and irrigation drain water in one conveyance to reduce cost. There is one irrigation delivery point from the Gila Drain as shown in Exhibit 1 which provides water to GRIC's Broadacres agricultural area west of I-10. It is assumed that the delivery could be made using the new Gila Drain outlet channel and diverting flows at the channel crossing of the delivery canal west of I-10. HDR is not aware of any delivery points downstream of this one. Therefore, the present plan is to discharge the Gila Drain flows, which will sometimes be combined with storm water discharges from Basin B, into the Gila Drain Floodway.

The Gila Drain Floodway is a natural wash that runs westerly from Maricopa Road to the Gila River. The Gila Drain is a separate drain channel which parallels the Gila Drain Floodway from Maricopa Road about the 19th Avenue extension where it turns southward and discharges to the Gila River. The plan to divert Gila Drain flows to the Gila Drain Floodway would thus potentially allow the Gila Drain to be abandoned in the future.

The quality of the Gila Drain flow is of primary concern to the GRIC. Irrigation drain flows can contain non-point source pollutants. The community is in the process of drafting regulations concerning water quality. To date there has been almost no testing of Gila Drain discharges to characterize the quality of the water. The FCDMC has proposed to install a monitoring station at the Allison Road gate structure to begin the process of investigating the water quality. With the regulations in process and the quality unknown, the plan is to set aside a 1000-foot long segment of the existing Gila Drain along the west side of Basin B, as shown in Exhibit 2, for water quality monitoring and potential treatment in the future.

Since the water quality is unknown and the regulations are not defined, it is not possible to design or establish a cost for this water quality system at the present time. Some success at treating non-point source pollutants has been achieved simply by detaining flows to allow sediment removal and by various natural rock or multi-stage, multi-median porous filtering systems. This is shown conceptually and identified as the "Water Quality Basin" in the exhibits.

Storm Water Storm water also can contain non-point source pollutants and the GRIC concerns are similar to irrigation drain flows. The pollutant concentrations of "first flush" or wash-off flows are of greatest concern. Storm water can be treated like irrigation return flows, but because of the very large volumes to be handled in a short period of time, it is usually not feasible to treat all storm flows . In the SVRDS plan, Basin B and the Water Quality Basin will be configured so that "first flush" storm flows can either be directed to the Water Quality Basin or to Basin B. For all alternatives except Alternate B, the remaining storm flows exceeding the first flush would discharge into Basin B and would be retained until the level in the basin exceeds the overflow spillway elevation. Suspended sediment would have an opportunity to settle out in this process. Since pollutants are often attached to sediment, the settling that occurs in the basin provides a measure of treatment. Alternate B has a bypass channel and only flows exceeding channel capacity would flow into Basin B. However, for all other alternatives, Basin B would provide adjunct water quality benefits by providing flow control, a location to monitor quality, and treatment by dilution and settling.

As shown in Exhibit 2, storm water low flows will either be directed to the Water Quality Basin or to Basin B where they will be detained. A water quality basin could also be constructed within Basin B. The storm flows can be monitored in Basin B and a treatment strategy developed in the future, if necessary.

Description of Alternatives

As previously mentioned, the alternatives that were developed apply only to Segment 2, as follows:

- Alternate A. The plan for Alternate A very similar to the original ADOT/HDR concept, except that Basin B is restructured as a deeper flow-through detention basin which requires post-event dewatering. The Gila Drain outlet channel has the same capacity of about 1700 cfs as in the original plan and is extended to the west side of I-10. The Kyrene pump station would moved to the southwest corner of the Kyrene/Santan Freeway interchange to drain Basin B. The existing Gila Drain channel along the west side of Basin B would be set aside for water quality monitoring, and perhaps used as a treatment basin in the future. A 60-inch diversion pipe would direct Gila Drain flow under the Santan Freeway and into the Water Quality Basin. Storm water low flows could also be directed to this basin or to a second monitoring and treatment basin constructed within Basin B. Gila Drain and Basin B outflows combine downstream of Basin B. Alternate A is shown in Exhibit 1. The Basin B total storage volume is 425 acre-feet. The basin is 25-feet deep and requires 23 acres of the 46-acre site. The Gila Drain channel has a base width of 20-feet and a depth of 8 feet. For all alternatives, the Gila Drain channel is a concrete-lined trapezoidal channel with 2:1 side slopes. Data for the other alternatives is shown in Exhibit 1. The dashed lines within Basin B indicate the limits of an active borrow site for a City of Tempe project.

- Alternate B. This alternate is very similar to the ADOT/HDR original plan, except the Gila Drain channel is extended to the west side of I-10 and the Water Quality basin is added. Basin B is bypassed until peak flows exceed the bypass channel capacity. The bypass channel is shown in Exhibit 2. Basin B is only about 10 feet deep and can be drained by gravity. It is the smallest basin at 267 acre-feet. The Kyrene pump station is not required for this plan. Otherwise the water quality and Gila Drain channel plans are similar to Alternate A.

- Alternate C. In this plan Basin B (as a flow-through basin) was enlarged in order to reduce the design capacity of the Gila Drain channel to under 1000 cfs. The Basin B volume is enlarged to 850 acre-feet, the depth is 25-feet and the basin occupies 38 acres. The Gila Drain channel reduces to an eight-foot wide base width and eight-foot deep channel. Otherwise the plan is similar to Alternate A.

- Alternate D. In this plan, the Basin B size is maximized on the existing site in order to minimize the Gila Drain channel size. This requires a 1200 acre-foot , 30-foot deep basin occupying the entire 46-acre site. The channel is reduced to an eight-foot wide base by seven-foot depth. Otherwise, this plan is also similar to Alternate A.

- Alternate E. This plan is similar to Alternate D, except the Gila Drain channel is replaced with a 10-foot diameter underground pipeline. While this pipe is more expensive than other alternatives there is a considerable reduction in right-of-way. The pipe could be constructed in a 30-foot right-of-way or smaller, compared to a 100-foot right-of-way for the channel alternatives. This represents a net reduction of about 14 acres. Another benefit is that the pipe is underground.

Basin 15 and its outlet to the Gila Drain Floodway was investigated with respect to each of the aforementioned alternatives. It was found that Basin 15 could be significantly downsized for any of the "channel" alternatives, as it can be reconfigured as a flow-through detention basin with a spillway overflow to channel outlet (Note: the original plan is shown in Exhibit 1). Because of timing of the hydrographs, the peak flow from Basin 15 has a minor impact on the total peak flow in the combined channel below the confluence.

The "new" Gila Drain corridors shown in Exhibit 1 are conceptual. The actual location should be integrated with GRIC development plans once the general plan is selected. A location study is recommended, which would take into account overall development plans, both east and west of I-10 and would identify utility conflicts. There are natural gas and petroleum pipelines running parallel to the proposed corridor along Pecos Road which should be avoided and there are also potential utility crossings at 56th Street and I-10 which may need to be relocated. A "utility" cost has been included in the estimates for this study which assumes several minor relocations will be required at each crossing.

Cost Estimates

Estimates of probable construction cost were prepared for each of the alternatives investigated. Construction costs were developed only for the major facilities. Included in the construction cost is 15 percent allowance for miscellaneous items, a 12 percent construction contingency and engineering cost, and a 10 percent design cost. The estimates are conservative and account for the total potential construction cost, but they do not take into account future price inflation.

The two largest single costs are for excavating Basin B and for lining the 8,500 to 16,000 feet of concrete channel for the Gila Drain outlet. These two items basically establish the relative cost differential between alternates. The cost for other structures, such as roadway cross-culverts, are the greatest for the original design and Alternates A and B which require the largest channel. However, these structures did not vary enough in size to justify reanalysis for each of the alternatives. The cost of these is assumed constant for all alternatives.

Some of the unit costs were updated from previous values. The two unit costs that significantly increase the total cost of the project compared to 1992 prices are Basin B excavation cost which increased from $1.50 to $3.00 per cubic yard and channel lining, which increased from $18 to $25 per square yard. Other unit costs are assumed not to have changed significantly since 1992.

For comparison, cost of the original ADOT/HDR design is provided in attached spreadsheets. (See files SRDSEG1.CST, SRDSEG2.CST, and SRDSEG3.CST). The SRDSG2A.CST spreadsheet is also included. It shows the cost of the original plan with the 60-inch Gila Drain diversion pipe deleted, which is similar to the alternatives investigated in this study.

Right-of-way acquisition costs are included in the estimates. The only right-of-way that has not been acquired by ADOT for the Santan Freeway is roughly from Stellar Airpark east to Price Road. This would need to be acquired in order to complete the connection of the Santan channel to the Price Freeway drainage system. The acquisition cost was estimated in 1992 to be $7.9 million. An updated appraisal was not available at the time of this study, so the 1992 figure is used in the estimates.

It is assumed for the purposes of this study that "new" Gila Drain corridor is a 1:1 exchange for the existing corridor, and therefore no cost has been included the Gila Drain right-of-way.

Cost Comparisons

Cost spreadsheets are attached for each of the alternatives for each of the segments. Segment 1 (Gila Drain Floodway excavation) and Segment 3 (Santan Channel) do not change for any of the alternatives. Table 1 compares the total estimated project cost, including right-of-way acquisition.

Table 1. Cost Comparison in $ millions.

Alternate	Seg. 1	Seg. 3		Seg. 2 Const.			Totals		
	Const.	Const.	ROW	I-10	48th St.	40th St.	I-10	48th	40th
Orig. Plan	3.8	7.8	7.9	5.3	-	-	24.8		
A	3.8	7.8	7.9	10.2	11.2	13.2	29.7	30.7	32.7
B	3.8	7.8	7.9	6.6	7.6	9.6	26.1	27.1	29.1
C	3.8	7.8	7.9	12.5	13.3	14.9	32.0	32.8	34.4
D	3.8	7.8	7.9	14.5	15.2	16.6	34.0	34.7	36.1
E	3.8	7.8	7.9	16.6	18.0	20.8	36.1	37.5	40.3

Table Notes:

1. Orig. Plan does not include 60" Gila Drain diversion pipe($1.9 mil. deduct). SRDSG2A.CST
2. Alts. A,C,D & E include $2.0 mil. pump station which is also required for Alt. B but not as part of this project.
3. The ROW cost is a 1992 estimate. Present acquisition costs may be higher. No ROW acquisition cost for Segments 1 and 2.
4. Segment 2 construction cost is shown for each of the Gila Drain channel alignment options.

Table 1 shows that the original plan without the 60" Gila Drain diversion pipe cost is still the least costly project that can be constructed. Alternate B is the least costly project for the new alignment, and is basically the original plan with an 1100-foot longer channel. There is also additional cost for excavating the deeper cuts along Pecos Road where the natural ground grade opposes the channel grade. However, the new alignment of the channel eliminates several structures that would be required along the existing Gila Drain alignment. These are the Ramp DE, Allison Road and Maricopa Road structures. This makes the net increased cost of Alternate B only $1.3 m. more than the original plan.

Alternate A is the least costly project for the "flow-through" basin alternatives. Potentially, the pump station construction could be deferred until the Santan Freeway is constructed, which would diminish the project cost by about $2.0 m. The resulting $27.7 m. total cost is $ 2.9 m. greater than present plan. This additional cost may be justified by the additional control that the flow-through basin provides, although the potential water quality benefits cannot be measured at the present time. Until the Santan Freeway is constructed, the basin could be dewatered with dry wells and perhaps a low-cost temporary dewatering pump. (Note: The Basin B excavation cost, $3.00 per CY, assumes the material will be utilized on another project within several miles of the site. If the material must be wasted and disposed of, the cost could be higher).

All of the other alternatives are more expensive without additional benefit except that Alternate E places the Gila Drain in a pipeline, which has an added benefit of being out-of-sight, and it's alignment and slope can more easily adjusted. For instance, it could be placed within a roadway alignment, and even under pavement. If it were placed in the exiting Gila Drain alignment, it would require only 30 feet (max.) of the 100-foot corridor and the exact alignment could be adjusted to follow roadway alignments.

Gila Drain Floodway. All of the alternatives evaluated have significant flood reduction benefits to the Gila Drain Floodway. Figure 2 from the ADOT/HDR "Gila Drain Floodway Master Plan " report is included to show that the present Gila Drain Alternative design will have a substantial peak flow reduction benefit at the discharge into Gila Drain Floodway. Figure 2 shows that the future 100-year peak flow with the freeway drainage system in place will reduce the 4771 cfs existing to 1852 cfs. The existing and planned future multi-celled Gila Drain Floodway out to approximately the 32nd Street alignment provides minimal additional peak flow reduction benefit. However, the floodway reduces the floodplain limits in this area from about 2000 feet wide to 600 to 800 feet wide, which is the primary benefit.

Alternates A and B have the same flood-retarding benefit as the original plan, and therefore impact the Gila Drain Floodway in the same positive manner. The remaining alternates discharge even smaller peaks to the floodway and therefore would further reduce the peak flows by 700 to 1100 cfs. The Gila Drain Master Plan Report also shows that an alternative to the multi-celled approach is a 1500-foot wide, 3 -foot deep natural channel out to 51st Avenue.

Basin 15 Basin 15 is part of the SMF/I-10 interchange which is not in ADOT's funded program and has therefore not been included in the cost estimates. However, the channel options in Segment 2 (all but Alt. E) would allow Basin 15 to be downsized and configured with a discharge channel to the Basin B outlet channel. Because Basin 15 peak outflows would arrive much earlier than the Basin B outflows, the channel size downstream of the Basin 15 confluence would be minimally effected. The basin could be downsized from 309 to about 220 acre-feet. The outlet channel would be designed for a flow of about 800 cfs. Also, the interchange on-site pump station could be used to dewater the basin to the outlet channel, which would eliminate the long 54" pipe outlet in the original plan.

Summary

Alternatives have been presented to divert Basin B outlet flows to the Gila Drain Floodway using a new alignment for the Gila Drain. A cost comparison suggests that Alternate B would be the least costly alternative. The added benefits of a flow-through basin may justify the somewhat more costly Alternate A. Alternate E is significantly more costly but a pipeline has some advantages over an open channel. All of the alternatives are configured to provide for future water quality monitoring and treatment, but the costs cannot be established for these facilities at this time. A 15 percent allowance has been included in the estimates for undefined elements of the plan, such as water quality.

Basin 15 could be downsized for any of the channel alternatives, which would lower the cost of that system. The amount of downsizing that can be accomplished would depend on the Basin B alternative that is selected.

It was observed that the extension of the Gila Drain channel out to 40th Street would require a more southwesterly alignment beyond 48th Street. Also, the natural grades suggest that it would be easier to collect the South Mountain drainage in a channel from about the 24th Street alignment eastward along Pecos Road than it would be to extend the Gila Drain channel straight westerly to 40th Street. Likely , the outlet for this collector channel could be the Gila Drain channel. The magnitude of the impact on the size of the Gila Drain channel has not been investigated in detail, but hydrology for that portion of the Gila Drain Floodway suggests that the South Mountain flows could possibly double the peak flow in the combined Gila Drain channel below the confluence. This suggests that an alternatives study much like this study would be necessary to define the best alternative for controlling South Mountain discharges.

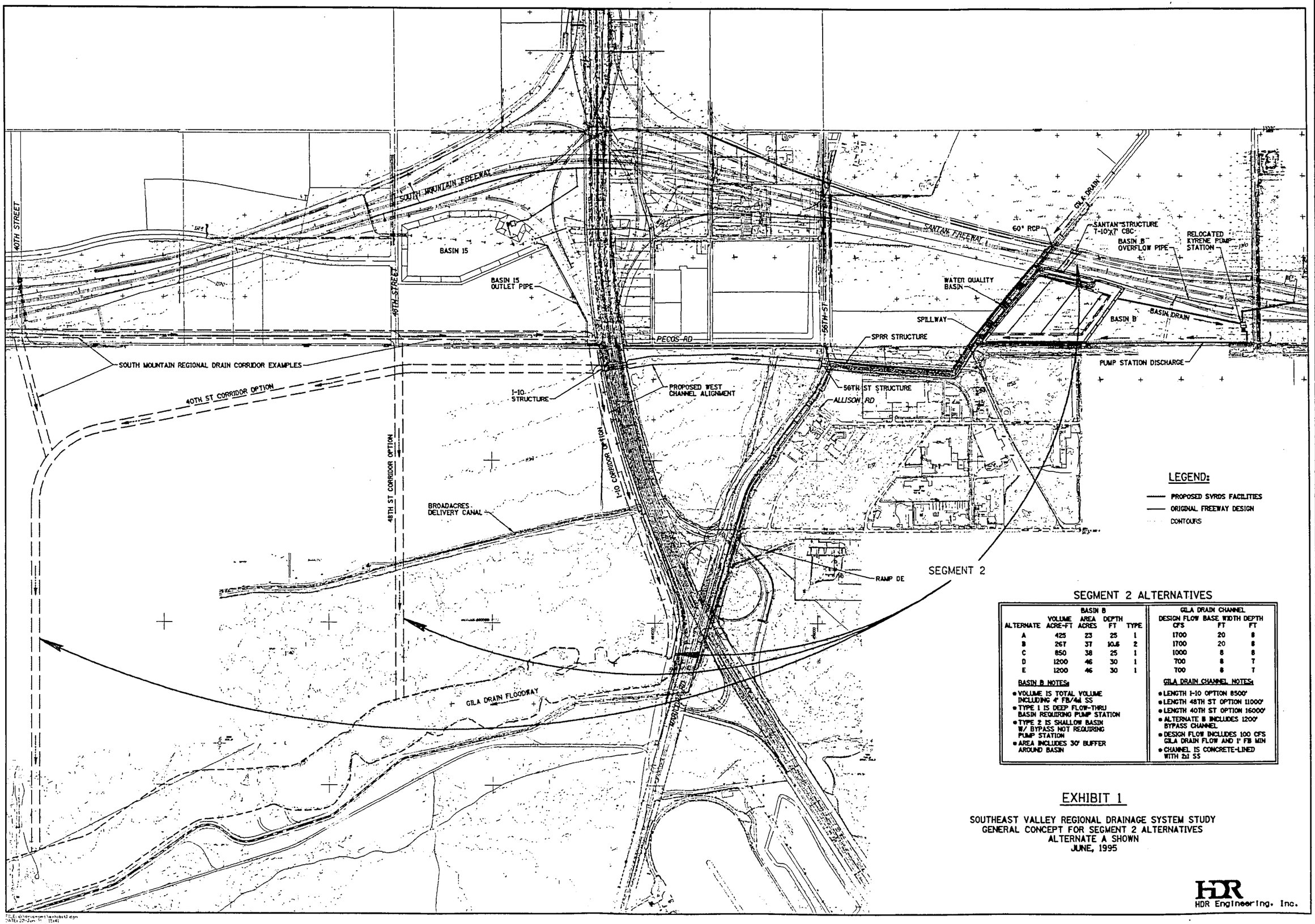
The Gila Drain Floodway is not required in the SVRDS plan. The floodway itself has minimal flood-retarding benefits. The primary benefit of the floodway is to reduce the floodplain limits by about 1200

feet, which releases this land for other purposes. It is included in the SVRDS plan because of the agreement between ADOT and GRIC.

Because the Gila Drain Floodway is already partially constructed, and because the construction of Basin B will significantly reduce flood peaks presently discharging into the floodway, the excavation schedule can be deferred until the Price and Santan Freeways are constructed. This would allow maximum opportunity for other ADOT or non-ADOT projects to use the floodway as a borrow source. The SVRDS project would benefit by not having to directly finance the excavation of the floodway at this time.

The study has shown that the Gila Drain channel can be relocated to the west side of I-10. The minimum additional cost over the present plan is about $1.3 m. The minimum construction cost in the interim would be for Alternate B with the I-10 alignment and deferring the Kyrene pump station, the Santan and Hearthstone culverts and the Price/Santan siphon until the Santan Freeway is constructed. The construction cost of this interim project is estimated to be $16.7 m. for Alternate A and $15.2 m. for Alternate B. The 48th Street and 40th Street alignments would increase the cost by approximately $1.0 m. and $3.0 m., respectively. Potentially, the Santan channel from McClintock Road to the Price/Santan TI could also be deferred until the Price Freeway is constructed for an additional deferred savings of about $1.0 m. This would also allow the Santan Freeway ROW purchase to be deferred. Finally, the Gila Drain Floodway excavation could be deferred until freeway construction to allow other projects to use it as a borrow source. The would likely reduce and perhaps entirely eliminate the $3.8 m. cost to the SVRDS project.

When all potential deferrals are taken into account, Alternate A's probable construction cost is $11.9 m. and Alternate B's is $10.4 m. The estimate includes escalation factors of 15, 12, and 10 percent for undeveloped design details, construction contingency and engineering, and design costs, respectively. The estimate allows for such additional costs as water quality features to be defined in the future. All of the alternatives include provisions to allow for easy retrofit of water quality monitoring and treatment facilities in the future.



SEGMENT 2 ALTERNATIVES

ALTERNATE	BASIN B VOLUME ACRE-FT	BASIN B AREA ACRES	BASIN B DEPTH FT	BASIN B TYPE	GILA DRAIN CHANNEL DESIGN FLOW CFS	GILA DRAIN CHANNEL BASE WIDTH FT	GILA DRAIN CHANNEL DEPTH FT
A	425	23	25	1	1700	20	8
B	267	37	10.5	2	1700	20	8
C	850	38	25	1	1000	8	8
D	1200	46	30	1	700	8	7
E	1200	46	30	1	700	8	7

BASIN B NOTES:
- VOLUME IS TOTAL VOLUME INCLUDING 4' FB/4:1 SS
- TYPE 1 IS DEEP FLOW-THRU BASIN REQUIRING PUMP STATION
- TYPE 2 IS SHALLOW BASIN W/ BYPASS NOT REQUIRING PUMP STATION
- AREA INCLUDES 30' BUFFER AROUND BASIN

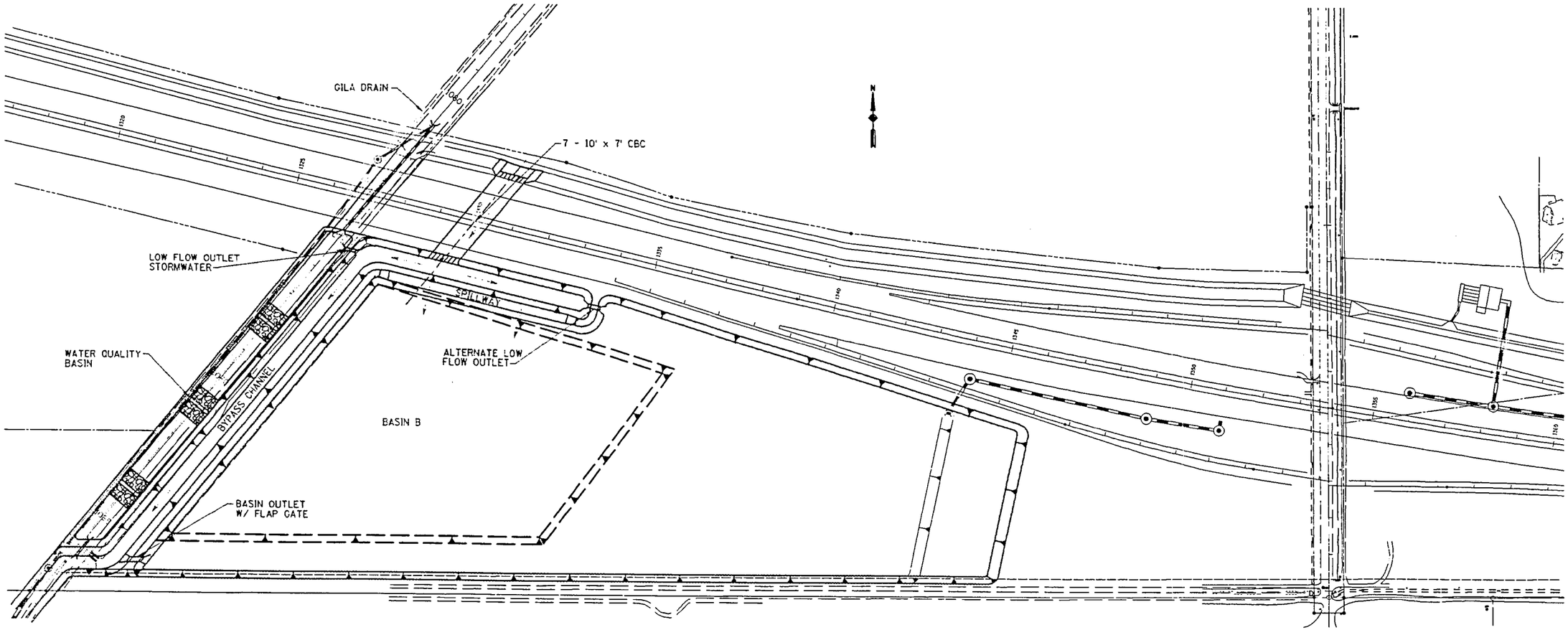
GILA DRAIN CHANNEL NOTES:
- LENGTH I-10 OPTION 8500'
- LENGTH 48TH ST OPTION 11000'
- LENGTH 40TH ST OPTION 16000'
- ALTERNATE B INCLUDES 1200' BYPASS CHANNEL
- DESIGN FLOW INCLUDES 100 CFS GILA DRAIN FLOW AND 1' FB MIN
- CHANNEL IS CONCRETE-LINED WITH 2:1 SS

EXHIBIT 1

SOUTHEAST VALLEY REGIONAL DRAINAGE SYSTEM STUDY
GENERAL CONCEPT FOR SEGMENT 2 ALTERNATIVES
ALTERNATE A SHOWN
JUNE, 1995

HDR Engineering, Inc.

FILE: d:\ervin\exhibit1.dgn
DATE: 20-Jun-95 15:41



LEGEND:

—— PROPOSED SVRDS FACILITIES

—— ORIGINAL FREEWAY DESIGN

EXHIBIT 2

SOUTHEAST VALLEY REGIONAL DRAINAGE SYSTEM STUDY
SEGMENT 2
BASIN B AND WATER QUALITY BASIN
(ALTERNATE B SHOWN)
JUNE, 1995

HDR Engineering, Inc.

FILE: d:\priceqec\exhibit2.dgn
DATE: 30-Jun-95 16:04

CLIENT: Arizona Department of Transportation PROJECT: Southeast Valley Regional Drain Study LOCATION: Price/Santan TI to Gila Drain Floodway LENGTH: 9 miles		Author JJZ Date: 6/1/95 Revised:		DESCRIPTION: Original Concept Plan		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST	SUMMARY
	Segment 1: Gila Drain Floodway Multi-celled Excavation From 44th St. to 32nd St. Alignment ASSUMED TO BE A BORROW SOURCE FOR OTHER ADOT PROJECTS					
	Major Items:					
1	Floodway excavation	1,200,000	CY	$3.20	$3,840,000	
		Subtotal A			$3,840,000	$3,840,000

HDR Engineering, Inc. SRD SEGMENT 2 COST ESTIMATE 6/30/95
SRDSEG2.CST

CLIENT: Arizona Department of Transportation				DESCRIPTION:		
PROJECT: Southeast Valley Regional Drain Study		Author JJZ		Original Concept Plan		
LOCATION: Price/Santan TI to Gila Drain Floodway						
LENGTH: 9 miles		Date: 6/1/95		Includes Ramp DE and Santan Structures		
		Rev.		not in 1992 Interim Plan		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST	SUMMARY
	Original Gila Drain Alt. Concept Includes:					
	Lined Channel from Maricopa Rd. to					
	Santan Frwy within Gila Drain Corridor.					
	Structures at Maricopa Rd., I-10,					
	Allison Rd., SPRR, Santan Frwy					
	Minor Utility Relocation as needed.					
	Rebuild pavement and tracks at crossings					
	Gila Drain in 60" Pipe					
	Major Items:					
1	Concrete Channel Lining	43,347	SY	$25	$1,083,675	
	Gila Drain Improvement, L=7395'					
2	Drainage Excavation					
	Gila Drain Improvement, L=7395'	59,500	CY	$4	$238,000	
3	Structural Excavation					
	Maricopa Road	4,091	CY	$4	$16,364	
	I-10	3,882	CY	$4	$15,528	
	Ramp DE	3,481	CY	$4	$13,924	
	Allison Rd.	1,518	CY	$4	$6,072	
	SPRR	1,518	CY	$4	$6,072	
	Santan Fwy Crossing	7,467	CY	$4	$29,868	
4	Structures					
	4-10x7 Box Culvert Maricopa Road	235	LF	$900	$211,500	
	4-10x7 Box Culvert I-10	1	LS	$200,714	$200,714	
	4-10x7 Box Culvert Ramp DE	200	LF	$900	$180,000	
	4-10x6 Box Culvert Allison Rd.	110	LF	$868	$95,480	
	4-10x6 Box Culvert SPRR	110	LF	$868	$95,480	
	7-10x7 Box Culvert Santan Freeway	280	LF	$1,500	$420,000	
	60" Gila Drain Pipe	9,230	LF	$135	$1,246,050	
5	Rebuild Pavement/Crossing(Inc. Removal)					
	Maricopa Road (AC)	667	SY	$14	$9,338	
	I-10 (AC)	1,389	SY	$14	$19,446	
	Allison Rd. (AC)	444	SY	$14	$6,216	
	SPRR	1	LS	$10,000	$10,000	
6	Utility Relocation	1	LS	$15,000	$15,000	
7	Basin B					
	Excavation	360,000	CY	$3.00	$1,080,000	
	Wier, conc. lined, L=500'	778	SY	$25	$19,450	
	36-inch Basin B (inflow and outflow)	400	LF	$68	$27,200	
		Subtotal A			$5,045,377	$5,045,377
	Allowance for Misc. Items:	(15% of Subtotal A)			$756,807	
		Subtotal B			$5,802,184	$5,802,184
	Contingency and Engineering :	(12% of Subtotal B)			$696,262	
		Est. Construction Total			$6,498,446	$6,498,446
	Right of Way : (Note: all construction on existing ROW)				$0	$0
	1 Basin B Site about 48 acres owned by ADOT					
	2 Gila Drain existing 100' ROW = about 18 acres					
		Total Cost including ROW			$6,498,446	$6,498,446
	Design	(10% of Subtotal B)			$580,218	
		TOTAL PROJECT COST				$7,078,664

CLIENT: Arizona Department of Transportation		Author JJZ		DESCRIPTION: Original 1992 Concept Plan		
PROJECT: Southeast Valley Regional Drain Study				Exc. Gila Drain NOT DIVERTED into pipe		
LOCATION: Price/Santan TI to Gila Drain Floodway		Date: 8/4/92		Includes Ramp DE and Santan Structures		
LENGTH: 9 miles		Revised:		not in 1992 Interim Plan		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST	SUMMARY
	Original Gila Drain Alt. Estimate Includes: Lined Channel from Maricopa Rd. to Santan Frwy within Gila Drain Corridor. Structures at Maricopa Rd., I-10, Allison Rd., SPRR, Santan Frwy Minor Utility Relocation as needed. Rebuild pavement and tracks at crossings Gila Drain in 60" Pipe(Deleted,this est.)					
	Major Items:					
1	Concrete Channel Lining Gila Drain Improvement, L=7395'	43,347	SY	$25	$1,083,675	
2	Drainage Excavation Gila Drain Improvement, L=7395'	59,500	CY	$4	$238,000	
3	Structural Excavation					
	Maricopa Road	4,091	CY	$4	$16,364	
	I-10	3,882	CY	$4	$15,528	
	Ramp DE	3,481	CY	$4	$13,924	
	Allison Rd.	1,518	CY	$4	$6,072	
	SPRR	1,518	CY	$4	$6,072	
	Santan Fwy Crossing	7,467	CY	$4	$29,868	
4	Structures					
	4-10x7 Box Culvert Maricopa Road	235	LF	$900	$211,500	
	4-10x7 Box Culvert I-10	1	LS	$200,714	$200,714	
	4-10x7 Box Culvert Ramp DE	200	LF	$900	$180,000	
	4-10x6 Box Culvert Allison Rd.	110	LF	$868	$95,480	
	4-10x6 Box Culvert SPRR	110	LF	$868	$95,480	
	7-10x7 Box Culvert Santan Freeway	280	LF	$1,500	$420,000	
	60" Gila Drain Pipe(Deleted)	9,230	LF	$0	$0	
5	Rebuild Pavement/Crossing(Inc. Removal)					
	Maricopa Road (AC)	667	SY	$14	$9,338	
	I-10 (AC)	1,389	SY	$14	$19,446	
	Allison Rd. (AC)	444	SY	$14	$6,216	
	SPRR	1	LS	$10,000	$10,000	
6	Utility Relocation	1	LS	$15,000	$15,000	
7	Basin B					
	Excavation	360,000	CY	$3.00	$1,080,000	
	Weir, conc. lined, L=500'	778	SY	$25	$19,450	
	36-inch RCP (Basin B inflow and outflow)	400	LF	$68	$27,200	
		Subtotal A			$3,799,327	$3,799,327
	Allowance for Misc. Items:	(15% of Subtotal A)			$569,899	
		Subtotal B			$4,369,226	$4,369,226
	Contingency and Engineering :	(12% of Subtotal B)			$524,307	
		Est. Construction Total			$4,893,533	$4,893,533
	Right of Way : (Note: all construction on existing ROW) 1 Basin B Site about 48 acres owned by ADOT 2 Gila Drain existing 100' ROW = about 18 acres				$0	$0
		Total Cost including ROW			$4,893,533	$4,893,533
	Design	(10% Of Subtotal B)			$436,923	
		TOTAL PROJECT COST				$5,330,456

HDR Engineering, Inc. SRD SEGMENT 3 COST ESTIMATE 6/30/95
SRDSEG3.CST

CLIENT: Arizona Department of Transportation			DESCRIPTION:
PROJECT: Southeast Valley Regional Drain Study	Author JJZ		Original Concept Plan
LOCATION: Price/Santan TI to Gila Drain Floodway			
LENGTH: 9 miles	Date: 6/1/95		
	Revised:		

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST	SUMMARY	
	Original Gila Drain Alt. Concept includes: Siphon and Main Channel from Price/ Santan TI to Gila Drain; Channel from 56th St. to Gila Drain; Structures at McClintock, Hearthstone, Kyrene. Not included: Small channel from I-10 TI to 56th St. and 2-54"RCP crossing at 56th						
	Major Items:						
1	Concrete Channel Lining						
	1299+80 to 1458+64	93,559	SY	$25	$2,338,975		
	1460+31 to Siphon	11,733	SY	$25	$293,325		
2	Drainage Excavation						
	1299+80 to 1458+64	191,250	CY	$4	$765,000		
	1460+31 to Siphon	47,128	CY	$4	$188,512		
3	Structural Excavation						
	Kyrene Crossing	2,350	CY	$4	$9,400		
	1458+64 to 1460+31 McClintock Crossing	2,250	CY	$4	$9,000		
	1461+15 to 1487+16 Hearthstone Box	42,833	CY	$4	$171,332		
	2-8x8 Box Culvert Inv. Siphon	4,200	CY	$4	$16,800		
4	Structures						
	4-10x7 Box Culvert Kyrene	135	LF	$900	$121,500		*
	3-8x8 Box Culvert Hearthstone & McClint.	2,570	LF	$547	$1,405,790		*
	2-8x8 Box Culvert Siphon(Price Rd.)	350	LF	$394	$137,900		*
6	Utility Relocation						
	Siphon	1	LS	$84,625	$84,625		
	Kyrene	1	LS	$36,000	$36,000		
		Subtotal A			$5,578,159	$5,578,159	
	Allowance for Misc. Items:	(15% of Subtotal A)			$836,724		
		Subtotal B			$6,414,883	$6,414,883	
	Contingency and Engineering	(12% of Subtotal B)			$769,786		
		Est. Construction Total			$7,184,669	$7,184,669	
	Right of Way :				$7,948,400	$7,948,400	
	1 ROW Hearthstone;Misc.Parcels	1	LS	$1,048,400			
	2 Country Club Dr. to Price	1	LS	$6,900,000			
		Total Const. Cost including ROW			$15,133,069	$15,133,069	
	Design	(10% of Subtotal B)			$641,488		
		TOTAL PROJECT COST				$15,774,557	

* These items could be deferred until the mainline is constructed. Total cost of deferred items with mark-ups is $2,360,000.

HDR Engineering, Inc. SRD SEGMENT 2 COST ESTIMATE*****ALTERNATE A***** 6/30/95
ALTA.CST

CLIENT:	Arizona Department of Transportation			DESCRIPTION:	
PROJECT:	Southeast Valley Regional Drain Study	Author	JJZ	Segment 2 Alternate A	
LOCATION:	Price/Santan TI to Gila Drain Floodway			Original Concept Channel (1600-1700cfs)	
LENGTH:	9 miles	Date:	6/1/95	Channel realigned to the West from 56th St.	
		Rev.		Basin B converted to flow through basin	

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST	SUMMARY	
Concept Includes:							
	Lined channel from Basin B to 56St. in existing Gila Drain corridor(2300')						
	Lined channel from 56st west to I-10 and then south to Gila Drain Floodway(6200')						
	Structures at Santan Fwy, SPRR, 56th St., and I-10						
	Gila Drain in 60" Pipe under Santan to new linear(1000'x100') water quality treatment basin						
	Kyrene Pump Station moved to Basin B site to dewater Basin B						
	Basin B deepened to 25' to provide flow through capability(Total volume 425 AF and 180' spillway)						
	Relocate utilities--allowance for 4 relocations at $15,000 per relocation						
	Rebuild pavement at I-10 and 56th St. and tracks SPRR crossing						
	Major Items:						
1	Concrete Channel Lining						
	Gila Drain Improvement, L=8500'	57,300	SY	$25	$1,432,500		
	3" Gunite Lining	18,100	SY	$18	$325,800		
2	Drainage Excavation						
	Gila Drain Improvement, L=8500'	160,000	CY	$4	$640,000		
3	Structural Excavation						
	I-10	3,882	CY	$4	$15,528		
	56 th St.	1,518	CY	$4	$6,072		
	SPRR	1,518	CY	$4	$6,072		
	Santan Fwy Crossing	7,467	CY	$4	$29,868		
4	Structures						
	4-10x7 Box Culvert I-10	1	LS	$200,714	$200,714		
	4-10x6 Box Culvert 56th St.	110	LF	$868	$95,480		
	4-10x6 Box Culvert SPRR	110	LF	$868	$95,480		
	7-10x7 Box Culvert Santan Freeway	280	LF	$1,500	$420,000	*	
	60" Gila Drain Basin B Diversion Pipe	400	LF	$135	$54,000		
5	Rebuild Pavement/Crossing(Inc. Removal)						
	I-10 (AC)	1,389	SY	$14	$19,446		
	56th St. (AC)	444	SY	$14	$6,216		
	SPRR	1	LS	$10,000	$10,000		
6	Utility Relocation	4	LS	$15,000	$60,000		
7	Basin B						
	Excavation	686,000	CY	$3.00	$2,058,000		
	Spillway, 160' Conc. Lined	250	SY	$25	$6,250		
	Pump Station (Move Kyrene on-site)	1	LS	$1,500,000	$1,500,000	*	
	36" RCP inflow and outflow piping	4,600	LF	$68	$312,800		
		Subtotal A			$7,294,226		$7,294,226
	Allowance for Misc. Items:	(15% of Subtotal A)			$1,094,134		
		Subtotal B			$8,388,360		$8,388,360
	Contingency and Engineering :	(12% of Subtotal B)			$1,006,603		
		Est. Construction Total			$9,394,963		$9,394,963
	Right of Way : (Note: all construction on existing ROW)				$0		$0
	1 Basin B Site about 46 acres owned by ADOT						
	2 Gila Drain existing 100' ROW = about 7acres						
	3 New Gila Drain 100' ROW = about 14 acres						
		Total Cost including ROW			$9,394,963		$9,394,963
	Design	(10% of Subtotal B)			$838,836		
		TOTAL PROJECT COST					$10,233,799

* Items that could be deferred until mainline is constructed. Total cost of deferred items with mark-ups is $2,720,000.

NOTES: Add approx. $1 million for 48th St. channel alignment; 2500 ft additional channel. Includes mark-ups.
Add approx. $ 3 million for 40th St. channel alignment; 7500 ft. additional channel. Includes mark-ups.

HDR Engineering, Inc. SRD SEGMENT 2 COST ESTIMATE*****ALTERNATE B***** 6/30/95
ALTB.CST

CLIENT:	Arizona Department of Transportation			DESCRIPTION:	
PROJECT:	Southeast Valley Regional Drain Study	Author	JJZ	Segment 2 Alternate B	
LOCATION:	Price/Santan TI to Gila Drain Floodway			Original Concept Channel (1600-1700cfs)	
LENGTH:	9 miles	Date:	6/1/95	Original Basin B	
		Rev.		Gila Drain and low flows to linear "Quality" basin	

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST	SUMMARY	
Concept Includes:							
	Lined channel from Basin B to 56St. in exdsting Gila Drain corridor(2300') and Bypass channel(1200')						
	Lined channel from 56st west to I-10 and then south to Gila Drain Floodway(6200')						
	Structures at Santan Fwy, SPRR, 56th St., and I-10						
	Gila Drain in 60" Pipe under Santan Fwy to linear water quality treatment basin 1000'x100' in existing Gila Drain ROW						
	Kyrene Pump Station moved to Basin B site to dewater Basin B						
	Basin B and Santan 7-10x7 Box Culvert moved 100' and 300' eastward to accommodate bypass channel						
	Relocate utilities--allowance for 4 relocations at $15,000 per relocation						
	Rebuild pavement at I-10 and 56th St. and tracks SPRR crossing						
	Major Items:						
1	Concrete Channel Lining						
	Gila Drain Improvement, L=9700'	65,400	SY	$25	$1,635,000		
	3" Gunite Lining	18,100	SY	$18	$325,800		
2	Drainage Excavation						
	Gila Drain Improvement, L=9700'	160,000	CY	$4	$640,000		
3	Structural Excavation						
	I-10	3,882	CY	$4	$15,528		
	56 th St.	1,518	CY	$4	$6,072		
	SPRR	1,518	CY	$4	$6,072		
	Santan Fwy Crossing	7,467	CY	$4	$29,868		
		0	CY	$4	$0		
4	Structures						
	4-10x7 Box Culvert I-10	1	LS	$200,714	$200,714		
	4-10x6 Box Culvert 56th St.	110	LF	$868	$95,480		
	4-10x6 Box Culvert SPRR	110	LF	$868	$95,480		
	7-10x7 Box Culvert Santan Freeway	280	LF	$1,500	$420,000	*	
	60" Gila Drain Santan crossing	400	LF	$135	$54,000		
5	Rebuild Pavement/Crossing(Inc. Removal)						
	I-10 (AC)	1,389	SY	$14	$19,446		
	56th St. (AC)	444	SY	$14	$6,216		
	SPRR	1	LS	$10,000	$10,000		
6	Utility Relocation	4	LS	$15,000	$60,000		
7	Basin B						
	Excavation	360,000	CY	$3.00	$1,080,000		
	Spillway, 160' Conc. Lined	778	SY	$25	$19,450		
	Pump Station (Move Kyrene on-site)	0	LS	$1,500,000	$0		
	36" RCP inflow and outflow piping	200	LF	$68	$13,600		
		Subtotal A			$4,732,726		$4,732,726
	Allowance for Misc. Items:	(15% of Subtotal A)			$709,909		
		Subtotal B			$5,442,635		$5,442,635
	Contingency and Engineering :	(12% of Subtotal B)			$653,116		
		Est. Construction Total			$6,095,751		$6,095,751
	Right of Way : (Note: all construction on existing ROW)				$0		$0
	1 Basin B Site about 46 acres owned by ADOT						
	2 Gila Drain existing 100' ROW = about 7acres						
	3 New Gila Drain 100' ROW = about 14 acres						
		Total Cost including ROW			$6,095,751		$6,095,751
	Design	(10% of Subtotal B)			$544,263		
		TOTAL PROJECT COST					$6,640,015

* Item can be deferred until mainline is constructed. Total cost of deferred item with mark-ups is $600,000.

HDR Engineering, Inc. SRD SEGMENT 2 COST ESTIMATE*****ALTERNATE C***** 6/30/95
ALTC.CST

CLIENT:	Arizona Department of Transportation			DESCRIPTION:		
PROJECT:	Southeast Valley Regional Drain Study	Author	JJZ	Segment 2 Alternate C		
LOCATION:	Price/Santan TI to Gila Drain Floodway			Smaller Channel (1000cfs)		
LENGTH:	9 miles	Date:	6/1/95	Channel realigned to the West from 56th St.		
		Rev.		Basin B converted to flow through basin		

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST	SUMMARY
Concept Includes:						
	Lined channel from Basin B to 56St. in existing Gila Drain corridor(2300')					
	Lined channel from 56st west to I-10 and then south to Gila Drain Floodway(6200')					
	Structures at Santan Fwy, SPRR, 56th St., and I-10					
	Gila Drain in 60" Pipe under Santan into new linear water quality treatment basin					
	Kyrene Pump Station moved to Basin B site to dewater Basin B					
	Basin B deepened to provide flow through capability(Total volume 850 AF and 100' spillway)					
	Relocate utilities--allowance for 4 relocations at $15,000 per relocation					
	Rebuild pavement at I-10 and 56th St. and tracks SPRR crossing					
	Major Items:					
1	Concrete Channel Lining					
	Gila Drain Improvement, L=8500'	45,300	SY	$25	$1,132,500	
	3" Gunite Lining	18,100	SY	$18	$325,800	
2	Drainage Excavation					
	Gila Drain Improvement, L=8500'	126,800	CY	$4	$507,200	
3	Structural Excavation					
	I-10	3,882	CY	$4	$15,528	
	56 th St.	1,518	CY	$4	$6,072	
	SPRR	1,518	CY	$4	$6,072	
	Santan Fwy Crossing	7,467	CY	$4	$29,868	
4	Structures					
	4-10x7 Box Culvert I-10	1	LS	$200,714	$200,714	
	4-10x6 Box Culvert 56th St.	110	LF	$868	$95,480	
	4-10x6 Box Culvert SPRR	110	LF	$868	$95,480	
	7-10x7 Box Culvert Santan Freeway	280	LF	$1,500	$420,000	*
	60" Gila Drain Basin B Diversion Pipe	400	LF	$135	$54,000	
5	Rebuild Pavement/Crossing(Inc. Removal)					
	I-10 (AC)	1,389	SY	$14	$19,446	
	56th St. (AC)	444	SY	$14	$6,216	
	SPRR	1	LS	$10,000	$10,000	
6	Utility Relocation	4	LS	$15,000	$60,000	
7	Basin B					
	Excavation	1,370,000	CY	$3.00	$4,110,000	
	Spillway, 100' Conc. Lined	160	SY	$25	$4,000	
	Pump Station (Move Kyrene on-site)	1	LS	$1,500,000	$1,500,000	*
	36" RCP inflow and outflow piping	4,600	LF	$68	$312,800	
		Subtotal A			$8,911,176	$8,911,176
	Allowance for Misc. Items:	(15% of Subtotal A)			$1,336,676	
		Subtotal B			$10,247,852	$10,247,852
	Contingency and Engineering :	(12% of Subtotal B)			$1,229,742	
		Est. Construction Total			$11,477,595	$11,477,595
	Right of Way : (Note: all construction on existing ROW)				$0	$0
	1 Basin B Site about 46 acres owned by ADOT					
	2 Gila Drain existing 100' ROW = about 7acres					
	3 New Gila Drain 100' ROW = about 14 acres					
		Total Cost including ROW			$11,477,595	$11,477,595
	Design	(10% of Subtotal B)			$1,024,785	
		TOTAL PROJECT COST				$12,502,380

* Items could be deferred until mainline constructed. Total cost with mark-ups is $2,720,000.

NOTES: Add about $0.8 million for 48th St. alignment, including mark-ups.
Add about $2.4 million for 48th St. alignment, including mark-ups.

CLIENT:	Arizona Department of Transportation			DESCRIPTION:		
PROJECT:	Southeast Valley Regional Drain Study	Author	JJZ	Segment 2 Alternate D		
LOCATION:	Price/Santan TI to Gila Drain Floodway			Basin B maximized(1200 af)		
LENGTH:	9 miles	Date:	6/1/95	Channel realigned to the West from 56th St.		
		Rev.		Alt. D is channel option		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST	SUMMARY
Concept Includes:						
	Lined channel from Basin B to 56St. in existing Gila Drain corridor(2300')					
	Lined channel from 56st west to I-10 and then south to Gila Drain Floodway(6200')					
	Structures at Santan Fwy, SPRR, 56th St., and I-10					
	Gila Drain in 60" Pipe under Santan to new linear water quality treatment channel(1000'x100') in existing Gila Drain ROW					
	Kyrene Pump Station moved to Basin B site to dewater Basin B					
	Basin B deepened to provide flow through capability(Total volume 1200 AF and no spillway)					
	Relocate utilities--allowance for 4 relocations at $15,000 per relocation					
	Rebuild pavement at I-10, 56th St. and SPRR crossing					
	Major Items:					
1	Concrete Channel Lining					
	Gila Drain Improvement, L=8500'	39,700	SY	$25	$992,500	
	3" Gunite Lining	18,100	SY	$18	$325,800	
2	Drainage Excavation					
	Gila Drain Improvement, L=8500'	87,400	CY	$4	$349,600	
3	Structural Excavation					
	I-10	3,882	CY	$4	$15,528	
	56 th St.	1,518	CY	$4	$6,072	
	SPRR	1,518	CY	$4	$6,072	
	Santan Fwy Crossing	7,467	CY	$4	$29,868	
4	Structures					
	4-10x7 Box Culvert I-10	1	LS	$200,714	$200,714	
	4-10x6 Box Culvert 56th St.	110	LF	$868	$95,480	
	4-10x6 Box Culvert SPRR	110	LF	$868	$95,480	
	7-10x7 Box Culvert Santan Freeway	280	LF	$1,500	$420,000	*
	60" Gila Drain Basin B Diversion Pipe	400	LF	$135	$54,000	
5	Rebuild Pavement/Crossing(Inc. Removal)					
	I-10 (AC)	1,389	SY	$14	$19,446	
	56th St. (AC)	444	SY	$14	$6,216	
	SPRR	1	LS	$10,000	$10,000	
6	Utility Relocation	4	LS	$15,000	$60,000	
7	Basin B					
	Excavation	1,936,000	CY	$3.00	$5,808,000	
	Spillway, not required	0	SY	$25	$0	
	Pump Station (Move Kyrene on-site)	1	LS	$1,500,000	$1,500,000	*
	36" RCP Inflow and outflow piping	4,600	LF	$68	$312,800	
		Subtotal A			$10,307,576	$10,307,576
	Allowance for Misc. Items:	(15% of Subtotal A)			$1,546,136	
		Subtotal B			$11,853,712	$11,853,712
	Contingency and Engineering :	(12% of Subtotal B)			$1,422,445	
		Est. Construction Total			$13,276,158	$13,276,158
	Right of Way : (Note: all construction on existing ROW)				$0	$0
	1 Basin B Site about 46 acres owned by ADOT					
	2 Gila Drain existing 100' ROW = about 7acres					
	3 New Gila Drain 100' ROW = about 14 acres					
		Total Cost including ROW			$13,276,158	$13,276,158
	Design	(10% of Subtotal B)			$1,185,371	
		TOTAL PROJECT COST				$14,461,529

* Items could be deferred until mainline is constructed. Total cost including mark-ups is $2,720,000

NOTES: Add approximately $0.7 million for 48th St. alignment including mark-ups.
Add approximately $2.1 million for 40th St. alignment including mark-ups.

HDR Engineering, Inc. SRD SEGMENT 2 COST ESTIMATE*****ALTERNATE E***** 6/30/95
ALTE.CST

CLIENT:	Arizona Department of Transportation			DESCRIPTION:	
PROJECT:	Southeast Valley Regional Drain Study	Author	JJZ	Segment 2 Alternate E	
LOCATION:	Price/Santan TI to Gila Drain Floodway			Basin B maximized(1200 af)	
LENGTH:	9 miles	Date:	6/1/95	Outlet Pipe realigned to the West from 56th St.	
		Rev.		Alt E is pipe option	

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST	SUMMARY
Concept Includes:	120" Pipe from Basin B to 56th St.					
	120" Pipe from 56 St.to Gila Drain Flooday(Flexible alignment; only 30" ROW)					
	No Structures at Santan Fwy, SPRR, 56th St., and I-10					
	Gila Drain in 60" Pipe under Santan to new water quality treatment basin					
	Kyrene Pump Station moved to Basin B site to dewater Basin B					
	Basin B deepened to provide flow through capability(Total volume1200 AF and no spillway)					
	Relocate utilities--allowance for 4 relocations at $15,000 per relocation					
	Pipe jacked under I-10, 56th St. and SPRR tracks)					
	Major Items:					
1	Underground Pipe Option					
	Gila Drain Improvement, 120" Pipe L=8500'	8,500	LF	$400	$3,400,000	
	3" Gunite Lining	0	SY	$18	$0	
2	Drainage Excavation					
	Gila Drain Improvement, 120" Pipe L=8500'	0	CY	$4	$0	
	(Inc. in Pipe Cost)					
3	Structural Excavation					
	I-10(Allowance for tunnel construction)	240	LF	$800	$192,000	
	56 th St.(Allowance for jacking)	40	LF	$800	$32,000	
	SPRR(Allowance for jacking)	40	LF	$800	$32,000	
	Santan Fwy Crossing	7,467	CY	$4	$29,868	
4	Structures					
	4-10x7 Box Culvert I-10	0	LS	$200,714	$0	
	4-10x6 Box Culvert 56th St.	0	LF	$868	$0	
	4-10x6 Box Culvert SPRR	0	LF	$868	$0	
	7-10x7 Box Culvert Santan Freeway	280	LF	$1,500	$420,000	*
	60" Gila Drain Basin B Diversion Pipe	400	LF	$135	$54,000	
5	Rebuild Pavement/Crossing(Inc. Removal)					
	I-10 (AC)	0	SY	$14	$0	
	56th St. (AC)	0	SY	$14	$0	
	SPRR	0	LS	$10,000	$0	
6	Utility Relocation	4	LS	$15,000	$60,000	
7	Basin B					
	Excavation	1,936,000	CY	$3.00	$5,808,000	
	Spillway, not required	0	SY	$25	$0	
	Pump Station (Move Kyrene on-site)	1	LS	$1,500,000	$1,500,000	*
	36" RCP inflow and outflow piping	4,600	LF	$68	$312,800	
		Subtotal A			$11,840,668	$11,840,668
	Allowance for Misc. Items:	(15% of Subtotal A)			$1,776,100	
		Subtotal B			$13,616,768	$13,616,768
	Contingency and Engineering :	(12% of Subtotal B)			$1,634,012	
		Est. Construction Total			$15,250,780	$15,250,780
	Right of Way : (Note: all construction on existing ROW)				$0	$0
	1 Basin B Site about 46 acres owned by ADOT					
	2 Requires only 30' of 100' existing ROW to 56th St.(1.6 acres underground)					
	Requires only 30' ROW(4.3 acres) Alignment very flexible					
		Total Cost including ROW			$15,250,780	$15,250,780
	Design	(10% of Subtotal B)			$1,361,677	
		TOTAL PROJECT COST				$16,612,457

* Items could be deferred until mainline constructed. Total cost $2,720,000 including mark-ups.

NOTES: Add approximately $1.4 million for 48 th St. alignment including mark-ups.
Add approximately $4.2 million for 40 th St. alignment including mark-ups.

HDR Engineering, Inc. SRD BASIN 15 COST ESTIMATE 6/30/95
SRDBAS15.CST

CLIENT: Arizona Department of Transportation PROJECT: Southeast Valley Regional Drain Study LOCATION: Price/Santan TI to Gila Drain Floodway LENGTH: 9 miles		Author JJZ Date: 8/4/92 Revised:		DESCRIPTION: Original Concept Plan Cost Basin 15 and outlet works		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST	SUMMARY
	Basin 15 and 54" Outlet Pipe to Gila Drain Floodway–Original Concept Plan Not Included: SMF Channel and Cross Culvert Inlet to Basin					
	Major Items:					
1	Basin 15 Basin Excavation	831,200	CY	$3	$2,493,600	
2	Basin 15 Gravity Drain (54")	6,230	LF	$100	$623,000	
		Subtotal A			$3,116,600	$3,116,600
	Allowance for Misc. Items:	(15% of Subtotal A)			$467,490	
		Subtotal B			$3,584,090	$3,584,090
	Contingency and Engineering :	(12% of Subtotal B)			$430,091	
		Est. Construction Total			$4,014,181	$4,014,181
	Right of Way : Basin 15 (27 acres)				$0	
		Total Cost including ROW			$4,014,181	$4,014,181
	Design	(10% Of Subtotal B)			$358,409	
		TOTAL PROJECT COST				$4,372,590

GILA DRAIN FLOODWAY
DISCHARGE LOCATION MAP

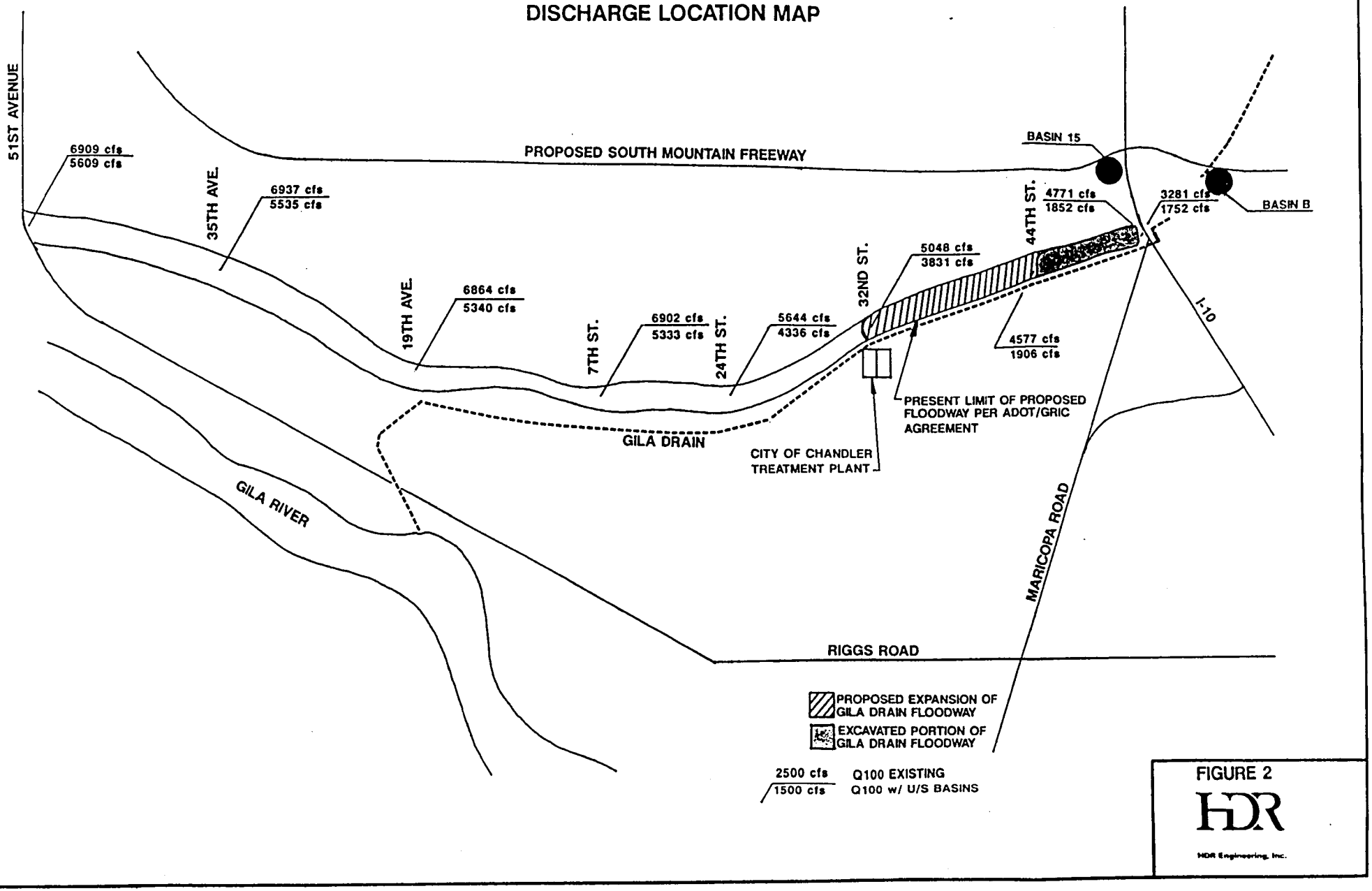
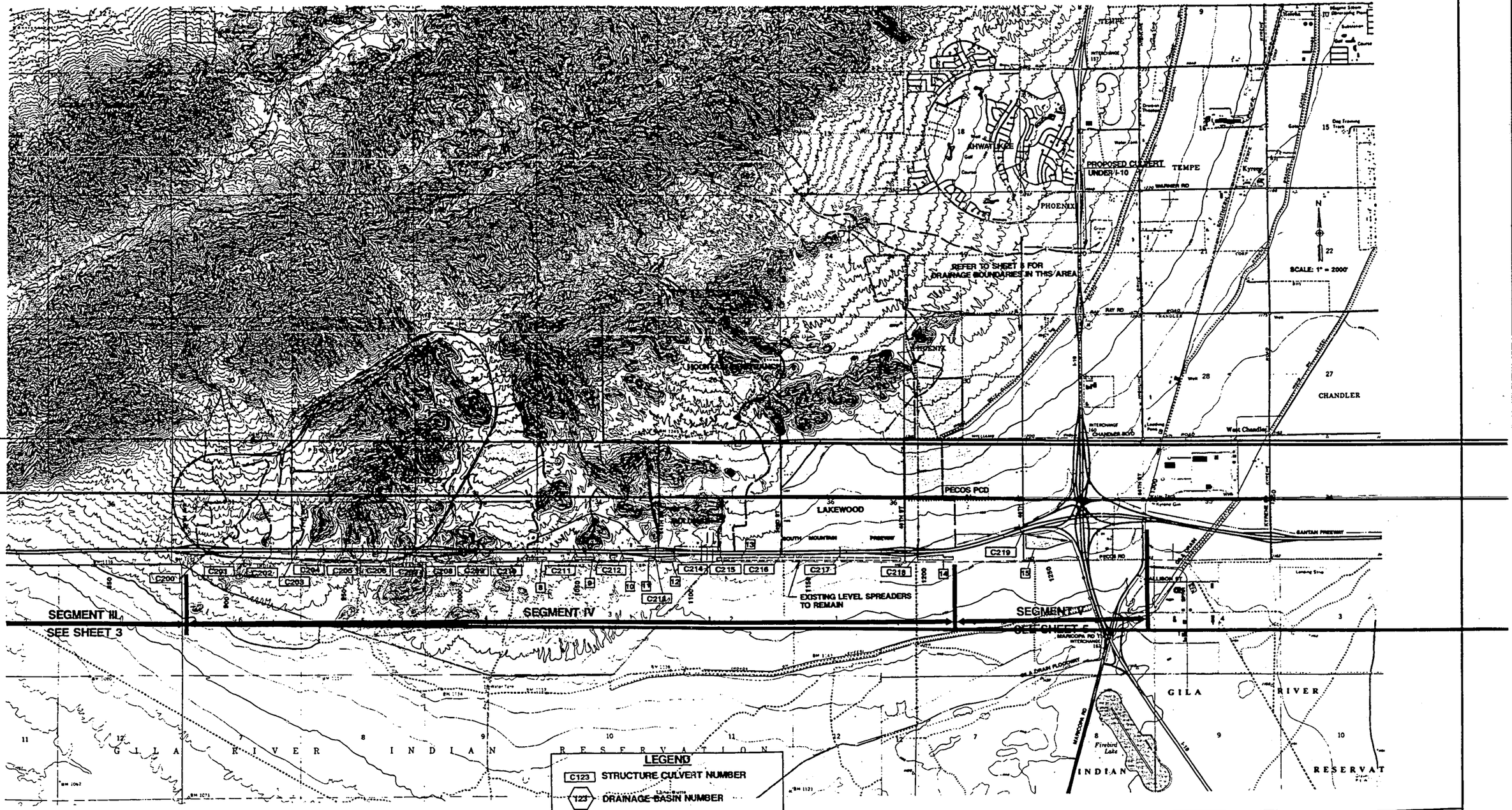


FIGURE 2

HDR

HDR Engineering, Inc.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				



LEGEND

- C123 — STRUCTURE CULVERT NUMBER
- 123 — DRAINAGE BASIN NUMBER
- 2 — DETENTION/LEVEL SPREADER CELL
- DRAINAGE BASIN BOUNDARY
- DITCH/CHANNEL

	NAME	DATE
DESIGN	SMC & ETL	4-92
DRAWN	JDM	5-92
CHECKED		

HDR Engineering, Inc.

ROUTE | MILEPOST

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202-SO. MOUNTAIN FREEWAY

SEGMENT IV
DRAINAGE AREA MAP

LOCATION
19TH AVENUE TO 56TH STREET

DWG NO. | OF

TRACS NO. H-2222-01D

4 OF 5

*****NON-SPECIFICATION*****
*****SYSTEM*****
VIEW NAME: