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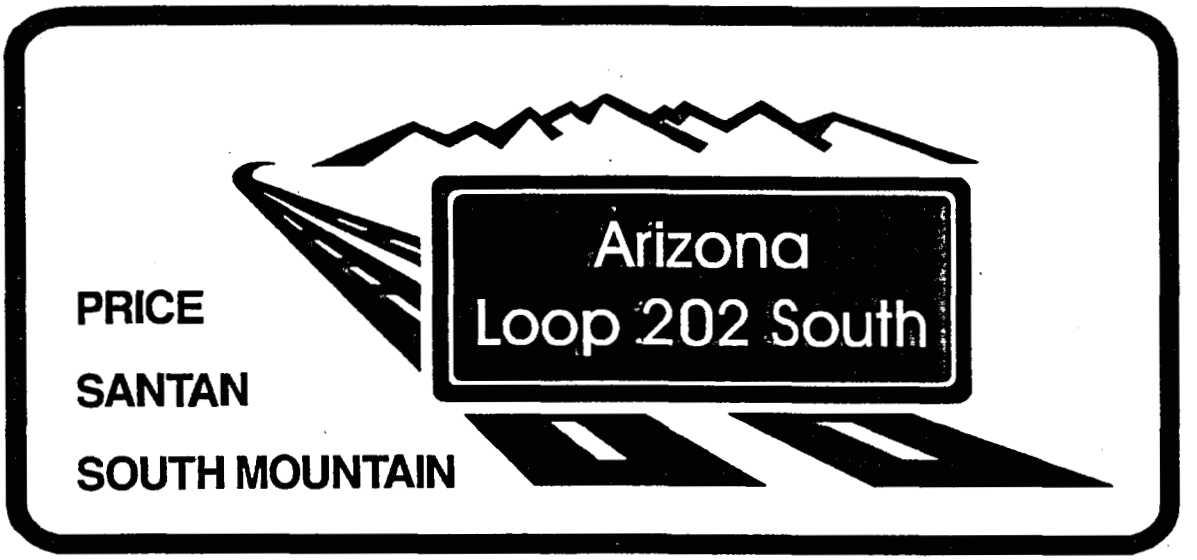

CONCEPT DRAINAGE REPORT
SANTAN FREEWAY - PRICE RD. TO GILBERT RD.
and
Preliminary Drainage Concepts
Santan Freeway - Gilbert Road to Baseline Road

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Prepared for:
Arizona Department of Transportation

Prepared by:
HDR Engineering, Inc.
Phoenix, Arizona

June 1995

SANTAN FREEWAY

DOBSON ROAD TO GILBERT ROAD

CONCEPT DRAINAGE REPORT

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SECTION 1

INTRODUCTION

1.1 Project Description

This report covers the drainage concept plans for a portion of the Santan Freeway from Price Road to Gilbert Road. The drainage plans are part of the General Plan development for this portion of the freeway that was developed in Phase V of the Price Expressway (now Freeway) GEC agreement with the Arizona Department of Transportation (ADOT) . On-site drainage plans are presented in Section 3 and off-site plans in Section 4 of the report.

In addition, preliminary drainage concepts are included for the remaining portion of the Santan Freeway from Gilbert Road to Baseline Road near the interchange with US 60. These concepts are not fully-developed conceptual plans but indicate design discharges and preliminary size and location of channels, culverts and detention basins. Phase V did not include general plan development east of Gilbert Road. However, the drainage activities in Phase V included developing the offsite hydrology (HEC-1) models for all of the Santan Freeway which was reported in "Hydrology Study for Santan Freeway and Reanalysis of Price Freeway Hydrology," (December, 1994). Using the revised hydrology, which conforms to ADOT's new criteria adopted in 1993, HDR updated the original drainage concepts which were developed by Dames and Moore in 1988. These are presented in Section 5.

SECTION 2

DRAINAGE AREA AND HYDROLOGY

2.1 Previous Reports

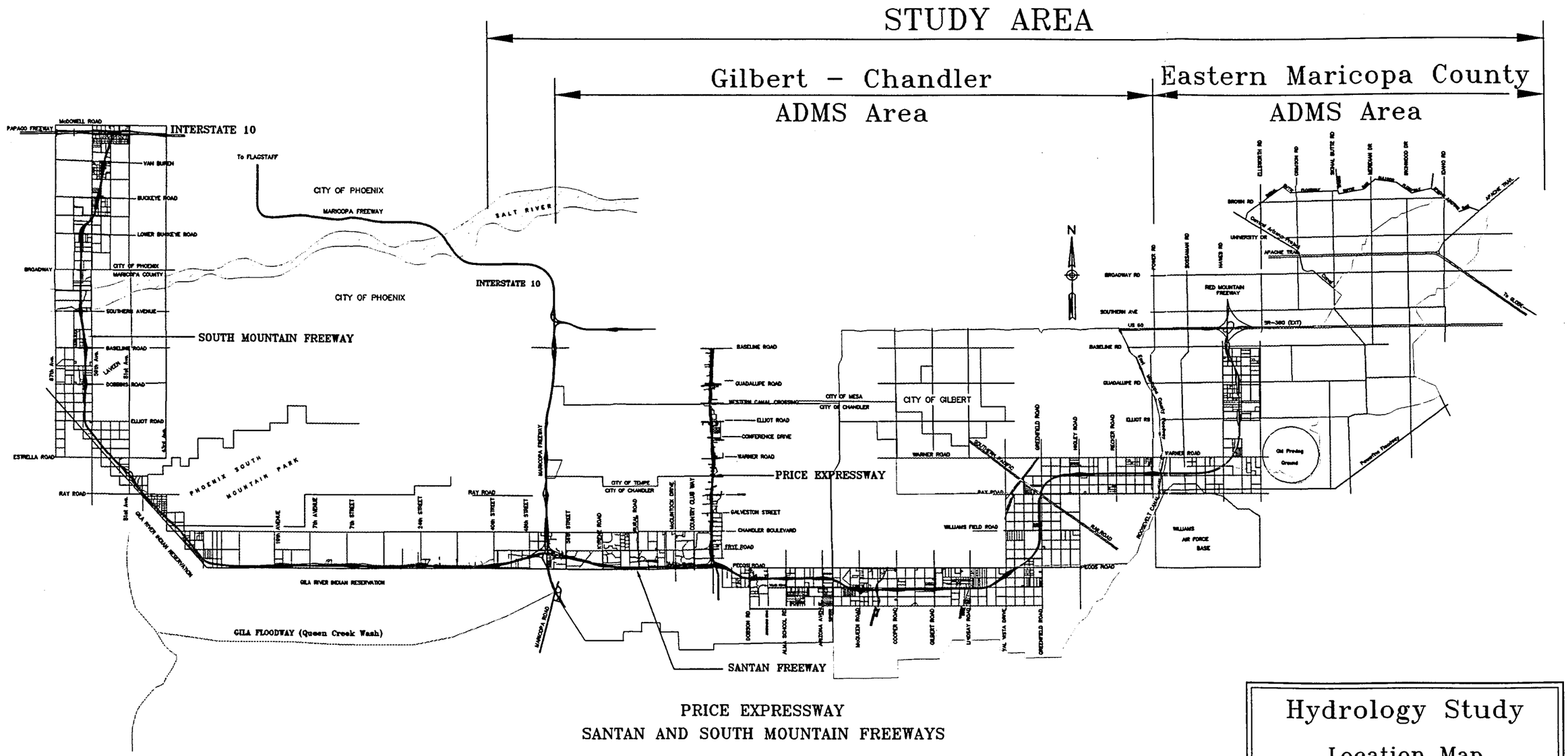
The drainage area and hydrology were previously described in the HDR report entitled "Hydrology Study for Santan Freeway and Reanalysis of Price Freeway Hydrology," (December, 1994). A brief summary of results of that report is presented in this report. For details, the original report should be obtained. The hydrology for two large drainage areas was developed in that study as shown in Figure 1. The first was the Gilbert-Chandler ADMS area, which is so-named because the hydrologic model structure was adapted from a model developed by the Flood Control District of Maricopa County(FCDMC) in 1993 and 1994. The second was a new model developed in an area that is identified by the FCDMC as the Eastern Maricopa County ADMS area.

2.2 Gilbert-Chandler ADMS Model

The ADOT version of the Gilbert-Chandler ADMS model flow-routing is shown in Figure 2. The model is divided into three subareas that total approximately 123 square miles. The model structure is nearly identical FCDMC's model in that the flows are routed with the same assumptions regarding flow splits at intersections between arterial streets, railroad embankments, and canals. Most FCDMC routing parameters such as flow length and slope and Green-Ampt loss-rate parameters were adopted in the ADOT model. The two models differ in the distribution of rainfall and in the unit hydrograph methodology. ADOT's precipitation model is based upon the use of the default "balanced storm" distribution and rainfall reductions in the HEC-1 Flood Hydrograph Package. Comparisons are given in the aforementioned report. Each of the three subareas constitutes a very large and complicated model in itself. For this reason the model results are not included in this report. The design flows and other model results that directly impact the design of Santan Freeway drainage facilities are reported in subsequent chapters of this report.

2.3 Eastern Maricopa County ADMS Model

The ADOT version of the FCDMC's model is shown in Figure 3. Unlike the Gilbert-Chandler model, HDR developed a substantially new model for this area. The existing FCDMC model for this area conformed neither to ADOT's new hydrology standards adopted in 1993 nor to FCDMC's own new hydrology standards adopted in 1992. Furthermore, the structure of the original model was not conducive to calculating hydrographs at the required design points along the Santan Freeway. The ADOT model is developed for the 33 square miles that are tributary to the planned freeway corridor. Details of this model are in the December, 1994 report. Design flows and approximate locations of culverts and channels are included in this report.



PRICE EXPRESSWAY
SANTAN AND SOUTH MOUNTAIN FREEWAYS

Hydrology Study

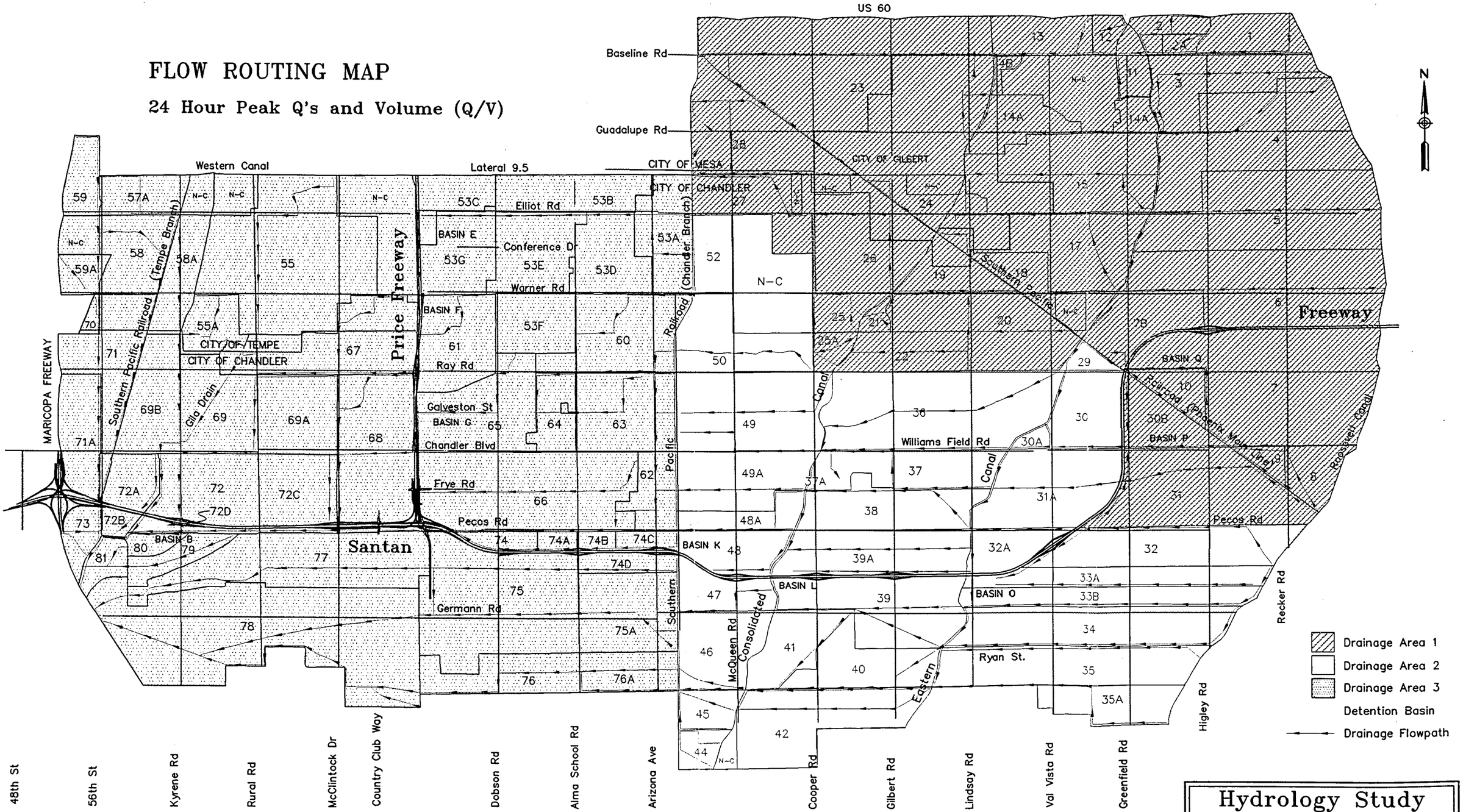
Location Map

Figure 1

HDR

FLOW ROUTING MAP

24 Hour Peak Q's and Volume (Q/V)



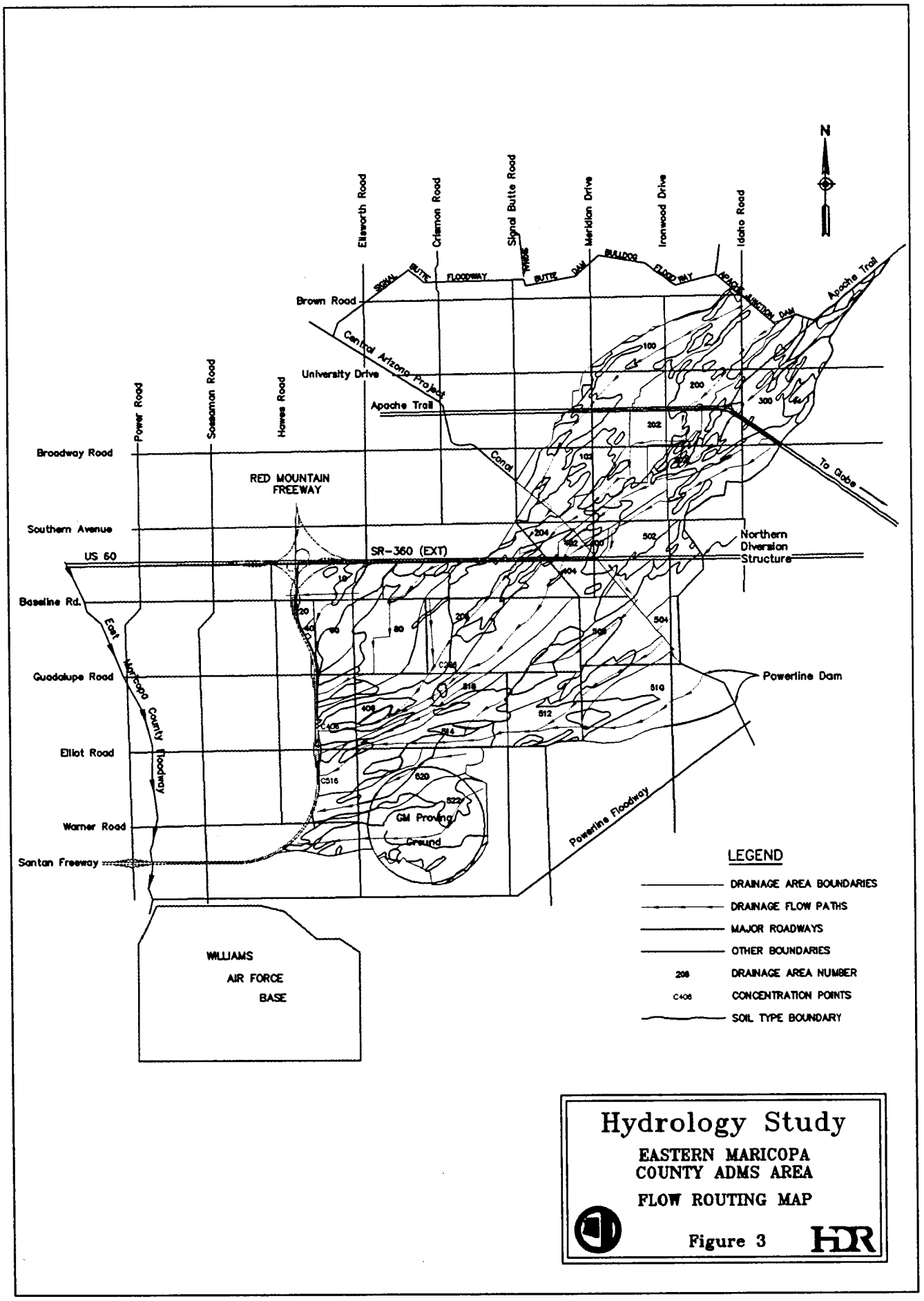
Hydrology Study

Gilbert – Chandler
ADMS Area

FLOW ROUTING MAP

Figure 2

HDR



Hydrology Study

EASTERN MARICOPA COUNTY ADMS AREA

FLOW ROUTING MAP

Figure 3

HDR

SECTION 3

ON-SITE DRAINAGE PLAN (Price Road to Gilbert Road)

3.1 General Description

The on-site drainage system consists of a series of large diameter storm sewers that collect and concentrate runoff from the mainline roadway section. At low points in the depressed freeway sections, on-site pump stations will pump the ponded storm water into the channels on the north side of the Santan Freeway. The channels are part of the off-site collection system discussed in Section 4.

In this segment the mainline profile passes under Dobson, Alma School, McQueen, Cooper and Gilbert Road crossings and over Arizona Avenue, the Southern Pacific Railroad, and the Consolidated Canal. There are three storm sewer collection systems under the mainline profile that drain the depressed freeway segments to low points at Dobson, McQueen and Cooper Roads. Pump stations are located at each of these intersection low points which discharge to the off-site channel collection system running east to west along the north side of the freeway. The off-site collection system conveys combined off-site and on-site storm water to the Price/Santan Interchange where it discharges to an inverted siphon. The siphon is part of the Price Freeway drainage system previously designed to a concept level by HDR. ("Gila Drain Alternative Concept Drainage Report," February, 1993).

The pump stations are identical 200 cfs capacity pump stations designed in accordance with ADOT's pump station design criteria developed by HDR for the Price and Santan Freeway pump stations in 1991. ("Storm Water Pump Station Design Documents," Vols. I, II, and III, 1991). In general, the five pump stations for the original Price and Santan drainage systems in the "Gila Drain Alternative" report are also identical stations with a peak capacity of 200 cfs. The difference in peak inflows is buffered by varying lengths of 96-inch diameter storage pipes placed upstream of the pump station intake and in the same location as the on-site storm sewers.

3.2 Drainage Criteria and Assumptions

The conceptual design of on-site drainage systems was performed using guidelines of the ADOT Urban Highways Design Procedures Manual (DPM), 1990 and the Highway Drainage Design Manual, Hydrology, March, 1993. Runoff collected by the on-site system is generated only within the project's right-of-way. As a result, the drainage areas are small and the rational method (Q=CIA) was used to compute peak runoff flows. The Hydrology Manual recommends its use be limited to watersheds not larger than 160 acres.

The rational method requires three types of data for peak discharge computation. They are the runoff coefficient, C, which represents the ratio of runoff to rainfall; the rainfall intensity (I) which is the intensity of rainfall, in inches per hour, for a storm duration equal to time of concentration and; the drainage area (A) in acres.

For the on-site analysis two principal values of C were applied:

Paved Surfaces	0.95
Highway Slopes (decomposed granite with 3:1 slope)	0.70

The maximum C value of 0.70 for highway slopes was applied universally to all nonpaved areas within the project.

The rainfall intensity was determined using the standard ADOT method. A 50-year return period, one hour precipitation depth of 2.2 inches was derived from precipitation maps and procedures in Chapter 1 of the ADOT Hydrology Manual. Intensity values were selected from Figure 2-2 I-D-F graph for Zone 8 for a storm duration equal to the drainage area time of concentration (Tc). Due to the typically small drainage areas the estimated time of concentration rarely exceeded the minimum recommended value of 10 minutes as shown in Table 1. The Tc formula in Table 1 is Equation 2-2 from the Hydrology Manual.

On-site drainage areas are a function of the rolling profile of the depressed freeway sections, prevalent throughout this alignment. Vertical curve crest points set upper boundary limits and curve sag points are the concentration points. The major areas were then subdivided as needed to assist in developing the design of the major storm drain trunk lines. The drainage areas were estimated and are subject to adjustment during the final design process.

As directed in the DPM, the design frequency selected for use on on-site areas of depressed roadway is 50 years. Most sections of the Price/Santan alignments are depressed. Those portions not depressed and not directly contributing to a depressed concentration point, including bridge crossings, would normally be analyzed for the 10-year frequency storm by the section designer. The concept design is limited to the mainline collection system and does not include details such as catch basins and cross-street drainage that would likely to be designed for the 10-year storm.

The mainline (on-site) storm drain pipes for this segment are designed for the 50-year peak flow. Where 100-year off-site flows combine with 50-year on-site flows, such as where pump stations discharge to the off-site collector channels, the off-site flow peaks are usually larger and occur much later than the on-site peaks. Therefore, channels are generally designed for the 100-year off-site peak flows, and 50-year on-site peak flows are disregarded. This assumption should be verified in final design.

3.3 Storm Drain System Design

On-site gravity storm drains collect runoff from the ramps and mainline areas. This closed conduit system will intercept surface runoff via a network of catch basins and lateral connector pipes, conveying and concentrating most of the on-site runoff to three mainline sag locations at Dobson McQueen and Cooper Roads.

Because of the depressed configuration of the mainline profile, the sag points have no positive gravity outfall and on-site storm water pump stations are required at these locations.

The on-site storm sewer design data is given in Table 2. Drainage Concept Plans DR-80 though DR-93 are included in Appendix 1 and in the master plan set. The 50-year peak inflows at the three locations range from 274 cfs at Dobson Road to 315 cfs at Cooper Road. By using 96-inch underground storage pipes, the peak design inflow to each pump station will be reduced to approximately the same value of 200 cfs. The inflow hydrographs for the storage volume calculations were developed using HEC-1 models. Program print-outs are included in Appendix 2. The total base pump station is capacity is 222 cfs, which consists of 4-50 cfs engine driven pumps and a 22 cfs electric submersible low-flow pump.

The storm drain facilities discussed here and shown on the drainage plans represent only the major drainage structures. The overall collection system was conceptualized in order to obtain reasonable drainage boundaries, times of concentration and other input parameters necessary to the analysis. It should be noted that the storm drain trunk lines analyzed and shown in plan depict an average pipe size for the reach in which they are located. These sizes should be reanalyzed and refined during the detail design process.

Table 1

SANTAN FREEWAY
PRICE ROAD TO GILBERT ROAD
ON-SITE STORM SEWER DESIGN
RUNOFF CALCULATION SHEET
FREQUENCY = 50 YEARS

Formula: Tc = 11.4*L^0.5*Kb^0.52*S^-0.31*i^-0.38
Kb = 0.04 for L < 1,000 ft.
Kb = 0.025 for L > 1,000 ft.

DRAINAGE AREA NUMBER	STATION FROM	STATION TO	AREA (ACRES)	PAVEMENT C	PAVEMENT A	PAVEMENT CA	3:1 DG C	3:1 DG A	3:1 DG CA	SUM CA	Tc (MIN)	I (IN/HR)	Q (CFS)	LENGTH FT (L)	WATERSHED RESISTANCE COEFFICIENT (Kb)	Slope Ft/Ft value	Slope Ft/Mile (S)	I/hr (i)	CALC. (Tc)
DOBSON ROAD to ALMA SCHOOL ROAD																			
D 101A	1555+00	1562+00	5.62	0.95	2.22	2.11	0.70	3.41	2.38	4.49	10.00	6.30	28.30	700	0.040	0.00908	47.9424	6.3	6.99
D 100	1562+00	1571+50	7.63	0.95	3.01	2.86	0.70	4.62	3.24	6.10	10.00	6.30	38.40	950	0.040	0.00910	48.048	6.3	8.14
D 101	1571+50	1579+00	7.32	0.95	3.70	3.52	0.70	3.61	2.53	6.05	10.00	6.30	38.10	750	0.040	0.00541	28.5648	6.3	8.50
D 102	1579+00	1589+00	7.23	0.95	4.42	4.20	0.70	2.81	1.97	6.17	10.00	6.30	38.85	1,000	0.025	0.00541	28.5648	6.3	7.68
D 103	1589+00	1600+00	6.31	0.95	3.48	3.31	0.70	2.83	1.98	5.29	10.00	6.30	33.33	1,100	0.025	0.00541	28.5648	6.3	8.06
D 104	1600+00	1612+00	8.26	0.95	5.67	5.39	0.70	2.59	1.81	7.20	10.00	6.30	45.38	1,200	0.025	0.00541	28.5648	6.3	8.42
	Totals:	5,700 LF	42.38		22.51			19.88		35.30				5,700					
ALMA SCHOOL ROAD to SPRR																			
D 105	1612+00	1623+50	10.56	0.95	5.28	5.02	0.70	5.28	3.69	8.71	10.00	6.30	54.89	1,150	0.025	0.00396	20.9088	6.3	9.08
D 106	1623+50	1634+00	9.64	0.95	4.97	4.72	0.70	4.68	3.27	7.99	10.00	6.30	50.34	1,050	0.025	0.00706	37.2768	6.3	7.25
D 107	1634+00	1644+00	6.89	0.95	4.10	3.90	0.70	2.78	1.95	5.85	10.00	6.30	36.84	1,000	0.025	0.00706	37.2768	6.3	7.08
D 108	1644+00	1655+50	7.92	0.95	3.64	3.46	0.70	4.28	2.99	6.45	10.00	6.30	40.67	1,150	0.025	0.00706	37.2768	6.3	7.59
D 109	1655+50	1666+00	8.44	0.95	4.61	4.38	0.70	3.82	2.68	7.06	10.00	6.30	44.47	1,050	0.025	0.00706	37.2768	6.3	7.25
D 110	1666+00	1674+00	12.86	0.95	3.86	3.67	0.70	8.99	6.30	9.96	10.00	6.30	62.78	800	0.040	0.00706	37.2768	6.3	8.08
D 111	1674+00	1677+50	8.03	0.95	1.50	1.42	0.70	6.54	4.58	6.00	10.00	6.30	37.79	350	0.040	0.00706	37.2768	6.3	5.35
D 112	1677+50	1680+50	2.75	0.95	1.42	1.35	0.70	1.34	0.94	2.28	10.00	6.30	14.38	300	0.040	0.00706	37.2768	6.3	4.95
D 113	1680+50	1688+50	5.51	0.95	3.78	3.59	0.70	1.73	1.21	4.80	10.00	6.30	30.26	800	0.040	0.01000	52.8	6.3	7.25
	Totals:	7,650 LF	72.60		33.17	31.51		39.43		59.11	90.00		372.42	7,650					63.87
SPRR to CONSOLIDATED CANAL																			
D 200A	1688+50	1696+00	5.17	0.95	2.38	2.26	0.70	2.79	1.95	4.21	10.00	6.30	26.52	750	0.040	0.01239	65.4192	6.3	6.57
D 200	1696+00	1707+00	7.58	0.95	3.48	3.31	0.70	4.09	2.86	6.17	10.00	6.30	38.90	1,100	0.025	0.01239	65.4192	6.3	6.23
D 201	1707+00	1718+25	9.04	0.95	5.22	4.96	0.70	3.82	2.68	7.63	10.00	6.30	48.08	1,125	0.025	0.01239	65.4192	6.3	6.30
D 202	1718+25	1733+00	16.08	0.95	7.21	6.85	0.70	8.88	6.21	13.06	10.00	6.30	82.28	1,475	0.025	0.01239	65.4192	6.3	7.22
D 203	1733+00	1737+00	4.59	0.95	1.89	1.80	0.70	2.70	1.89	3.69	10.00	6.30	23.23	400	0.040	0.02542	134.2176	6.3	3.84
D 204	1737+00	1741+75	5.45	0.95	2.29	2.17	0.70	3.17	2.22	4.39	10.00	6.30	27.64	475	0.040	0.02542	134.2176	6.3	4.19
D 205	1741+75	1753+00	12.91	0.95	4.97	4.72	0.70	7.94	5.56	10.28	10.00	6.30	64.77	1,125	0.025	0.02542	134.2176	6.3	5.05
D 206	1753+00	1758+50	4.10	0.95	1.74	1.66	0.70	2.36	1.65	3.31	10.00	6.30	20.84	550	0.040	0.01500	79.2	6.3	5.30
	Totals:	7,000 LF	64.92		29.17			35.75		52.74	80.00		332.27	7,000					44.71
CONSOLIDATED CANAL to COOPER ROAD																			
D 300A	1758+50	1770+00	9.24	0.95	4.03	3.83	0.70	5.21	3.64	7.48	10.00	6.30	47.10	1,150	0.025	0.008	42.24	6.3	7.30
D 300	1770+00	1787+00	18.54	0.95	7.73	7.34	0.70	10.81	7.57	14.91	10.00	6.30	93.92	1,700	0.025	0.01464	77.2992	6.3	7.36
D 302	1787+00	1800+00	12.68	0.95	6.15	5.84	0.70	6.54	4.58	10.42	10.00	6.30	65.62	1,300	0.025	0.00923	48.7344	6.3	7.42
D 303	1800+00	1813+00	10.45	0.95	4.51	4.28	0.70	5.94	4.16	8.44	10.00	6.30	53.17	1,300	0.025	0.00923	48.7344	6.3	7.42
	Totals:	5,450 LF	50.91		22.42			28.49		41.24	40.00		259.81	5,450					29.51
COOPER ROAD to GILBERT ROAD																			
D 304	1813+00	1825+00	9.64	0.95	3.96	3.76	0.70	5.68	3.98	7.74	10.00	6.30	48.75	1,200	0.025	0.00481	25.3968	6.3	8.73
D 305	1825+00	1837+50	12.20	0.95	5.91	5.62	0.70	6.28	4.40	10.01	10.00	6.30	63.09	1,250	0.025	0.00481	25.3968	6.3	8.91
D 306	1837+50	1844+00	6.71	0.95	2.92	2.77	0.70	3.80	2.66	5.43	10.00	6.30	34.21	650	0.040	0.0111	58.608	6.3	6.33
D 307	1844+00	1854+00	8.61	0.95	4.73	4.49	0.70	3.88	2.72	7.21	10.00	6.30	45.41	1,000	0.025	0.0111	58.608	6.3	6.15
D 308	1854+00	1865+00	8.84	0.95	3.88	3.68	0.70	4.96	3.47	7.16	10.00	6.30	45.08	1,100	0.025	0.01110	58.608	6.3	6.45
	Totals:	5,200 LF	46.00		21.39			24.61		37.55	50.00		236.55	5,200					36.57
	Grand Total:	31,000 LF	277 Acr																

Table 2

SANTAN FREEWAY
PRICE ROAD TO GILBERT ROAD
ON-SITE STORM SEWER DESIGN
SEWER CALCULATION SHEET
FREQUENCY = 50 YEARS

LINE NO.	STATION FROM	STATION TO	DRAINAGE AREA NUMBER	INCREM CA	SUM CA	TIME INLET	TIME SEWER	TIME DESIGN	I IN/HR	CA * I Q CFS	CROWN EL INLET	CROWN EL OUTLET	LENGTH FT	SLOPE FT/FT	DIAM IN	QFULL CFS	V > 3fps V FPS	SF FT/FT	SF * L HL FT	ELEV INLET	ELEV OUTLET	ASSUMED STR LOSS FT
SYSTEM 1 - DOBSON ROAD to SPRR																						
No Pipe	1555+00	1562+00	D 101A	4.49	4.49	10.00	0	10.00	6.30				700.00									
P1-40	1562+00	1569+00	D 100	6.10	10.59	10.00	1.35	10.00	6.30	28.30	1171.55	1163.00	700.00	-0.01221	24	27.07	8.62	0.01221	8.55	1172.05	1163.00	0.50
SUMP																						
P1-41A	1569+00	PS	-	-	-	10.00		10.00		222.00	1161.00	1160.50			72	INFLOW TO PUMP STATION						
	Low Point of Sumpy at Dobson Rd			1171.50 ac					Peak Flow at Dobson Road													
P1-41	1569+00	1575+00	D 101	6.05	89.87	10.00		30.62	3.50	297.57	1163.90	1163.00	600.00	0.00150	96			0.00150	0.90	0.90		
P1-42	1575+00	1579+00	D 101	6.05	83.82	10.00	0.58	30.04	3.55	283.88	1168.00	1163.90	400.00	0.01025	72	324.42	11.47	0.01025	4.10	1167.60	1163.00	0.50
P1-43	1579+00	1589+00	D 102	6.17	77.77	10.00	1.45	28.59	3.65	268.53	1173.00	1168.00	1,000.00	0.00500	72	324.42	11.47	0.00500	5.00	1172.60	1167.60	
P1-44	1589+00	1600+00	D 103	5.29	71.61	10.00	1.58	27.00	3.75	261.96	1178.55	1173.00	1,100.00	0.00505	72	327.65	11.59	0.00505	5.55	1178.15	1172.60	
P1-45	1600+00	1612+00	D 104	7.20	66.32	10.00	2.33	24.68	3.95	277.84	1181.85	1178.55	1,200.00	0.00275	72	242.77	8.59	0.00275	3.30	1181.45	1178.15	
P1-46	1612+00	1623+00	D 105	8.71	59.11	10.00	2.17	22.50	4.70	224.29	1185.00	1181.85	1,100.00	0.00286	72	238.40	8.43	0.00286	3.15	1184.60	1181.45	
P1-47	1623+00	1634+00	D 106	7.99	50.40	10.00	2.17	20.33	4.45	199.33	1187.88	1185.00	1,100.00	0.00262	72	238.40	8.43	0.00262	2.88	1187.98	1184.60	0.50
P1-48	1634+00	1644+00	D 107	5.85	42.41	10.00	2.06	18.27	4.70	186.47	1190.63	1187.88	1,000.00	0.00275	66	192.50	8.10	0.00275	2.75	1190.73	1187.98	
P1-49	1644+00	1655+50	D 108	6.45	36.56	10.00	2.41	15.86	5.10	170.11	1193.78	1190.63	1,150.00	0.00274	66	189.03	7.96	0.00274	3.15	1193.88	1190.73	
P1-50	1655+50	1666+00	D 109	7.06	30.11	10.00	2.34	13.52	5.65	139.45	1196.66	1193.78	1,050.00	0.00274	60	146.61	7.47	0.00274	2.88	1196.76	1193.88	
P1-51	1666+00	1674+00	D 110	9.96	23.05	10.00	2.00	11.52	6.05	81.78	1199.00	1196.66	800.00	0.00292	48	83.80	6.67	0.00292	2.34	1199.10	1196.76	
P1-52	1674+00	1677+50	D 111	6.00	13.08	10.00	0.96	10.56	6.25	44.64	1200.00	1199.00	350.00	0.00286	42	58.70	6.10	0.00286	1.00	1200.10	1199.10	
P1-53	1677+50	1680+50	D 112	2.28	7.09	10.00	0.56	10.00	6.30	30.26	1236.00	1232.10	300.00	0.01300	24	27.94	8.89	0.01300	3.90	1237.00	1232.10	1.00
No Pipe	1680+50	1688+50	D 113	4.80	4.80	10.00	0	10.00	6.30				800.00									
		13,350 LF						242.86					13,350 LF									
SYSTEM 2 - SPRR to CONSOLIDATED CANAL																						
No Pipe	1688+50	1696+00	D 200A	4.21	4.21	10.00	0	10.00	6.30				750.00									
P1-54	1696+00	1707+00	D 200	6.17	10.38	10.00	2.11	10.00	6.30	26.52	1240.50	1226.90	1,100.00	-0.01236	24	27.29	8.69	0.01236	13.6	1241.00	1227.40	
P1-55	1707+00	1718+25	D 201	7.63	18.02	10.00	1.65	12.11	5.95	65.42	1226.90	1213.00	1,125.00	-0.01236	36	80.46	11.38	0.01236	13.90	1227.40	1213.50	
P1-56	1718+25	1732+00	D 202	13.06	31.08	10.00	1.72	13.76	5.60	107.19	1213.00	1194.00	1,375.00	-0.01382	42	128.04	13.31	0.01382	19.00	1213.50	1194.00	0.50
SUMP									Peak Flow at McQueen Road													
P1-57A	1732+00	PS	-							222.00	1192.00	1191.00			72	INFLOW TO PUMP STATION						
	Low Point of Sumpy at McQueen Rd			1301.2ac +/-	52.74			15.48	5.20	274.25												
P1-57	1732+00	1737+00	D 203	3.69	21.66	10.00	0.95	10.36	6.25	113.26	1194.50	1194.00	500.00	0.00100	96	441.88	8.79	0.00100	0.5	1194.50	1194.00	
P1-58	1737+00	1741+75	D 204	4.39	17.98	10.00	0.36	10.00	6.30	85.61	1211.86	1194.50	475.00	0.03655	36	157.31	22.26	0.03655	17.36	1212.36	1194.50	0.50
No Pipe	1741+75	1753+00	D 205	10.28	13.59	10.00	0	10.00	6.30				1,125.00									
No Pipe	1753+00	1758+50	D 206	3.31	3.31	10.00	0	10.00	6.30				550.00									
		7,800 LF											7,000 LF									
SYSTEM 3 - CONSOLIDATED CANAL to GILBERT ROAD																						
No Pipe	1758+50	1770+00	D 300A	7.48	7.48	10.00	0	10.00	6.30				1,150.00									
P1-59	1770+00	1781+50	D 300	14.91	22.38	10.00	1.63	10.00	6.30	47.10	1234.00	1212.00	1,150.00	-0.01913	30	57.77	11.77	0.01913	22	1234.50	1212.00	0.50
SUMP									Peak Flow at Cooper Road													
P1-60A	1781+50	PS	-							222.00	1209.00	1208.50			72	INFLOW TO PUMP STATION						
	Low Point of Sumpy at Cooper Rd			1356.2ac +/-	78.79			25.37	4.00	315.15												
P1-60	1781+50	1787+50	-		-		1.07	24.30	4.15	248.17	1212.00	1211.00	600.00	-0.00167	(3) 96	263.56	9.32	-0.00167	-1	1211.00	1212.00	
P1-61	1787+50	1800+00	D 302	10.42	56.40	10.00	2.27	22.03	4.40	216.14	1217.50	1211.00	1,250.00	0.00520	72	259.54	9.18	0.00520	6.5	1218.00	1211.00	0.50
P1-62	1800+00	1813+00	D 303	8.44	45.99	10.00	3.06	18.97	4.70	169.91	1220.00	1217.50	1,300.00	0.00192	72	199.99	7.07	0.00192	2.5	1220.50	1218.00	
P1-63	1813+00	1825+00	D 304	7.74	37.55	10.00	2.83	16.14	5.15	169.91	1222.30	1220.00	1,200.00	0.00192	72	199.99	7.07	0.00192	2.3	1222.80	1220.50	
P1-64	1825+00	1837+50	D 305	10.01	29.81	10.00	3.09	13.05	5.70	118.76	1224.00	1222.30	1,250.00	0.00136	60	132.34	6.74	0.00136	1.7	1224.50	1222.80	
P1-65	1837+50	1844+00	D 306	5.43	19.79	10.00	1.29	11.76	6.00	90.49	1227.00	1224.00	650.00	0.00462	48	105.54	8.4	0.00462	3	1227.50	1224.50	
P1-66	1844+00	1854+00	D 307	7.21	14.36	10.00	1.76	10.00	6.30	45.08	1238.00	1227.00	1,000.00	0.01100	30	46.60	9.49	0.01100	11	1239.00	1227.50	0.50
No Pipe	1854+00	1864+00	D 308	7.16	7.16	10.00	0	10.00	6.30				1,000.00									
No Pipe	1864+00	1865+00			0.00		0						100.00									
		10,650 LF											10,650 LF									

SECTION 4

OFF-SITE DRAINAGE (Price Road to Gilbert Road)

4.1 General Plan

The freeway mainline profile in this segment is mostly depressed except at the crossings of the SPRR and the Consolidated Canal. As detailed in the Hydrology Study(Dec. 1994), the canal and railroad embankments interrupt the westward flow of runoff. Sheet flows pond against the east embankments and may flow southward. In some locations the 100-year flow overtops the embankment. In the case of a canal, such as Consolidated Canal, the overtopping flow usually discharges into the canal and may exceed the canal capacity. This, in turn, may cause an overflow of the west bank at some location downstream. In the case of the Chandler spur of the SPRR, there are several locations where the ponded flow discharges through small culverts or bridges. The flow routing map of Figure 2 shows the sheet flow routing paths over or through the embankments. The locations are described in detail in the HEC-1 models for this area.

The freeway drainage plan for this segment protects the mainline from flooding by the 100-year off-site flood event. The off-site system conveys flows westward to the proposed regional drainage system that begins at the future Price/Santan Interchange. The elements of the regional drainage system consist of a channel along the north side of the Santan Freeway between the Price/Santan Interchange and the Gila Drain, Detention Basin B, a large channel improvement of the Gila Drain from the Santan Freeway to Maricopa Road, and the enlargement of a three-mile portion of the Gila Drain Floodway. These are described in previous HDR reports ("Gila Drain Alternative" and "Gila Drain Floodway Master Plan," February, 1993)

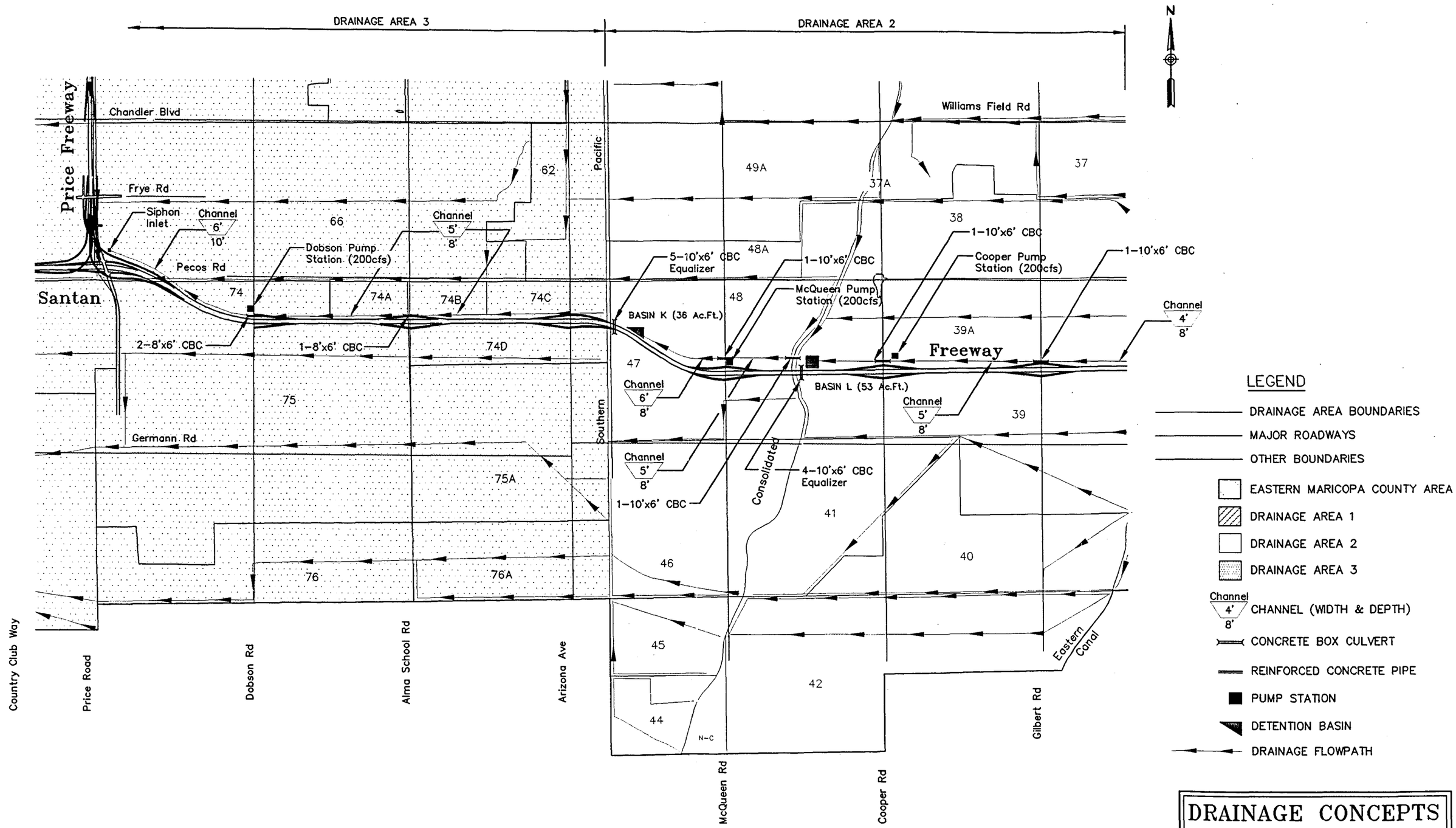
The principal features of the off-site drainage plan for this segment are shown in Figure 4. The facilities consist of concrete-lined collection channels, two detention basins, K and L, and equalizing cross-culverts upstream of the SPRR and Consolidated Canal embankments.

4.2 Channels

The purpose of the channels running along the north side of the freeway is to collect on-site and "local" off-site flows that are intercepted by the freeway and to convey these flows, along with the pump station discharges, to detention basins K and L. The general direction of drainage is westerly and parallels the freeway except where the freeway jogs between the SPRR and McQueen Road. In this reach the freeway intercepts the off-site flow from Subarea 48 (Figure 2), which is assumed to flow into Basin K and is regarded as "local" off-site flow. This also occurs between Price and Dobson Roads and the channel is designed to accept the 100-year discharges from Subareas 74A,B and C, respectively.

The channels have bottom widths of 8 or 10 feet, depths of 4 to 6 feet, 2:1 side slopes, and are lined with concrete with an n-value = 0.018 (conservatively high for planning purposes). The 100-year design discharges range from 350 to 596 cfs. Freeboard is generally a minimum of one foot and most channels have more than one foot of freeboard because the channel depth is rounded to the even foot of depth. The channel data is given in Table 3 and the channels are shown on the plan sheets in Appendix 1. The channels are not optimized in terms of being segmented into shorter reaches with channel drops to minimize size and excavation cost. This is a process that should be undertaken in detailed design.

Table 3 and the plan sheets also show the size and location of channel cross-culverts at the arterial crossings of the freeway at Dobson Road, Alma School Road, Arizona Avenue, Cooper Road and Gilbert Road.



DRAINAGE CONCEPTS

SANTAN FREEWAY

Price Rd to Gilbert Rd

Figure 4

HDR

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Table 3

SANTAN FREEWAY
OFF-SITE DRAINAGE
CHANNEL AND CULVERT DATA SHEET
PRICE ROAD TO GILBERT ROAD

Start Station	End Station	Length (ft)	Channel or Box Culvert Outfall Elev	Channel or Box Culvert Inlet Elev	Channel or Box Culvert Slope (ft/ft)	Type	Design Flow Q (cfs)	Channel Bottom Width	Channel Bottom Depth	RCBC Box Size	PIPE/ RCBC #	Comments
1515+00	1529+00	1400.00	1173.85	1179.42	0.00398	Channel	596	10	6	N/A	N/A	From Siphon at Santan/Price T.I.
1529+00	1555+00	2600.00	1179.42	1182.00	0.00099	Channel	596	10	6	N/A	N/A	
1555+00	1569+30	1430.00	1182.00	1185.50	0.00245	Channel	596	10	6	N/A	N/A	
1569+30	1570+65	135.00	1185.50	1186.50	0.00741	CBC	485	N/A	N/A	2 - 8' x 6'	C240	Dobson Road
1570+65	1622+30	5165.00	1186.50	1201.00	0.00281	Channel	485	8	5	N/A	N/A	
1622+30	1623+80	150.00	1201.00	1202.00	0.00667	CBC	376	N/A	N/A	1 - 10' x 6'	C241	Alma School Road
1623+80	1675+00	5120.00	1202.00	1211.00	0.00176	Channel	376	8	5	N/A	N/A	
1691+60	1691+69	450.00	1216.00	1216.00	None	CBC	550	N/A	N/A	5 - 10' x 6'	C242	Equalizer at SPRR
1677+50	1691+50	1400.00	1200.00	1201.00	0.00071	30" Pipe	37	N/A	N/A	N/A	N/A	Restricted Flow From Basin "K" Under SPRR
1690+00	1698+50	850.00	1201.00	1202.00	0.00118	Basin K	N/A	N/A	N/A	N/A	N/A	Basin "K"
1698+00	1731+80	3380.00	1209.12	1212.50	0.00100	Channel	343	8	6	N/A	N/A	
1731+80	1733+15	135.00	1212.50	1213.50	0.00741	CBC	331	N/A	N/A	1 - 10' x 6'	C243	McQueen Road
1733+15	1755+25	2210.00	1213.50	1219.25	0.00260	Channel	331	8	5	N/A	N/A	
1755+25	1759+25	400.00	1219.25	1218.25	-0.00250	CBC	N/A	N/A	N/A	1 - 10' x 6'	C244	Consolidated Canal
1757+35	1757+35	320.00	1228.80	1228.80	None	CBC	314	N/A	N/A	4 - 10' x 6'	C247	Equalizer at Consolidated Canal
1741+75	1760+10	1835.00	1211.67	1213.50	0.00100	30" Pipe	37	N/A	N/A	N/A	N/A	Restricted Flow From Basin "L"
1759+00	1764+36	536.00	1211.00	1212.00	0.00187	Basin "L"	N/A	N/A	N/A	N/A	N/A	Basin "L"
1764+36	1784+70	2034.00	1225.75	1231.00	0.00258	Channel	350	8	5	N/A	N/A	
1784+70	1786+05	135.00	1231.00	1232.00	0.00741	CBC	350	N/A	N/A	1 - 10' x 6'	C245	Cooper Road
1786+05	1837+45	5140.00	1232.00	1240.00	0.00156	Channel	350	8	5	N/A	N/A	
1837+45	1838+80	135.00	1240.00	1241.00	0.00741	CBC	350	N/A	N/A	1 - 10' x 6'	C246	Gilbert Road
1838+80	1864+70	2590.00	1241.00	1248.72	0.00298	Channel	350	8	4	N/A	N/A	

4.3 Detention Basins

Detention basins K and L are located upstream of the SPRR and Consolidated Canal crossings as shown in Figure 4. Basin K has a 100-year storage volume of 36 acre-feet and is configured to fit in a remnant parcel (parcel is about 5.8 acres, Basin K requires about 5.2 acres) as shown on plan sheets D-86 and D-87. It is approximately 19 feet deep, 4:1 slopes, 4' freeboard, and the 1500' 24-inch gravity drain is shown to discharge into the on-site collection system at Arizona Avenue. An alternative to this is to extend the 24"(or larger) line over two miles to the off-site channel near Dobson Road. This would be considerably more expensive, but would avoid requiring the on-site pump station to pump the off-site flows. The on-site alternative was used because the flows are small and would initially judged not to significantly impact operating cost (i. e. fuel cost). A detailed study during the design phase is recommended to determine an optimal configuration of basin, outlet and pump station. If a larger site were available in the future, the basin could be configured as a shallow, gravity-drained multiple-purpose basin.

Detention basin L is located upstream of the Consolidated Canal and is configured with a 100-year volume of 53 acre-feet. Basin L detains the Cooper pump station on-site discharges and the gravity drain flows from Basin O. The Basin O gravity drain will likely discharge to the freeway channel east of Gilbert Road, and is therefore not shown in Table 3 or the plans in Appendix 1.

Basin L , with a total depth of 20 feet, 4:1 slopes, 4' freeboard and 30' buffer at the top, would occupy a 6.6 acre site. The 30-inch outlet is configured to discharge to the on-site collector system near McQueen Road. The 20' wide spillway discharges a maximum of 65 cfs to freeway channel via a 48" pipe culvert under the Consolidated Canal. Basin L, like Basin K, can be configured in a number of ways. The size, shape, location and outlet of the basin are flexible and depend to some extent upon local land use and development conditions when the freeway is constructed. The future plans may also be influenced by regional flood control projects that are undertaken as development occurs in this area.

Preliminary HEC-1 basin models are included in Appendix B.

4.4 Equalizing Cross-Culverts

As previously mentioned, the SPRR and Consolidated Canal embankments intercept and pond westward flowing sheet flows in the drainage areas north of the freeway. The ponded flows tend to move southward along the upstream (east) bank. They are passed unimpeded under the freeway using 5-10'x6' CBC's at the SPRR crossing and 4-10'x6' CBC's at the Consolidated Canal crossing. The culverts are oversized and are placed at the existing grade to minimize backwater effects. This may result in siltation within the barrels of these structures. However, the siltation will be similar to that occurring in the adjacent ponding areas.

SECTION 5

OFF-SITE DRAINAGE CONCEPTS (Gilbert Road to Baseline Road)

5.1 General

The hydrology study completed by HDR in December, 1994, included the entire Santan Freeway corridor. For the segments east of Gilbert Road, for which a general plan has not yet been developed, HDR completed a conceptual level drainage study which involved the determination of off-site design flows and preliminary sizing of channels, basins and cross-culverts which is reported in this section. The study was limited to major off-site facilities only.

Figure 5 shows the segments of the freeway from Gilbert Road east and north to Baseline Road. Within these segments there are two distinctly different drainage patterns. From Gilbert Road to approximately Warner Road the pattern is similar to the pattern for the freeway portions west of Gilbert Road, which are alternating depressed and elevated sections. Therefore, off-site drainage that is intercepted by the freeway is conveyed westward through a system of channels and detention basins, similar to the Price to Gilbert Road segment discussed in Section 4.

North of Warner Road the freeway mainline is mostly elevated and crosses many shallow, but relatively well-defined natural channels. Numerous cross-culverts are therefore required to pass the off-site flows for this segment and channels and basins are not necessary to protect the freeway. This area is largely undeveloped at the present time.

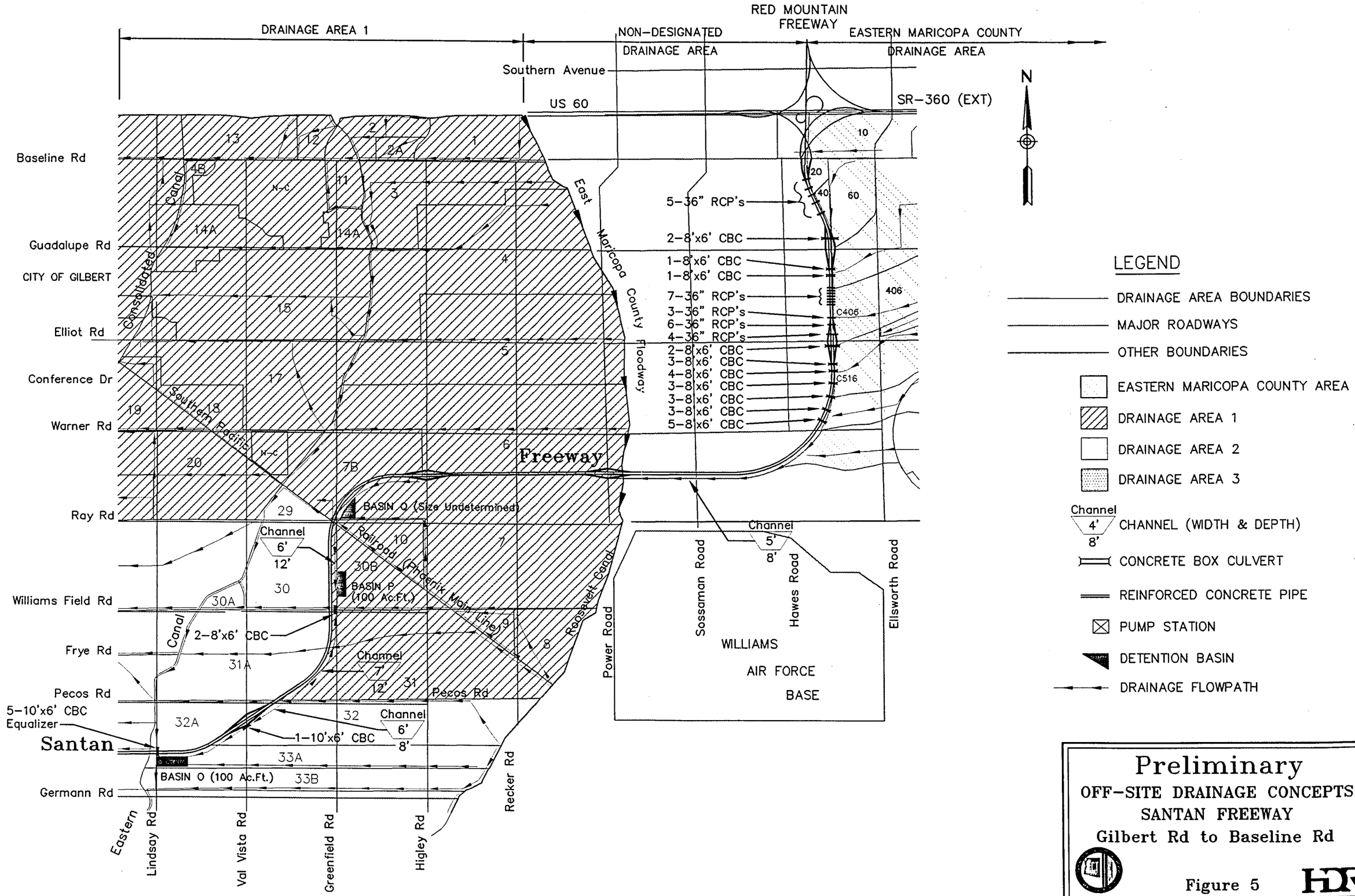
In 1992, HDR conceptually redesigned freeway to determine if there was a cost-reduction potential. A set of base plan sheets was developed for this purpose. This set of plan sheets were used to show the major drainage facilities for present study, and Sheets 106 through 120 are included in Appendix 4. The freeway alignment for the "Cost Reduction Study", particularly the vertical alignment, was altered from the original corridor study in 1988. Therefore, the drainage concepts also changed somewhat from original concepts (Dames and Moore; July 19,1988).

5.2 Gilbert Road to Warner Road Segment

The off-site facilities for this segment are listed in Table 4 and shown on Sheets 106 to 117 in Appendix 4. There are three detention basins. Basin O is a 100 acre-foot basin located south of the freeway corridor at Lindsay Road and the Eastern Canal crossing. It receives off-site flow from drainage subareas 32 and 33A, on-site flow from the Val Vista drive pump station, and basin drain flows from Basins P and Q. A 5-10'x6' CBC equalizer is planned for the Eastern Canal crossing.

Basin P is also a 100 acre-foot basin located at Williams Field Road and receives off-site flow from subareas 30B and 31, on-site flow from the elevated portion between Pecos and Ray, and drain flow from Basin Q.

Basin Q is not sized, but a 15 acre site is shown in the plans. Basin Q is located at a critical intersection from a drainage standpoint. The SPRR main line crosses the intersection of Ray and Greenfield Roads at this location. The SPRR embankment intercepts drainage from southeast of this location and diverts it to the north and through this intersection. These flows technically should be passed unimpeded under the freeway. However, to determine how much of this flow may actually be intercepted by the freeway will depend upon how this intersection is ultimately designed and will require detailed study during the design phase. Also, the flow splits along Higley and Ray Roads are not adequately defined by available mapping at the present time. An alternate site for this basin that strattles the railroad corridor is also shown in the plans.



Preliminary

OFF-SITE DRAINAGE CONCEPTS
SANTAN FREEWAY
Gilbert Rd to Baseline Rd

Figure 5

HDR

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Table 4

SANTAN FREEWAY
OFF-SITE DRAINAGE (PRELIMINARY) DATA SHEET
GILBERT ROAD TO WARNER ROAD

Start Station	End Station	Length (ft)	Type	Design Flow Q (cfs)	Channel Bottom Width	Channel Bottom Depth	Pipe/RCBC Box Size	Comments
1865+00	1894+00	2900	Pipe	88	N/A	N/A	48"(Max)	Outlet from Basin "O"
1890+00	1900+50	1050	Basin	N/A	N/A	N/A	N/A	Basin "O" (100af)
1900+50	1947+00	4650	Channel	532	8	6	N/A	
1947+00	1949+00	200	CBC	339	N/A	N/A	1 - 10' x 6'	Xing @ Val Vista Drive
1949+00	1975+00	2600	Channel	339	8	6	N/A	
1977+00	2038+50	6150	Channel	662	12	7	N/A	
2038+50	2040+00	150	CBC	662	N/A	N/A	2 - 8' x 6'	Xing @ Williams Field Road
1900+50	2040+00	13950	Pipe	88	N/A	N/A	48"(Max)	Outlet from Basin "P" to Basin "O"
2040+00	2050+60	1060	Basin	N/A	N/A	N/A	N/A	Basin "P" (100af)
2040+00	2090+00	5000	Channel	480	12	6	N/A	
2040+00	2094+00	5400	Pipe	32	N/A	N/A	36"(Max)	Outlet from Basin "Q" to Basin "P"
2094+00	2112+00	1800	Basin	N/A	N/A	N/A	N/A	Basin "Q" (Not Sized)
2112+00	2160+00	4800	Channel	*			N/A	
2281+00	2397+00	11600	Channel	450	8	5	N/A	East Maricopa County Floodway to Warner Road

* Design Flows Not Determined For This Segment

Collector channels are required along the east and south freeway boundary from Eastern Canal to Higley Road. East of Higley Road, the freeway parallels the drainage and the freeway is primarily elevated. Collection channels may therefore not be required for this segment. Small equalizer cross-culverts may be needed in this segment, but this is a design detail. Table 4 indicates approximate channel sizes and design flows.

5.3 Warner Road to Baseline Road Segment

The culverts required for this segment are listed in Table 5 and shown on Sheets 117 to 120 in Appendix 4.

Table 5

SANTAN FREEWAY
OFF-SITE DRAINAGE (PRELIMINARY) DATA SHEET
WARNER ROAD TO BASELINE ROAD

Station	RCBC Barrel Width	RCBC Barrel Height	RCBC No. of Barrels	Pipe Dia.	Pipe No. of Pipes	Natural Ground Elevation	Invert Elev	Design Flow Q (cfs)	Comments
2403+00	8	6	5	-	-	1376.00	1376.00	1015	Box
2415+75	8	6	3	-	-	1380.00	1380.00	~	Box
2420+20	8	6	3	-	-	1381.00	1380.00	2968	Box
2423+75	8	6	3	-	-	1383.00	1380.00	~	Box
2433+50	8	6	4	-	-	1384.00	1382.00	~	Box
2437+50	8	6	3	-	-	1383.00	1382.00	~	Box
2449+75	8	6	2	-	-	1383.00	1383.00	~	Box
2455+50	8	6	4	-	-	1383.00	1383.00	2560	Box
2461+50	8	6	6	-	-	1389.00	1388.00	~	Box
2467+50	8	6	3	-	-	1390.00	1389.00	~	Box
2480+00	-	-	-	36	2	1396.00	1395.00	~	Pipe
2484+75	-	-	-	36	2	1397.00	1397.00	~	Pipe
2489+00	-	-	-	36	2	1399.00	1399.00	784	Pipe
2494+00	-	-	-	36	1	1400.00	1400.00	~	Pipe
2498+50	8	6	1	-	-	1402.50	1401.00	~	Box
2499+50	8	6	1	-	-	1402.00	1402.00	~	Box
2508+50	8	6	2	-	-	1406.00	1406.00	431	Box
2524+00	-	-	-	24	1	1410.00	1410.00	60	Pipe
2529+10	-	-	-	36	1	1410.00	1410.00	~	Pipe
2535+00	-	-	-	36	1	1410.00	1410.00	~	Pipe
2542+25	-	-	-	36	1	1411.00	1411.00	149	Pipe
2549+25	-	-	-	36	1	1413.00	1413.00	~	Pipe
2553+80	-	-	-	36	1	1418.00	1418.00	~	Pipe
2560+50	-	-	-	-	-	-	-	-	Baseline Road
2562+00	8	6	2	-	-	1422.5	1421.5	327	Box

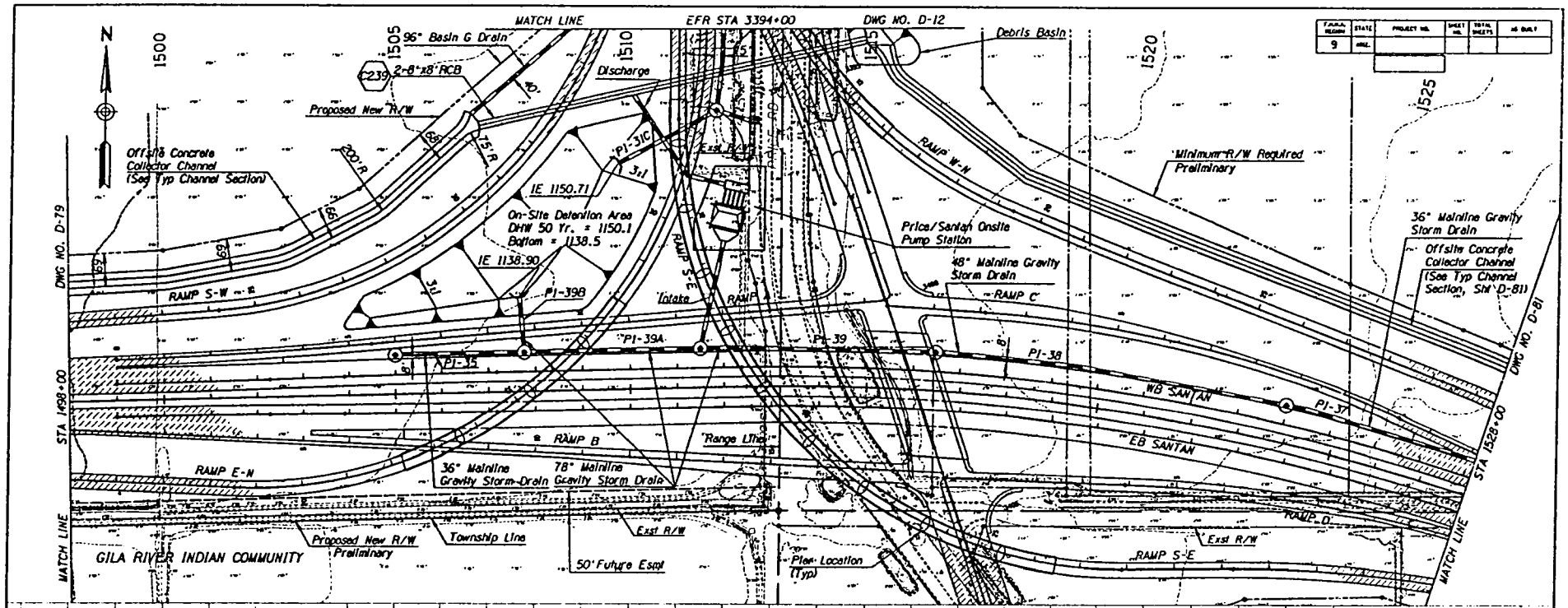
Note 1: Design flows are from the East Maricopa County ADMS 100-yr/24-hr Model (EASTMARI.DAT)

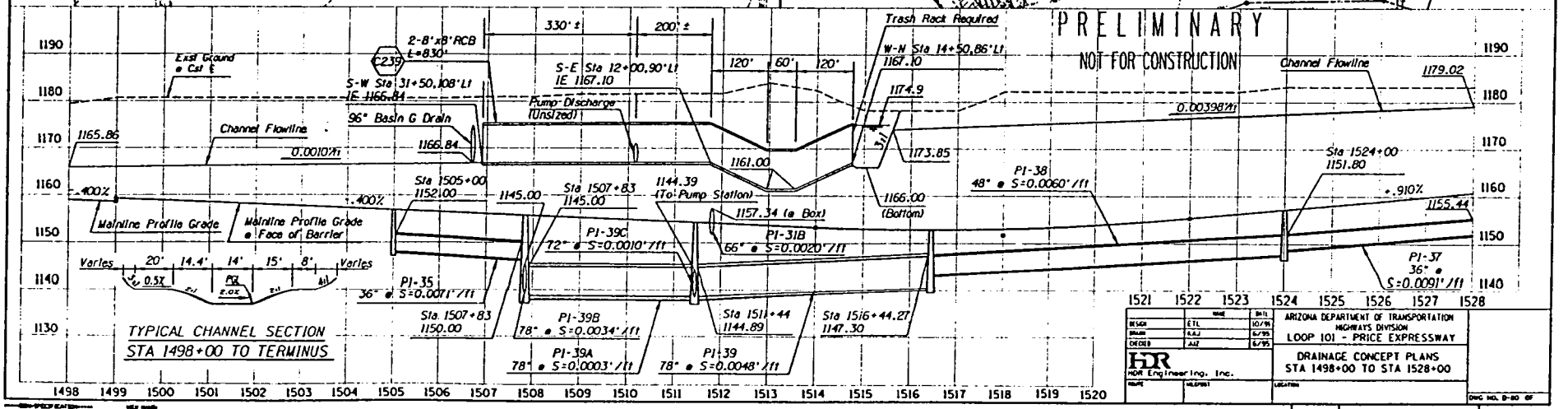
APPENDIX 1

DRAINAGE CONCEPT PLANS

Santan Freeway

Price Road to Gilbert Road





	NAME	DATE
DESIGN	ETL	10/95
DRAWN	KJJ	6/95
CHECKED	JMZ	6/95

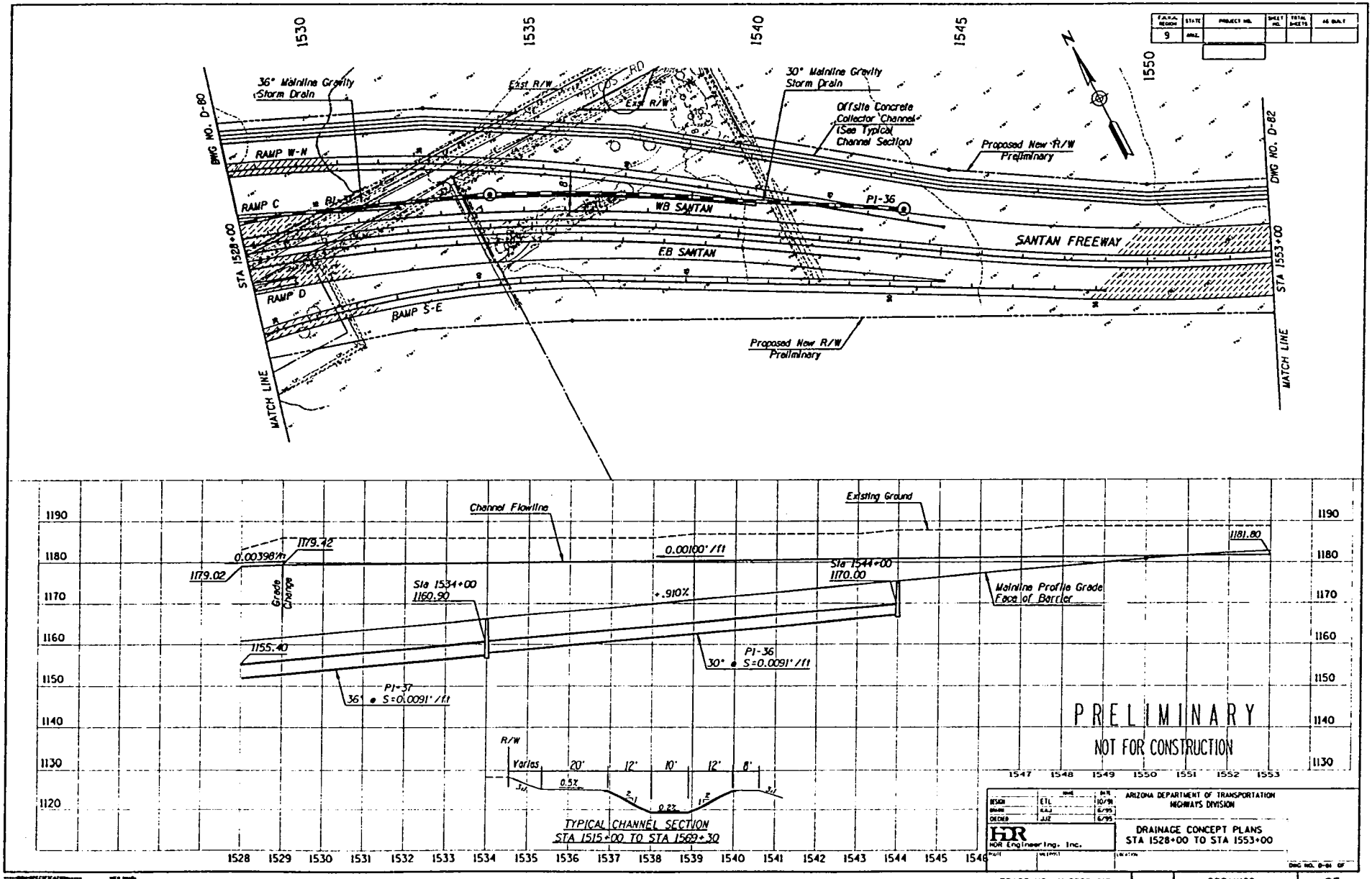
HDR Engineering, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 101 - PRICE EXPRESSWAY

DRAINAGE CONCEPT PLANS
STA 1498+00 TO STA 1528+00

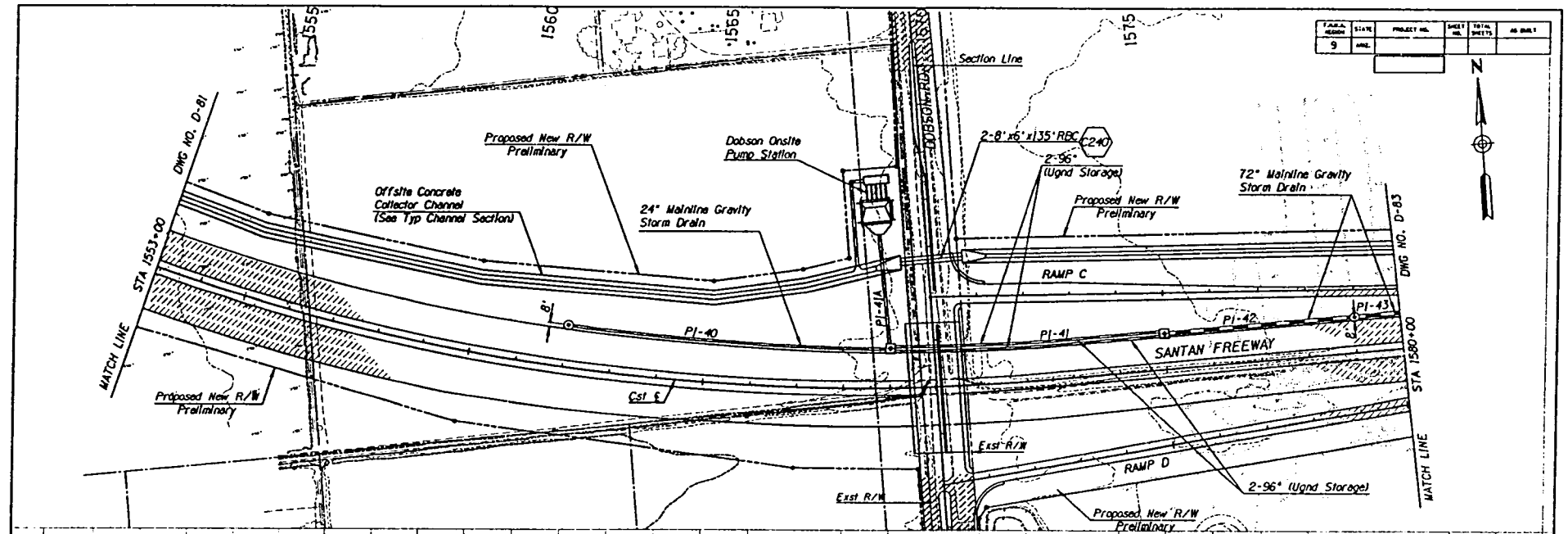
DWG NO. D-80 OF

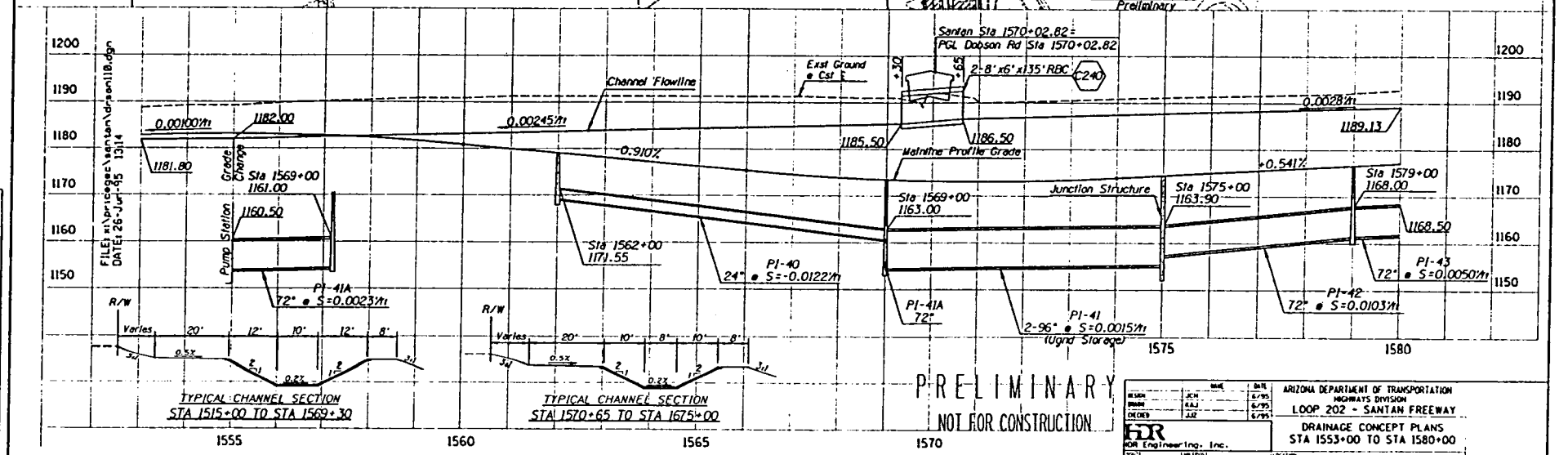
TRACS NO. H-2222-01D | DRSAN108 | ___ OF ___



CONSTRUCTION DISPLAY ON

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





PRELIMINARY
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	JCH	6/95
DRAWN	EAJ	6/95
CHECKED	JJZ	6/95

HDR Engineering, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
DRAINAGE CONCEPT PLANS
STA 1553+00 TO STA 1580+00

DWG NO. D-82 OF

TRACS NO. H-2222-01D | DRSAN110 | ___ OF ___

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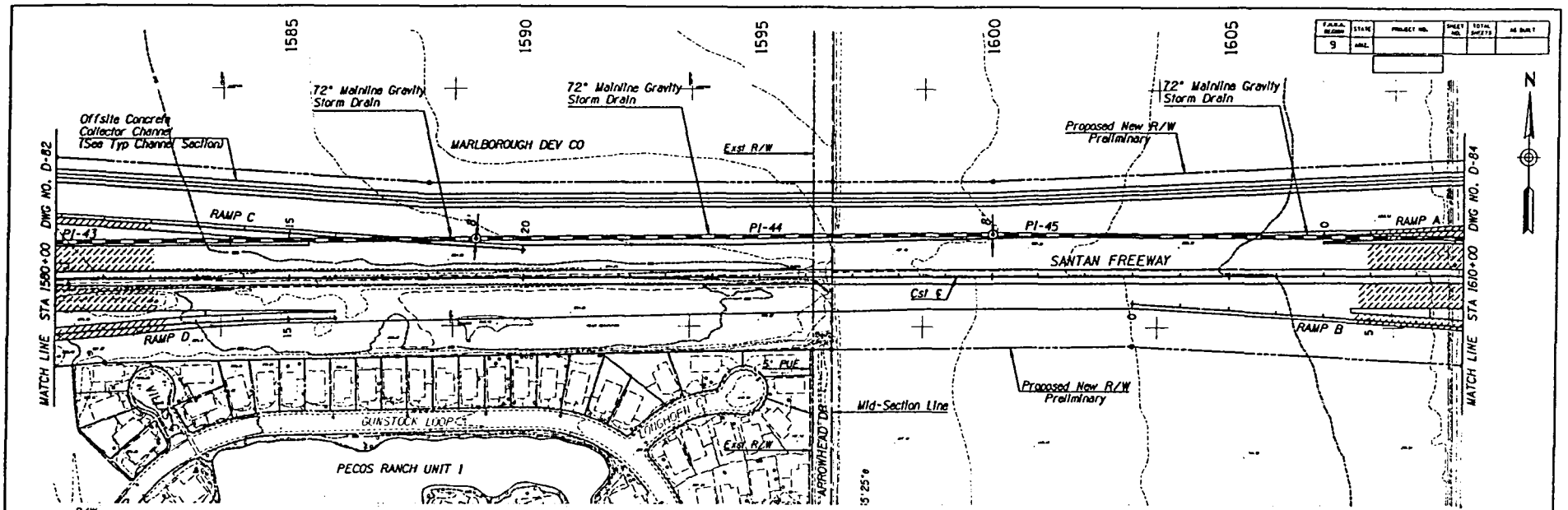
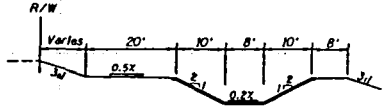
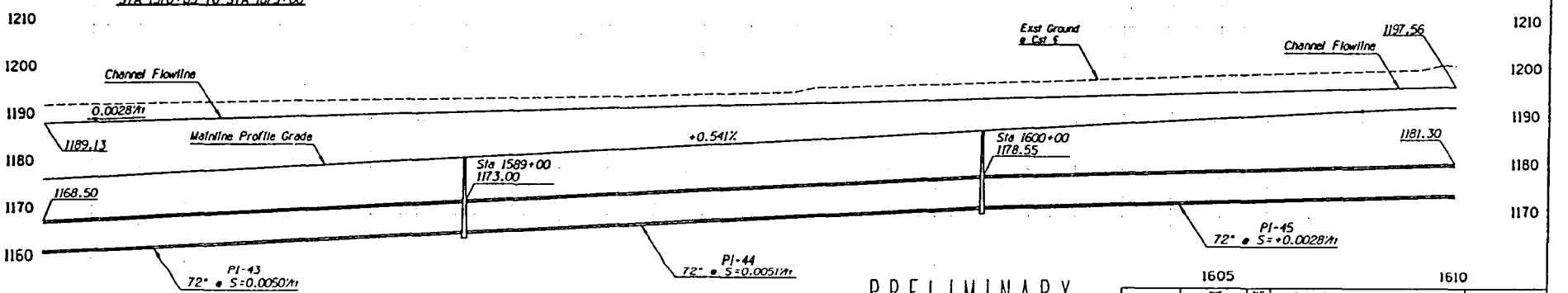
DATE: 26-Jun-95 13:14

CONSTRUCTION DISPLAY ON





TYPICAL CHANNEL SECTION
STA 1570+65 TO STA 1675+00



PRELIMINARY
NOT FOR CONSTRUCTION

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DATE: 26-Jun-95 13:22

1580 1585 1590 1595 1600

	NAME	DATE
DESIGN	JCN	6/95
DRAWN	KAJ	6/95
CHECKED	JJZ	6/95

HDR Engineering, Inc.

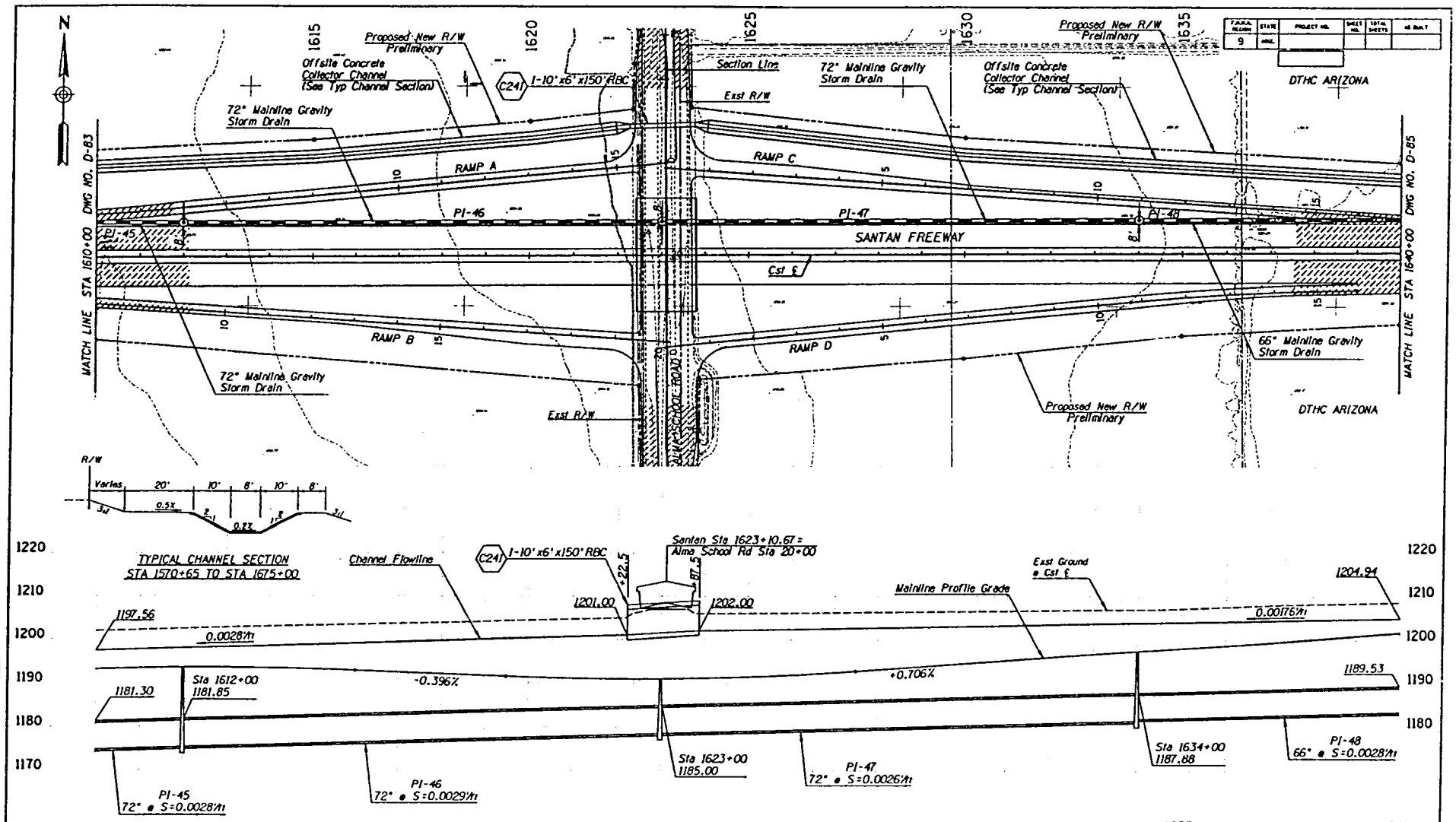
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY

DRAINAGE CONCEPT PLANS
STA 1580+00 TO STA 1610+00

DWG NO. D-83 OF

TRACS NO. H-2222-01D | DRESAN01 | ___ OF ___

CONSTRUCTION DISPLAY ON



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DATE: 26-Jun-95 13:33

PRELIMINARY
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	JCH	6/95
DRAWN	KAJ	6/95
CHECKED	JLZ	6/95

HDR Engineering, Inc.

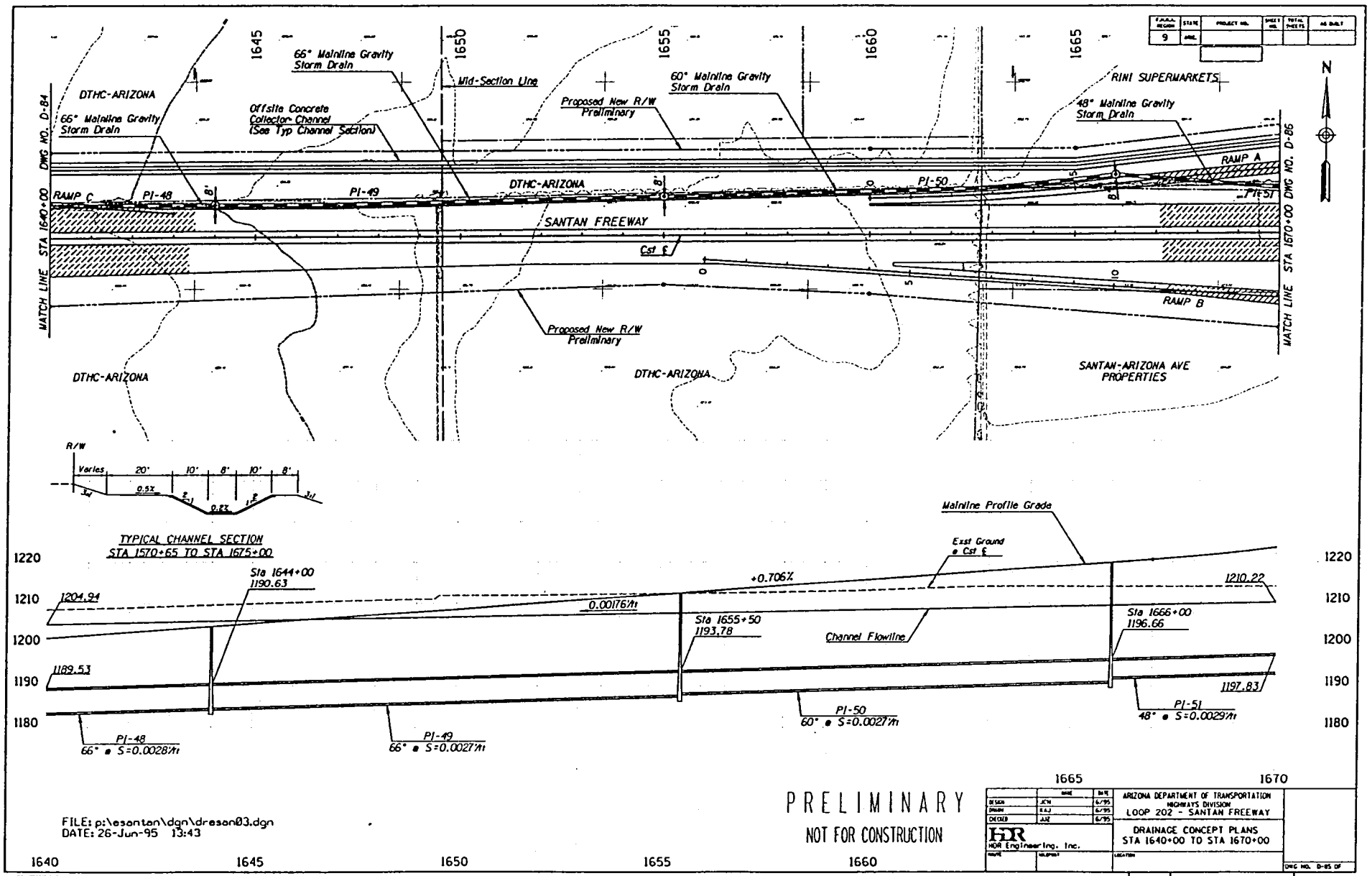
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY

DRAINAGE CONCEPT PLANS
STA 1610+00 TO STA 1640+00

DWG NO. D-84 OF

TRACS NO. H-2222-01D | DRESAN02 | ___ OF ___

CONSTRUCTION DISPLAY ON



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DATE: 26-Jun-95 13:43

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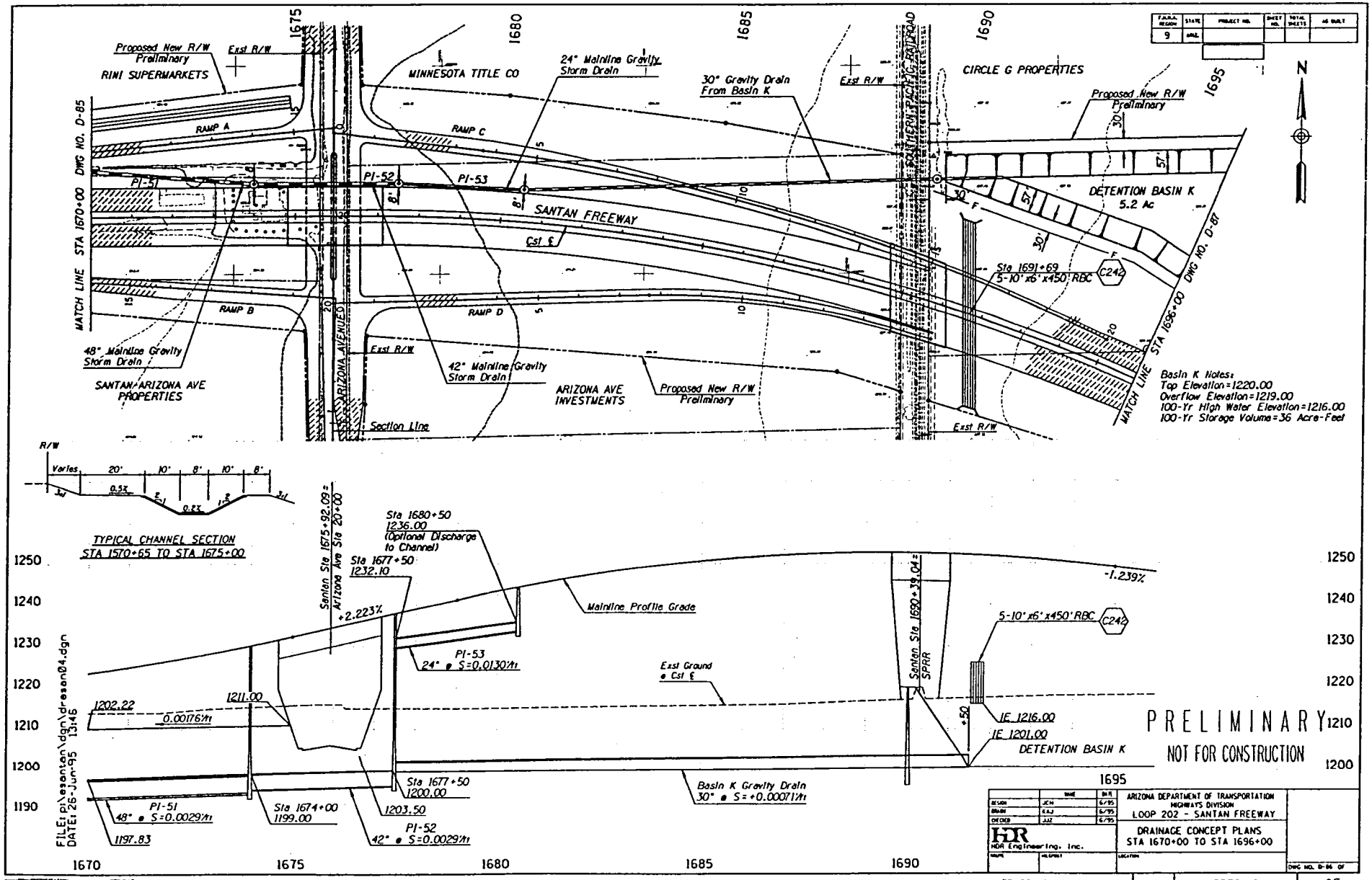
Proposed New R/W Preliminary
Exst R/W
RINI SUPERMARKETS
MINNESOTA TITLE CO
24" Mainline Gravity Storm Drain
30" Gravity Drain From Basin K
SOUTHERN PACIFIC RAILROAD
CIRCLE G PROPERTIES
Proposed New R/W Preliminary
RAMP A
RAMP C
PI-51
PI-52
PI-53
SANTAN FREEWAY
Cst ℄
DETENTION BASIN K
5.2 Ac
Sta 1691+69
5-10'x6'x450' RBC
C242
RAMP B
RAMP D
48" Mainline Gravity Storm Drain
SANTAN/ARIZONA AVE PROPERTIES
ARIZONA AVENUE
42" Mainline Gravity Storm Drain
ARIZONA AVE INVESTMENTS
Section Line
MATCH LINE STA 1670+00 DWG NO. D-85
MATCH LINE STA 1696+00 DWG NO. D-87
Basin K Notes:
Top Elevation=1220.00
Overflow Elevation=1219.00
100-Yr High Water Elevation=1216.00
100-Yr Storage Volume=36 Acre-Feet
TYPICAL CHANNEL SECTION
STA 1570+65 TO STA 1675+00
Sta 1680+50
1236.00
(Optional Discharge to Channel)
Sta 1677+50
1232.10
Santan Sta 1675+92.09 = Arizona Ave Sta 20+00
+2.223%
Mainline Profile Grade
-1.239%
Santan Sta 1690+39.04 = SPRR
5-10'x6'x450' RBC
C242
PI-53
24" ø S=0.0130'/ft
Exst Ground ø Cst ℄
1202.22
1211.00
0.00176'/ft
IE 1216.00
IE 1201.00
DETENTION BASIN K
PRELIMINARY
NOT FOR CONSTRUCTION
Sta 1677+50
1200.00
Basin K Gravity Drain
30" ø S=+0.00071'/ft
PI-51
48" ø S=0.0029'/ft
Sta 1674+00
1199.00
1203.50
PI-52
42" ø S=0.0029'/ft
1197.83
1250
1240
1230
1220
1210
1200
1190
1670
1675
1680
1685
1690
1695
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
DRAINAGE CONCEPT PLANS
STA 1670+00 TO STA 1696+00
HDR Engineering, Inc.
TRACS NO. H-2222-010
DRESAN04
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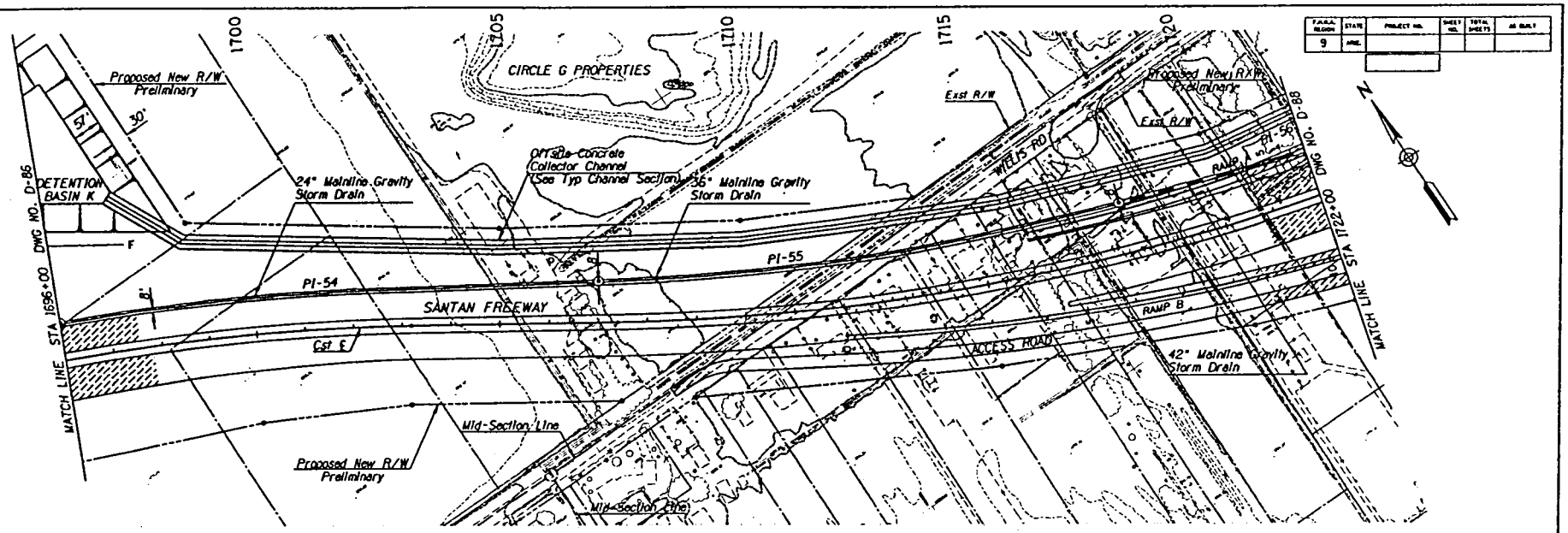
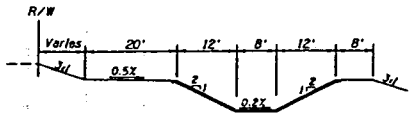
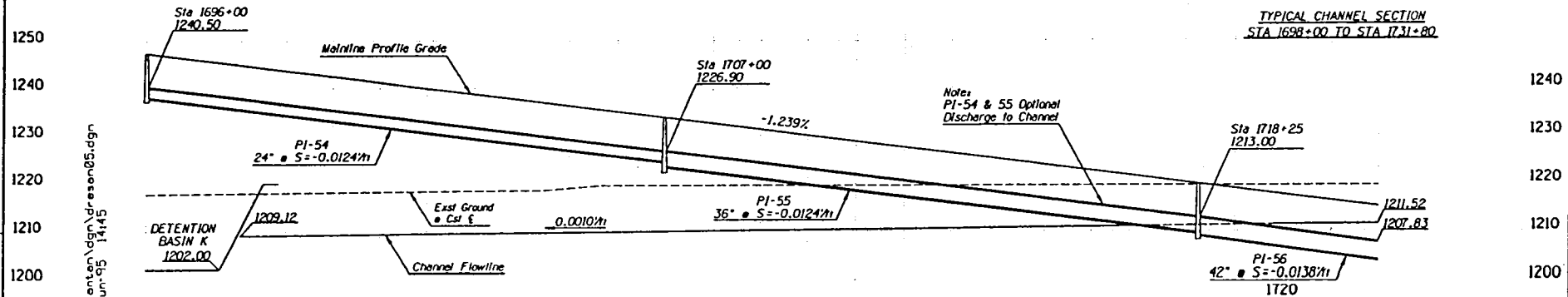
DATE: 26-Jun-95 13:46





TYPICAL CHANNEL SECTION
STA 1698+00 TO STA 1731+80



PRELIMINARY
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	JCN	6/95
DRAWN	EAJ	6/95
CHECKED	AJZ	6/95

HDR Engineering, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY

DRAINAGE CONCEPT PLANS
STA 1696+00 TO STA 1722+00

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

DWG NO. 9-87 OF

TRACS NO. H-2222-01D | DRESAN05 | ___ OF ___

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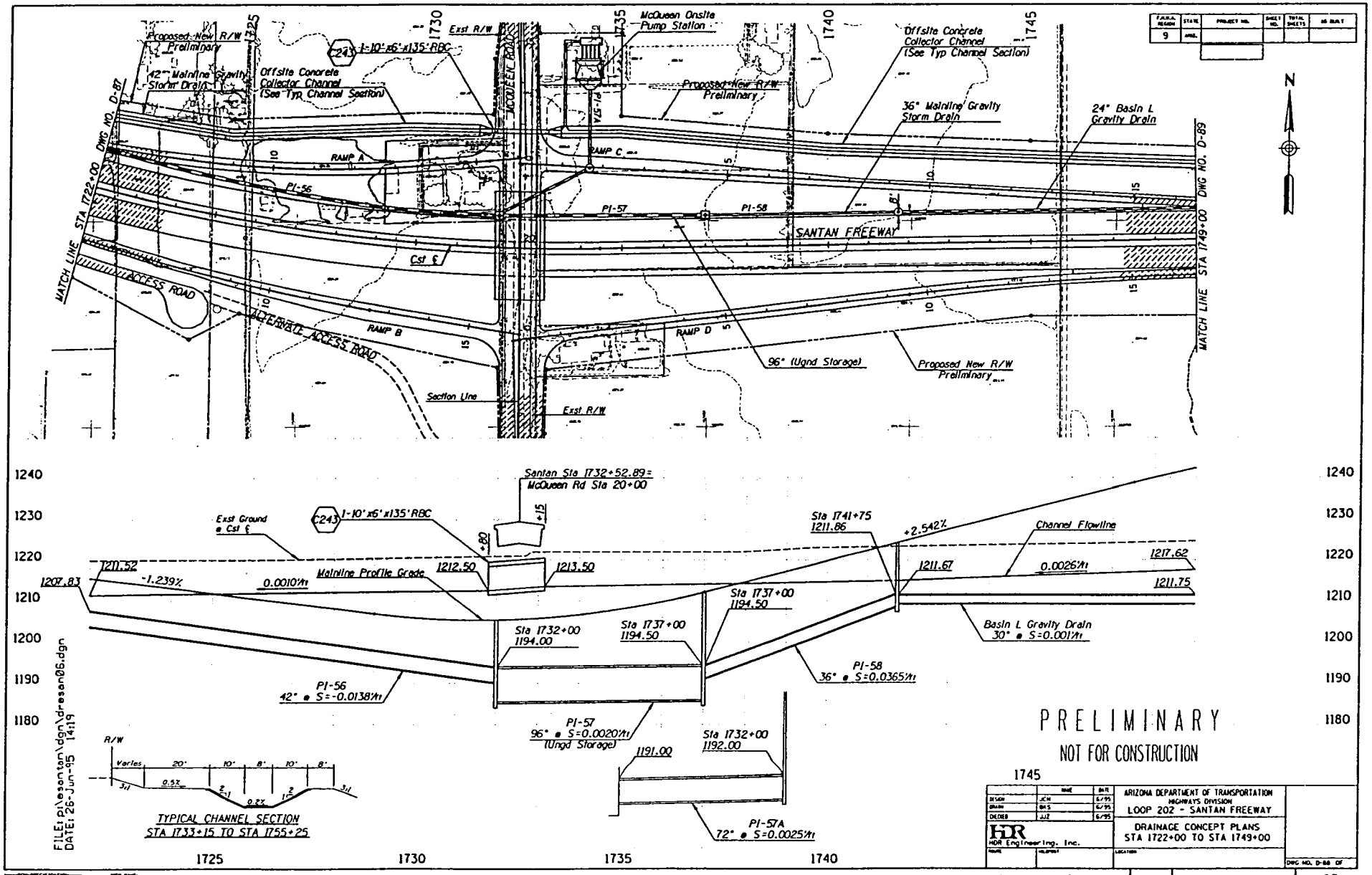
DATE: 26-Jun-95 14:45

CONSTRUCTION DISPLAY ON


Proposed New R/W Preliminary
42" Mainline Gravity Storm Drain
Offsite Concrete Collector Channel (See Typ Channel Section)
C243 1-10'x6'x135' RBC
Exst R/W
McQueen Onsite Pump Station
McQueen Rd
Proposed New R/W Preliminary
Offsite Concrete Collector Channel (See Typ Channel Section)
36" Mainline Gravity Storm Drain
24" Basin L Gravity Drain
DWG NO. D-87
DWG NO. D-89
STA 1722+00
STA 1749+00
MATCH LINE
RAMP A
RAMP B
RAMP C
RAMP D
PI-56
PI-57
PI-58
SANTAN FREEWAY
Cst ℄
ACCESS ROAD
ALTERNATE ACCESS ROAD
Section Line
96" (Ugnd Storage)
1725
1730
1735
1740
1745
N
Santan Sta 1732+52.89 = McQueen Rd Sta 20+00
Exst Ground @ Cst ℄
C243 1-10'x6'x135' RBC
+15
+80
1211.52
1207.83
-1.239%
0.0010'/ft
Mainline Profile Grade
1212.50
1213.50
Sta 1741+75
1211.86
+2.542%
Channel Flowline
1211.67
0.0026'/ft
1217.62
1211.75
Sta 1737+00
1194.50
Sta 1732+00
1194.00
Sta 1737+00
1194.50
Basin L Gravity Drain
30" @ S=0.001'/ft
PI-58
36" @ S=0.0365'/ft
PI-56
42" @ S=-0.0138'/ft
PI-57
96" @ S=0.0020'/ft
(Ugnd Storage)
1191.00
Sta 1732+00
1192.00
PI-57A
72" @ S=0.0025'/ft
1240
1230
1220
1210
1200
1190
1180
R/W
Varies
20'
10'
8'
10'
8'
3:1
0.5%
2:1
0.7%
1:2
TYPICAL CHANNEL SECTION
STA 1733+15 TO STA 1755+25
PRELIMINARY
NOT FOR CONSTRUCTION
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
DRAINAGE CONCEPT PLANS
STA 1722+00 TO STA 1749+00
HDR Engineering, Inc.
DESIGN JCH 6/95
DRAWN BKS 6/95
CHECKED JJZ 6/95
DWG NO. D-88
TRACS NO. H-2222-01D
DRESAN06
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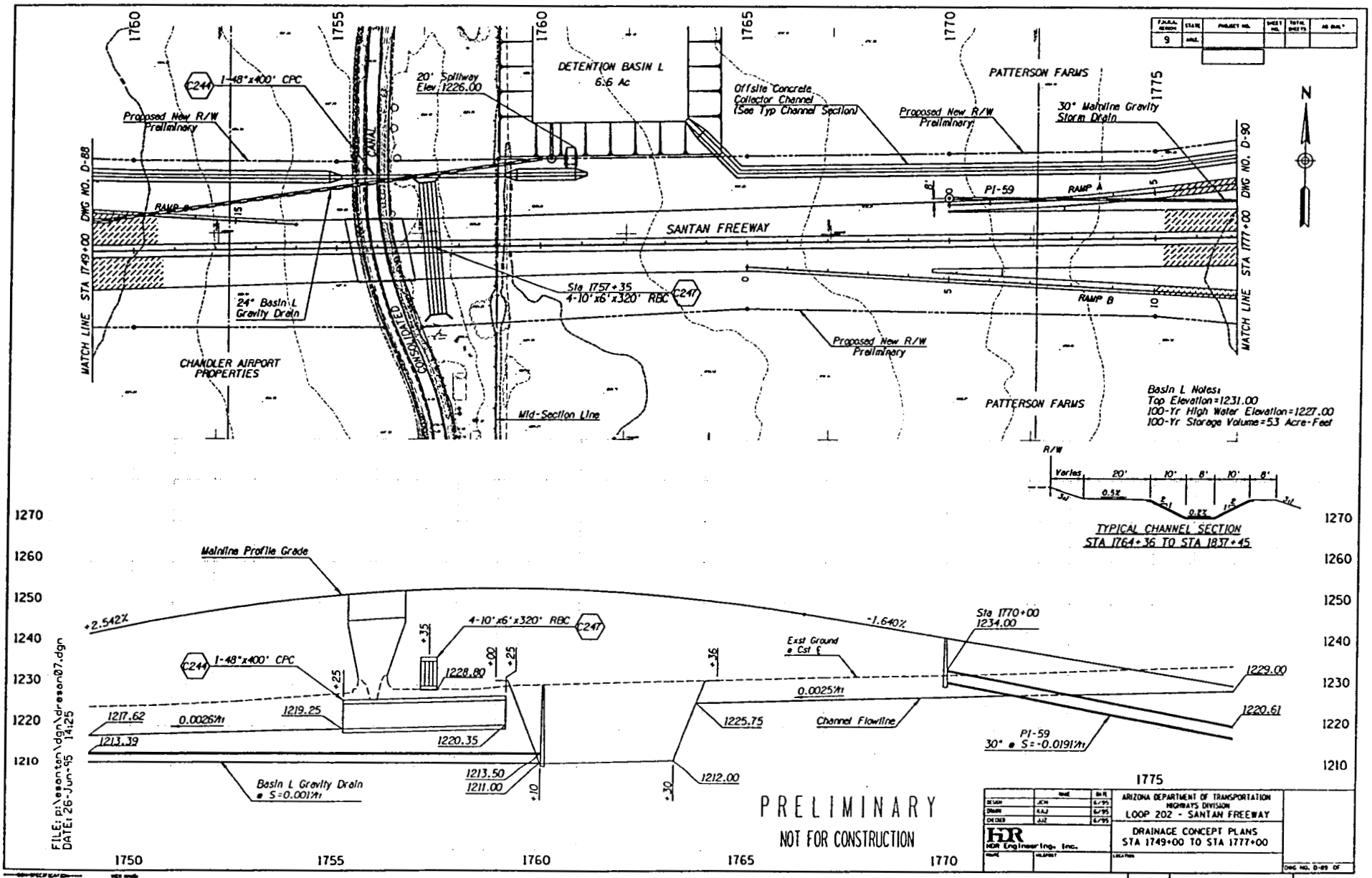
1760
1755
1760
1765
1770
1775
C244
1-48"x400' CPC
20' Spillway
Elev. 1226.00
DETENTION BASIN L
6.6 Ac
Offsite Concrete
Collector Channel
(See Typ Channel Section)
PATTERSON FARMS
Proposed New R/W
Preliminary
30" Mainline Gravity
Storm Drain
CANAL
CONSOLIDATED
MATCH LINE STA 1749+00 DWG NO. D-88
MATCH LINE STA 1777+00 DWG NO. D-90
RAMP B
PI-59
RAMP A
SANTAN FREEWAY
Sta 1757+35
4-10'x6'x320' RBC
C247
24" Basin L
Gravity Drain
CHANDLER AIRPORT
PROPERTIES
Mid-Section Line
N
Basin L Notes:
Top Elevation=1231.00
100-Yr High Water Elevation=1227.00
100-Yr Storage Volume=53 Acre-Feet
R/W
Varies
20'
10'
8'
10'
8'
0.5%
0.5%
TYPICAL CHANNEL SECTION
STA 1764+36 TO STA 1837+45
1270
1260
1250
1240
1230
1220
1210
Mainline Profile Grade
+2.542%
-1.640%
Sta 1770+00
1234.00
Exst Ground
@ Cst ℄
1229.00
1220.61
0.0025'/ft
Channel Flowline
PI-59
30" @ S=-0.0191'/ft
1217.62
0.0026'/ft
1219.25
1213.39
1220.35
1228.80
1225.75
1212.00
1213.50
1211.00
Basin L Gravity Drain
@ S=0.001'/ft
+35
+00
+25
+36
+10
+30
1750
1755
1760
1765
1770
1775
PRELIMINARY
NOT FOR CONSTRUCTION
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
DRAINAGE CONCEPT PLANS
STA 1749+00 TO STA 1777+00
HDR Engineering, Inc.
TRACS NO. H-2222-01D
DRESAN07
DWG NO. D-89 OF
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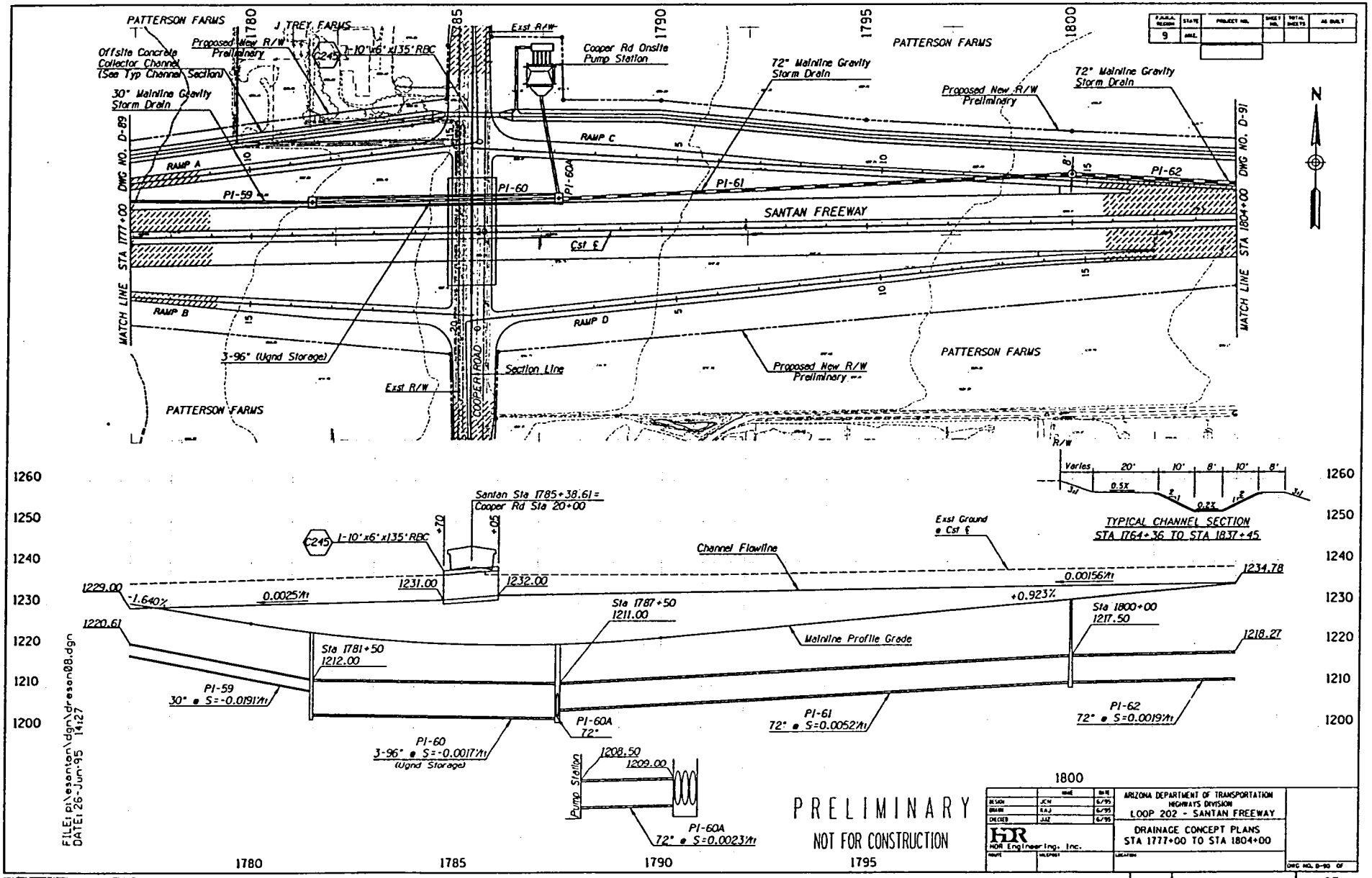
DATE: 26-Jun-95 14:25


PATTERSON FARMS
J TREY FARMS
Proposed New R/W Preliminary
Offsite Concrete Collector Channel (See Typ Channel Section)
30" Mainline Gravity Storm Drain
1-10'x6'x135' RBC
Exst R/W
Cooper Rd Onsite Pump Station
72" Mainline Gravity Storm Drain
RAMP A
RAMP B
RAMP C
RAMP D
PI-59
PI-60
PI-60A
PI-61
PI-62
SANTAN FREEWAY
Cst ℄
3-96" (Ugnd Storage)
Section Line
COOPER ROAD
MATCH LINE STA 1777+00 DWG NO. D-89
MATCH LINE STA 1804+00 DWG NO. D-91
TYPICAL CHANNEL SECTION
STA 1764+36 TO STA 1837+45
Santan Sta 1785+38.61 = Cooper Rd Sta 20+00
Exst Ground @ Cst ℄
Channel Flowline
Mainline Profile Grade
Sta 1781+50 1212.00
Sta 1787+50 1211.00
Sta 1800+00 1217.50
PI-59 30" @ S=-0.0191'/ft
PI-60 3-96" @ S=-0.0017'/ft (Ugnd Storage)
PI-60A 72"
PI-60A 72" @ S=0.0023'/ft
PI-61 72" @ S=0.0052'/ft
PI-62 72" @ S=0.0019'/ft
Pump Station
PRELIMINARY
NOT FOR CONSTRUCTION
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
DRAINAGE CONCEPT PLANS
STA 1777+00 TO STA 1804+00
HDR Engineering, Inc.
TRACS NO. H-2222-01D
DRESAN08
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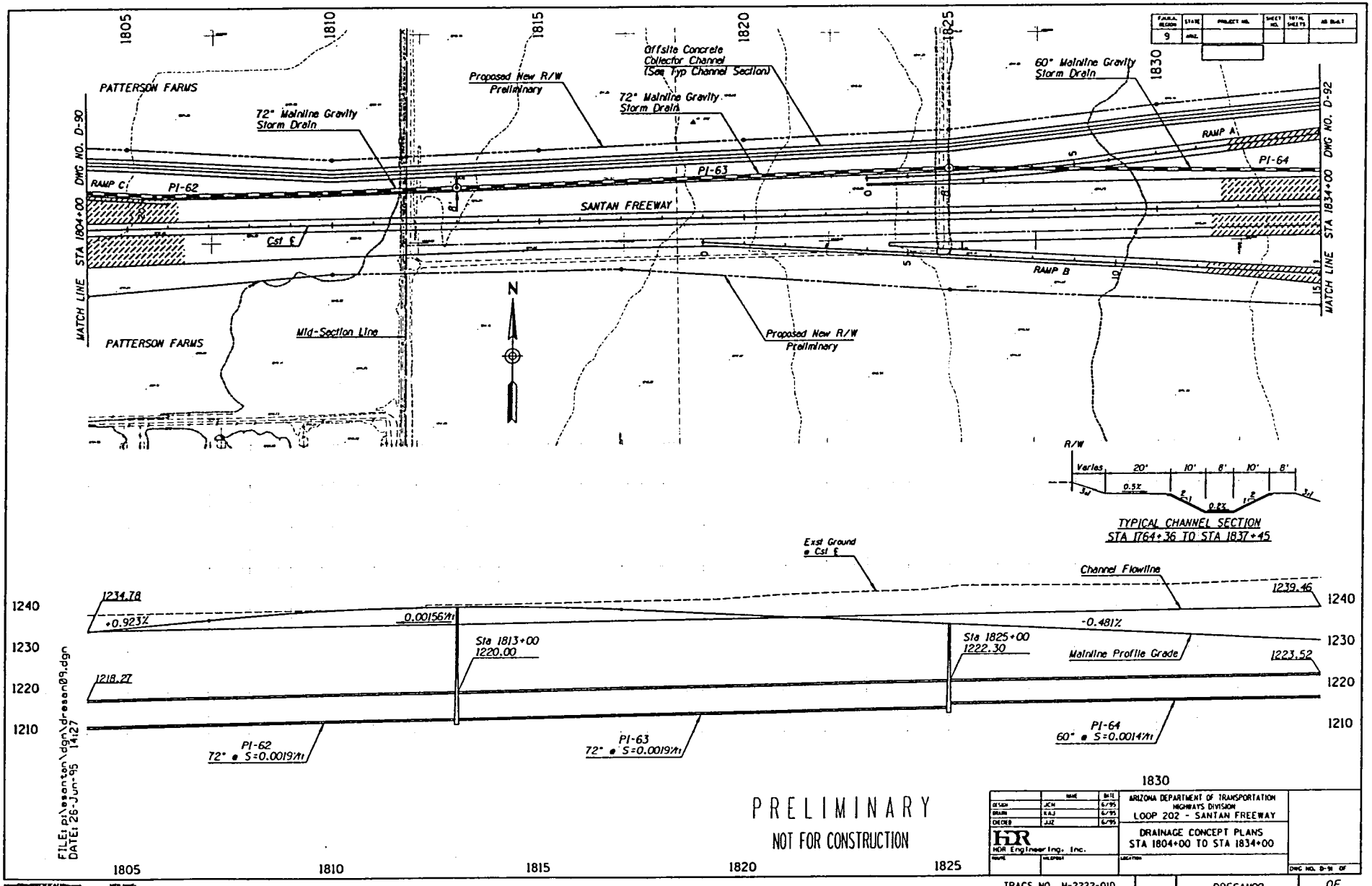
DATE: 26-Jun-95 14:27


1805
1810
1815
1820
1825
1830
PATTERSON FARMS
72" Mainline Gravity Storm Drain
Proposed New R/W Preliminary
Offsite Concrete Collector Channel (See Typ Channel Section)
72" Mainline Gravity Storm Drain
60" Mainline Gravity Storm Drain
RAMP C
PI-62
PI-63
PI-64
RAMP A
SANTAN FREEWAY
Cst ℄
RAMP B
Mid-Section Line
Proposed New R/W Preliminary
PATTERSON FARMS
MATCH LINE STA 1804+00 DWG NO. D-90
MATCH LINE STA 1834+00 DWG NO. D-92
N
R/W
Varies
20'
10'
8'
10'
8'
0.5%
0.5%
TYPICAL CHANNEL SECTION
STA 1764+36 TO STA 1837+45
Exst Ground @ Cst ℄
Channel Flowline
1234.78
1239.46
+0.923%
0.00156%/ft
-0.481%
Sta 1813+00
1220.00
Sta 1825+00
1222.30
Mainline Profile Grade
1223.52
1218.27
PI-62
72" @ S=0.0019%/ft
PI-63
72" @ S=0.0019%/ft
PI-64
60" @ S=0.0014%/ft
1240
1230
1220
1210
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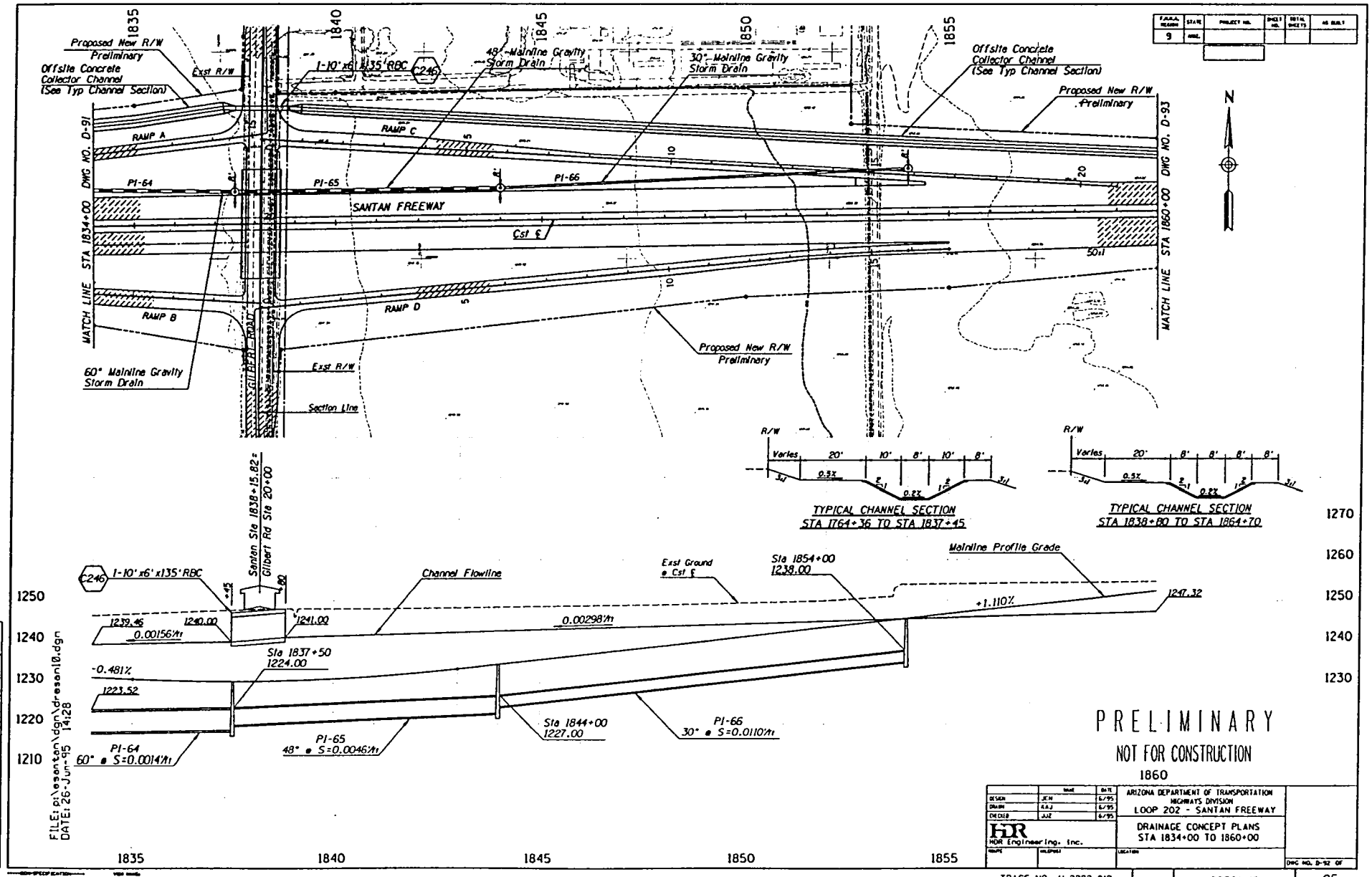
DATE: 26-Jun-95 14:27
PRELIMINARY
NOT FOR CONSTRUCTION
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
DRAINAGE CONCEPT PLANS
STA 1804+00 TO STA 1834+00
HDR Engineering, Inc.
TRACS NO. H-2222-01D
DRESAN09
OF


Proposed New R/W
Preliminary
Offsite Concrete
Collector Channel
(See Typ Channel Section)
Exst R/W
1-10' x6' x135' RBC
C246
48" Mainline Gravity
Storm Drain
30" Mainline Gravity
Storm Drain
Offsite Concrete
Collector Channel
(See Typ Channel Section)
Proposed New R/W
Preliminary
RAMP A
RAMP C
PI-64
PI-65
PI-66
SANTAN FREEWAY
Cst ℄
RAMP B
RAMP D
GILBERT ROAD
60" Mainline Gravity
Storm Drain
Exst R/W
Section Line
Proposed New R/W
Preliminary
MATCH LINE STA 1834+00 DWG NO. D-91
MATCH LINE STA 1860+00 DWG NO. D-93
N
R/W
Varies
20'
10'
8'
0.5%
0.2%
TYPICAL CHANNEL SECTION
STA 1764+36 TO STA 1837+45
TYPICAL CHANNEL SECTION
STA 1838+80 TO STA 1864+70
Santan Sta 1838+15.82 =
Gilbert Rd Sta 20+00
1-10' x6' x135' RBC
Channel Flowline
Exst Ground
@ Cst ℄
Sta 1854+00
1238.00
Mainline Profile Grade
1247.32
+1.110%
1239.46
1240.00
1241.00
0.00156'/ft
0.00298'/ft
Sta 1837+50
1224.00
-0.481%
1223.52
Sta 1844+00
1227.00
PI-66
30" @ S=0.0110'/ft
PI-65
48" @ S=0.0046'/ft
PI-64
60" @ S=0.0014'/ft
1250
1240
1230
1220
1210
1270
1260
1835
1840
1845
1850
1855
PRELIMINARY
NOT FOR CONSTRUCTION
1860
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
DRAINAGE CONCEPT PLANS
STA 1834+00 TO 1860+00
HDR Engineering, Inc.
DESIGN JEN 6/95
DRAWN KAJ 6/95
CHECKED JJZ 6/95
TRACS NO. H-2222-01D
DRESAN10
DWG NO. D-92 OF
OF
FILE: p:\esantan\dgn\dresan10.dgn
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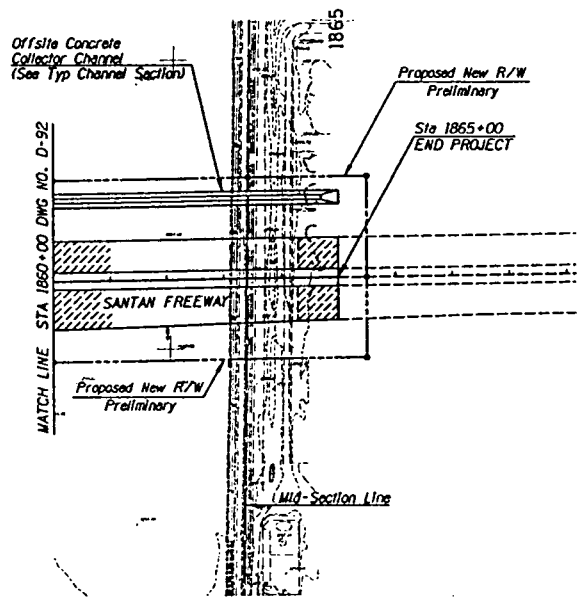
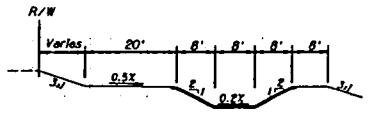
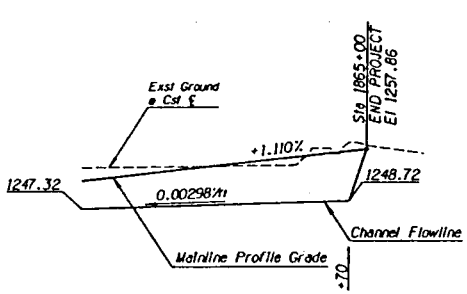
F.A.R.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				





TYPICAL CHANNEL SECTION
STA 1838+80 TO STA 1864+70



PRELIMINARY

NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	JCH	6/95
DRAWN	K.A.J.	6/95
CHECKED	J.J.Z.	6/95

HDR Engineering, Inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY

DRAINAGE CONCEPT PLANS
STA 1860+00 TO STA 1865+00

DWG NO. D-93 OF

TRACS NO. H-2222-01D

DRESAN11

___ OF ___

FILE: p:\esanten\dgn\dresan11.dgn
DATE: 26-Jun-95 14:29

FILE: p:\esanten\dgn\dresan11.dgn
DATE: 26-Jun-95 14:29

CONSTRUCTION DISPLAY ON

APPENDIX 2

Santan Freeway

Pump Station Storage Analysis HEC-1 Models

Dobson, McQueen, Cooper Pump Stations

```
1****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*             MAY   1991               *                    *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.0.1E             *                    *         609 SECOND STREET            *
*                                      *                    *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE  02/11/94  TIME  10:45:38  *                    *         (916) 551-1748               *
*                                      *                    *                                      *
****************************************                    ****************************************

                                        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

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

         1          ID    FILE: SYS1_D2G.DAT
         2          ID    DATE: JAN. 1994
         3          ID    SANTAN FREEWAY - DOBSON ROAD TO GILBERT ROAD / ON-SITE DRAINAGE
         4          ID    DOBSON PUMP STATION PIPE STORAGE ANALYSIS
         5          ID    INPUT HYDROGRAPH FROM ADOT HYDROLOGY MANUAL TABLE 2.2
         6          ID    DRAINAGE AREA FROM STA. 1555+00 TO STA. 1688+50
         7          IT       2                    240
         8          IO       2

         9          KK    PUMPIN
        10          KM    INFLOW HYDROGRAPH FOR DOBSON PUMP STATION
        11          BA  0.1797
        12          IN      15
        13          QI       0     2.5       5     7.5      10      12      17      25      52     222
        14          QI     293     149      78      60      38      33      26      24      20      18
        15          QI      16      14      13      12      11      10     9.5       9     8.5       8
        16          QI       4       0

        17          KK    PUMP REACH
        18          KM    STORAGE ANALYSIS / MINIMUM ROADWAY ELEVATION = 1171+
        19          KM    MAXIMUM WATER LEVEL = 1166 / 2-96" 600 LF STORAGE PIPES
        20          RS       1    STOR       0
        21          SV       0    0.57    2.35
        22          SE  1141.5    1157    1166
        23          SQ    0.01    0.01    0.01
        24          WP    1155      22  1141.5
        25          WP    1157      50    1148
        26          WP    1159      50    1149
        27          WP    1160      50    1150
        28          WP    1161      50    1151
```

```
            29          ZZ
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             MAY   1991                *
*           VERSION 4.0.1E              *
*                                       *
*  RUN DATE  02/11/94  TIME  10:45:38   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

```
                         FILE: SYS1_D2G.DAT
                         DATE: JAN. 1994
                         SANTAN FREEWAY - DOBSON ROAD TO GILBERT ROAD / ON-SITE DRAINAGE
                         DOBSON PUMP STATION PIPE STORAGE ANALYSIS
                         INPUT HYDROGRAPH FROM ADOT HYDROLOGY MANUAL TABLE 2.2
                         DRAINAGE AREA FROM STA. 1555+00 TO STA. 1688+50

  8 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          2  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          2  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1   0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        240  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1   0  ENDING DATE
                     NDTIME       0758  ENDING TIME
                      ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL    0.03 HOURS
                      TOTAL TIME BASE    7.97 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


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


          **************
          *            *
  9 KK    *     PUMP   *     IN
          *            *
          **************
                         INFLOW HYDROGRAPH FOR DOBSON PUMP STATION

 12 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN         15  TIME INTERVAL IN MINUTES
                     JXDATE      1   0  STARTING DATE
                     JXTIME          0  STARTING TIME

             SUBBASIN RUNOFF DATA
```

11 BA SUBBASIN CHARACTERISTICS
TAREA 0.18 SUBBASIN AREA

***

HYDROGRAPH AT STATION PUMP

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0200	61	52.	1		0400	121	26.	1		0600	181	11.
1		0002	2	0.	1		0202	62	75.	1		0402	122	26.	1		0602	182	11.
1		0004	3	1.	1		0204	63	97.	1		0404	123	25.	1		0604	183	11.
1		0006	4	1.	1		0206	64	120.	1		0406	124	25.	1		0606	184	11.
1		0008	5	1.	1		0208	65	143.	1		0408	125	25.	1		0608	185	10.
1		0010	6	2.	1		0210	66	165.	1		0410	126	25.	1		0610	186	10.
1		0012	7	2.	1		0212	67	188.	1		0412	127	24.	1		0612	187	10.
1		0014	8	2.	1		0214	68	211.	1		0414	128	24.	1		0614	188	10.
1		0016	9	3.	1		0216	69	227.	1		0416	129	24.	1		0616	189	10.
1		0018	10	3.	1		0218	70	236.	1		0418	130	23.	1		0618	190	10.
1		0020	11	3.	1		0220	71	246.	1		0420	131	23.	1		0620	191	10.
1		0022	12	4.	1		0222	72	255.	1		0422	132	22.	1		0622	192	10.
1		0024	13	4.	1		0224	73	265.	1		0424	133	22.	1		0624	193	10.
1		0026	14	4.	1		0226	74	274.	1		0426	134	21.	1		0626	194	10.
1		0028	15	5.	1		0228	75	284.	1		0428	135	21.	1		0628	195	10.
1		0030	16	5.	1		0230	76	293.	1		0430	136	20.	1		0630	196	10.
1		0032	17	5.	1		0232	77	274.	1		0432	137	20.	1		0632	197	9.
1		0034	18	6.	1		0234	78	255.	1		0434	138	19.	1		0634	198	9.
1		0036	19	6.	1		0236	79	235.	1		0436	139	19.	1		0636	199	9.
1		0038	20	6.	1		0238	80	216.	1		0438	140	19.	1		0638	200	9.
1		0040	21	7.	1		0240	81	197.	1		0440	141	19.	1		0640	201	9.
1		0042	22	7.	1		0242	82	178.	1		0442	142	18.	1		0642	202	9.
1		0044	23	7.	1		0244	83	159.	1		0444	143	18.	1		0644	203	9.
1		0046	24	8.	1		0246	84	144.	1		0446	144	18.	1		0646	204	9.
1		0048	25	8.	1		0248	85	135.	1		0448	145	18.	1		0648	205	9.
1		0050	26	8.	1		0250	86	125.	1		0450	146	17.	1		0650	206	9.
1		0052	27	9.	1		0252	87	116.	1		0452	147	17.	1		0652	207	9.
1		0054	28	9.	1		0254	88	106.	1		0454	148	17.	1		0654	208	9.
1		0056	29	9.	1		0256	89	97.	1		0456	149	17.	1		0656	209	9.
1		0058	30	10.	1		0258	90	87.	1		0458	150	16.	1		0658	210	9.
1		0100	31	10.	1		0300	91	78.	1		0500	151	16.	1		0700	211	9.
1		0102	32	10.	1		0302	92	76.	1		0502	152	16.	1		0702	212	8.
1		0104	33	11.	1		0304	93	73.	1		0504	153	15.	1		0704	213	8.
1		0106	34	11.	1		0306	94	71.	1		0506	154	15.	1		0706	214	8.
1		0108	35	11.	1		0308	95	68.	1		0508	155	15.	1		0708	215	8.
1		0110	36	11.	1		0310	96	66.	1		0510	156	15.	1		0710	216	8.
1		0112	37	12.	1		0312	97	64.	1		0512	157	14.	1		0712	217	8.
1		0114	38	12.	1		0314	98	61.	1		0514	158	14.	1		0714	218	8.
1		0116	39	12.	1		0316	99	59.	1		0516	159	14.	1		0716	219	8.
1		0118	40	13.	1		0318	100	56.	1		0518	160	14.	1		0718	220	7.
1		0120	41	14.	1		0320	101	53.	1		0520	161	14.	1		0720	221	7.
1		0122	42	14.	1		0322	102	50.	1		0522	162	14.	1		0722	222	6.
1		0124	43	15.	1		0324	103	47.	1		0524	163	13.	1		0724	223	6.
1		0126	44	16.	1		0326	104	44.	1		0526	164	13.	1		0726	224	5.
1		0128	45	16.	1		0328	105	41.	1		0528	165	13.	1		0728	225	5.
1		0130	46	17.	1		0330	106	38.	1		0530	166	13.	1		0730	226	4.
1		0132	47	18.	1		0332	107	37.	1		0532	167	13.	1		0732	227	4.
1		0134	48	19.	1		0334	108	37.	1		0534	168	13.	1		0734	228	4.
1		0136	49	20.	1		0336	109	36.	1		0536	169	13.	1		0736	229	4.
1		0138	50	21.	1		0338	110	35.	1		0538	170	12.	1		0738	230	4.
1		0140	51	22.	1		0340	111	35.	1		0540	171	12.	1		0740	231	4.
1		0142	52	23.	1		0342	112	34.	1		0542	172	12.	1		0742	232	4.
1		0144	53	24.	1		0344	113	33.	1		0544	173	12.	1		0744	233	4.
1		0146	54	27.	1		0346	114	33.	1		0546	174	12.	1		0746	234	4.

```
    1    0148   55      30.   *   1    0348  115      32.   *   1    0548  175      12.   *   1    0748  235       4.
    1    0150   56      34.   *   1    0350  116      31.   *   1    0550  176      12.   *   1    0750  236       4.
    1    0152   57      38.   *   1    0352  117      30.   *   1    0552  177      12.   *   1    0752  237       4.
    1    0154   58      41.   *   1    0354  118      29.   *   1    0554  178      11.   *   1    0754  238       4.
    1    0156   59      45.   *   1    0356  119      28.   *   1    0556  179      11.   *   1    075[illegible]  239       4.
    1    0158   60      48.   *   1    0358  120      27.   *   1    0558  180      11.   *   1    0758  240       4.
                                *                              *                              *
*****************************************************************************************************************************

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       7.97-HR
+   (CFS)       (HR)
                                  (CFS)
+    293.       2.50                 49.          38.          38.          38.
                                (INCHES)        2.525        2.614        2.614        2.614
                                 (AC-FT)          24.          25.          25.          25.

                              CUMULATIVE AREA =    0.18 SQ MI


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


            **************
            *            *
  17 KK     *     PUMP   *      REACH
            *            *
            **************
                                STORAGE ANALYSIS / MINIMUM ROADWAY ELEVATION = 1171+
                                MAXIMUM WATER LEVEL = 1166 / 2-96" 600 LF STORAGE PIPES

              HYDROGRAPH ROUTING DATA

  20 RS         STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC       0.00  INITIAL CONDITION
                          X       0.00 WORKING R AND D COEFFICIENT

  21 SV           STORAGE        0.0       0.6       2.3

  22 SE         ELEVATION     1141.50   1157.00   1166.00

  23 SQ         DISCHARGE        0.        0.        0.

  24 WP         PUMPING DATA

                  PUMP ON    PUMPING    PUMP OFF
                ELEVATION     RATE     ELEVATION

                  1155.0      22.       1141.5
                  1157.0      50.       1148.0
                  1159.0      50.       1149.0
                  1160.0      50.       1150.0
                  1161.0      50.       1151.0

                   ISTAD              PUMP FLOW HYDROGRAPH IDENTIFICATION
                                                        ***
*****************************************************************************************************************************

                                                HYDROGRAPH AT STATION     PUMP
*****************************************************************************************************************************
```

DA	MON	HRMN	ORD	PUMP Q	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	0.	0.0	1141.5
1		0002	2	0.	0.	0.0	1141.5
1		0004	3	0.	0.	0.0	1141.5
1		0006	4	0.	0.	0.0	1141.6
1		0008	5	0.	0.	0.0	1141.7
1		0010	6	0.	0.	0.0	1141.8
1		0012	7	0.	0.	0.0	1141.9
1		0014	8	0.	0.	0.0	1142.1
1		0016	9	0.	0.	0.0	1142.3
1		0018	10	0.	0.	0.0	1142.5
1		0020	11	0.	0.	0.0	1142.7
1		0022	12	0.	0.	0.1	1143.0
1		0024	13	0.	0.	0.1	1143.3
1		0026	14	0.	0.	0.1	1143.6
1		0028	15	0.	0.	0.1	1143.9
1		0030	16	0.	0.	0.1	1144.3
1		0032	17	0.	0.	0.1	1144.7
1		0034	18	0.	0.	0.1	1145.1
1		0036	19	0.	0.	0.1	1145.5
1		0038	20	0.	0.	0.2	1146.0
1		0040	21	0.	0.	0.2	1146.5
1		0042	22	0.	0.	0.2	1147.0
1		0044	23	0.	0.	0.2	1147.5
1		0046	24	0.	0.	0.2	1148.1
1		0048	25	0.	0.	0.3	1148.7
1		0050	26	0.	0.	0.3	1149.3
1		0052	27	0.	0.	0.3	1149.9
1		0054	28	0.	0.	0.3	1150.6
1		0056	29	0.	0.	0.4	1151.3
1		0058	30	0.	0.	0.4	1152.0
1		0100	31	0.	0.	0.4	1152.7
1		0102	32	0.	0.	0.4	1153.5
1		0104	33	0.	0.	0.5	1154.3
1		0106	34	0.	0.	0.5	1155.0
1		0108	35	22.	0.	0.5	1154.2
1		0110	36	22.	0.	0.4	1153.4
1		0112	37	22.	0.	0.4	1152.6
1		0114	38	22.	0.	0.4	1151.8
1		0116	39	22.	0.	0.4	1151.1
1		0118	40	22.	0.	0.3	1150.4
1		0120	41	22.	0.	0.3	1149.8
1		0122	42	22.	0.	0.3	1149.2
1		0124	43	22.	0.	0.3	1148.6
1		0126	44	22.	0.	0.2	1148.1
1		0128	45	22.	0.	0.2	1147.7
1		0130	46	22.	0.	0.2	1147.3
1		0132	47	22.	0.	0.2	1146.9
1		0134	48	22.	0.	0.2	1146.7
1		0136	49	22.	0.	0.2	1146.5
1		0138	50	22.	0.	0.2	1146.4
1		0140	51	22.	0.	0.2	1146.4
1		0142	52	22.	0.	0.2	1146.4
1		0144	53	22.	0.	0.2	1146.6
1		0146	54	22.	0.	0.2	1146.9
1		0148	55	22.	0.	0.2	1147.4
1		0150	56	22.	0.	0.2	1148.1
1		0152	57	22.	0.	0.3	1149.1
1		0154	58	22.	0.	0.3	1150.5
1		0156	59	22.	0.	0.4	1152.0
1		0158	60	22.	0.	0.5	1153.9
1		0200	61	22.	0.	0.5	1156.0
1		0202	62	22.	0.	0.6	1157.4
1		0204	63	72.	0.	0.7	1157.6
1		0206	64	72.	0.	0.8	1158.1

DA	MON	HRMN	ORD	PUMP Q	OUTFLOW	STORAGE	STAGE
1		0400	121	72.	0.	0.4	1153.6
1		0402	122	72.	0.	0.3	1150.2
1		0404	123	72.	0.	0.2	1146.7
1		0406	124	22.	0.	0.2	1147.0
1		0408	125	22.	0.	0.2	1147.2
1		0410	126	22.	0.	0.2	1147.4
1		0412	127	22.	0.	0.2	1147.6
1		0414	128	22.	0.	0.2	1147.8
1		0416	129	22.	0.	0.2	1147.9
1		0418	130	22.	0.	0.2	1148.0
1		0420	131	22.	0.	0.2	1148.1
1		0422	132	22.	0.	0.2	1148.1
1		0424	133	22.	0.	0.2	1148.1
1		0426	134	22.	0.	0.2	1148.0
1		0428	135	22.	0.	0.2	1148.0
1		0430	136	22.	0.	0.2	1147.8
1		0432	137	22.	0.	0.2	1147.7
1		0434	138	22.	0.	0.2	1147.5
1		0436	139	22.	0.	0.2	1147.3
1		0438	140	22.	0.	0.2	1147.1
1		0440	141	22.	0.	0.2	1146.8
1		0442	142	22.	0.	0.2	1146.6
1		0444	143	22.	0.	0.2	1146.3
1		0446	144	22.	0.	0.2	1146.0
1		0448	145	22.	0.	0.2	1145.7
1		0450	146	22.	0.	0.1	1145.3
1		0452	147	22.	0.	0.1	1145.0
1		0454	148	22.	0.	0.1	1144.6
1		0456	149	22.	0.	0.1	1144.2
1		0458	150	22.	0.	0.1	1143.8
1		0500	151	22.	0.	0.1	1143.3
1		0502	152	22.	0.	0.1	1142.9
1		0504	153	22.	0.	0.0	1142.4
1		0506	154	22.	0.	0.0	1141.9
1		0508	155	22.	0.	0.0	1141.5
1		0510	156	0.	0.	0.0	1142.6
1		0512	157	0.	0.	0.1	1143.7
1		0514	158	0.	0.	0.1	1144.8
1		0516	159	0.	0.	0.2	1145.8
1		0518	160	0.	0.	0.2	1146.9
1		0520	161	0.	0.	0.2	1147.9
1		0522	162	0.	0.	0.3	1148.9
1		0524	163	0.	0.	0.3	1149.9
1		0526	164	0.	0.	0.3	1150.9
1		0528	165	0.	0.	0.4	1151.9
1		0530	166	0.	0.	0.4	1152.9
1		0532	167	0.	0.	0.5	1153.8
1		0534	168	0.	0.	0.5	1154.8
1		0536	169	0.	0.	0.5	1155.7
1		0538	170	22.	0.	0.5	1155.0
1		0540	171	22.	0.	0.5	1154.3
1		0542	172	22.	0.	0.4	1153.6
1		0544	173	22.	0.	0.4	1152.8
1		0546	174	22.	0.	0.4	1152.1
1		0548	175	22.	0.	0.4	1151.3
1		0550	176	22.	0.	0.3	1150.6
1		0552	177	22.	0.	0.3	1149.8
1		0554	178	22.	0.	0.3	1149.0
1		0556	179	22.	0.	0.2	1148.2
1		0558	180	22.	0.	0.2	1147.4
1		0600	181	22.	0.	0.2	1146.6
1		0602	182	22.	0.	0.2	1145.7
1		0604	183	22.	0.	0.1	1144.9
1		0606	184	22.	0.	0.1	1144.0

1	0208	65	72.	0.	0.9	1158.9	*	1	0608	185	22.	0.	0.1	1143.2
1	0210	66	72.	0.	1.2	1160.1	*	1	0610	186	22.	0.	0.0	1142.3
1	0212	67	172.	0.	1.2	1160.1	*	1	0612	187	22.	0.	0.0	1141.5
1	0214	68	172.	0.	1.3	1160.5	*	1	0614	188	0.	0.	0.0	1141.5
1	0216	69	172.	0.	1.4	1161.2	*	1	0616	189	0.	0.	0.0	1142.3
1	0218	70	222.	0.	1.4	1161.3	*	1	0618	190	0.	0.	0.1	1143.0
1	0220	71	222.	0.	1.5	1161.6	*	1	0620	191	0.	0.	0.1	1143.7
1	0222	72	222.	0.	1.5	1161.9	*	1	0622	192	0.	0.	0.1	1144.5
1	0224	73	222.	0.	1.7	1162.5	*	1	0624	193	0.	0.	0.1	1145.2
1	0226	74	222.	0.	1.8	1163.1	*	1	0626	194	0.	0.	0.2	1145.9
1	0228	75	222.	0.	1.9	1163.9	*	1	0628	195	0.	0.	0.2	1146.6
1	0230	76	222.	0.	2.1	1164.8	*	1	0630	196	0.	0.	0.2	1147.3
1	0232	77	222.	0.	2.3	1165.7	*	1	0632	197	0.	0.	0.2	1148.1
1	0234	78	222.	0.	2.4	1166.3	*	1	0634	198	0.	0.	0.3	1148.8
1	0236	79	222.	0.	2.5	1166.6	*	1	0636	199	0.	0.	0.3	1149.5
1	0238	80	222.	0.	2.5	1166.7	*	1	0638	200	0.	0.	0.3	1150.2
1	0240	81	222.	0.	2.4	1166.4	*	1	0640	201	0.	0.	0.3	1150.8
1	0242	82	222.	0.	2.3	1166.0	*	1	0642	202	0.	0.	0.4	1151.5
1	0244	83	222.	0.	2.2	1165.2	*	1	0644	203	0.	0.	0.4	1152.2
1	0246	84	222.	0.	2.0	1164.2	*	1	0646	204	0.	0.	0.4	1152.9
1	0248	85	222.	0.	1.8	1163.1	*	1	0648	205	0.	0.	0.4	1153.5
1	0250	86	222.	0.	1.5	1161.8	*	1	0650	206	0.	0.	0.5	1154.2
1	0252	87	222.	0.	1.2	1160.4	*	1	0652	207	0.	0.	0.5	1154.9
1	0254	88	222.	0.	0.9	1158.8	*	1	0654	208	0.	0.	0.5	1155.5
1	0256	89	222.	0.	0.6	1157.2	*	1	0656	209	22.	0.	0.5	1154.5
1	0258	90	222.	0.	0.2	1148.2	*	1	0658	210	22.	0.	0.4	1153.5
1	0300	91	72.	0.	0.3	1149.0	*	1	0700	211	22.	0.	0.4	1152.5
1	0302	92	72.	0.	0.3	1149.4	*	1	0702	212	22.	0.	0.4	1151.5
1	0304	93	72.	0.	0.3	1149.5	*	1	0704	213	22.	0.	0.3	1150.5
1	0306	94	72.	0.	0.3	1149.5	*	1	0706	214	22.	0.	0.3	1149.4
1	0308	95	72.	0.	0.3	1149.3	*	1	0708	215	22.	0.	0.3	1148.4
1	0310	96	72.	0.	0.3	1149.0	*	1	0710	216	22.	0.	0.2	1147.4
1	0312	97	72.	0.	0.3	1148.4	*	1	0712	217	22.	0.	0.2	1146.3
1	0314	98	72.	0.	0.2	1147.7	*	1	0714	218	22.	0.	0.1	1145.3
1	0316	99	22.	0.	0.3	1150.6	*	1	0716	219	22.	0.	0.1	1144.2
1	0318	100	22.	0.	0.4	1153.2	*	1	0718	220	22.	0.	0.1	1143.2
1	0320	101	22.	0.	0.5	1155.6	*	1	0720	221	22.	0.	0.0	1142.0
1	0322	102	22.	0.	0.6	1157.1	*	1	0722	222	22.	0.	0.0	1141.5
1	0324	103	72.	0.	0.5	1156.0	*	1	0724	223	0.	0.	0.0	1141.5
1	0326	104	72.	0.	0.5	1154.0	*	1	0726	224	0.	0.	0.0	1141.9
1	0328	105	72.	0.	0.4	1151.8	*	1	0728	225	0.	0.	0.0	1142.3
1	0330	106	72.	0.	0.3	1149.4	*	1	0730	226	0.	0.	0.0	1142.6
1	0332	107	72.	0.	0.2	1146.8	*	1	0732	227	0.	0.	0.1	1142.9
1	0334	108	22.	0.	0.2	1147.9	*	1	0734	228	0.	0.	0.1	1143.2
1	0336	109	22.	0.	0.3	1149.0	*	1	0736	229	0.	0.	0.1	1143.5
1	0338	110	22.	0.	0.3	1150.0	*	1	0738	230	0.	0.	0.1	1143.8
1	0340	111	22.	0.	0.3	1151.0	*	1	0740	231	0.	0.	0.1	1144.1
1	0342	112	22.	0.	0.4	1151.9	*	1	0742	232	0.	0.	0.1	1144.4
1	0344	113	22.	0.	0.4	1152.8	*	1	0744	233	0.	0.	0.1	1144.7
1	0346	114	22.	0.	0.4	1153.6	*	1	0746	234	0.	0.	0.1	1145.0
1	0348	115	22.	0.	0.5	1154.3	*	1	0748	235	0.	0.	0.1	1145.3
1	0350	116	22.	0.	0.5	1155.0	*	1	0750	236	0.	0.	0.1	1145.6
1	0352	117	22.	0.	0.5	1155.6	*	1	0752	237	0.	0.	0.2	1145.9
1	0354	118	22.	0.	0.5	1156.2	*	1	0754	238	0.	0.	0.2	1146.2
1	0356	119	22.	0.	0.6	1156.7	*	1	0756	239	0.	0.	0.2	1146.5
1	0358	120	22.	0.	0.6	1157.0	*	1	0758	240	0.	0.	0.2	1146.8
							*							

****

PEAK OUTFLOW IS 0. AT TIME 0.00 HOURS

***** PUMP FLOW HYDROGRAPH *****

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW (CFS) 6-HR	24-HR	72-HR	7.97-HR
+					

```
+     222.      2.30                    49.        38.        38.        38.
                          (INCHES)    2.541      2.592      2.592      2.592
                           (AC-FT)      24.        25.        25.        25.

 ***** OUTFLOW HYDROGRAPH *****

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR      72-HR     7.97-HR
+   (CFS)       (HR)
                                     (CFS)
+      0.       0.03                     0.         0.         0.         0.
                          (INCHES)    0.001      0.001      0.001      0.001
                           (AC-FT)      0.         0.         0.         0.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR      72-HR     7.97-HR
+  (AC-FT)      (HR)
      2.        2.63                     0.         0.         0.         0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR      72-HR     7.97-HR
+   (FEET)      (HR)
   1166.66      2.63                  1151.20    1149.71    1149.71    1149.71

                          CUMULATIVE AREA =    0.18 SQ MI

1
                                          RUNOFF SUMMARY
                                     FLOW IN CUBIC FEET PER SECOND
                                   TIME IN HOURS,  AREA IN SQUARE MILES

                                   PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD     BASIN    MAXIMUM    TIME OF
          OPERATION      STATION   FLOW    PEAK                                         AREA     STAGE    MAX STAGE
+                                                     6-HOUR     24-HOUR    72-HOUR
          HYDROGRAPH AT
+                          PUMP     293.    2.50        49.        38.        38.      0.18
          PUMP FLOW TO
+                                   222.    2.30        49.        38.        38.      0.18
          HYDROGRAPH AT
+                          PUMP       0.    0.03         0.         0.         0.      0.18
+                                                                                               1166.66     2.63

 *** NORMAL END OF HEC-1 ***
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1****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*            MAY   1991                *                    *   HYDROLOGIC ENGINEERING CENTER      *
*          VERSION 4.0.1E              *                    *         609 SECOND STREET            *
*                                      *                    *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE  02/11/94  TIME  10:46:38  *                    *          (916) 551-1748              *
*                                      *                    *                                      *
****************************************                    ****************************************


                                    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

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

        1           ID    FILE: SYS2_D2G.DAT
        2           ID    DATE: JAN. 1994
        3           ID    SANTAN FREEWAY - DOBSON ROAD TO GILBERT ROAD / ON-SITE DRAINAGE
        4           ID    MCQUEEN PUMP STATION PIPE STORAGE ANALYSIS
        5           ID    INPUT HYDROGRAPH FROM ADOT HYDROLOGY MANUAL TABLE 2.2
        6           ID    DRAINAGE AREA FROM STA. 1688+50 TO STA. 1758+50
        7           IT       2                    240
        8           IO       2

        9           KK    PUMPIN
       10           KM    INFLOW HYDROGRAPH FOR MCQUEEN PUMP STATION
       11           BA  0.1014
       12           IN      15
       13           QI       0       2       4       6       8      13      15      60      95     274
       14           QI      85      46      35      23      20      17      16      15      14      13
       15           QI      12      10       9       8     7.5       7     6.5       6     5.5       5
       16           QI       3       0

       17           KK    PUMP REACH
       18           KM    STORAGE ANALYSIS / MINIMUM ROADWAY ELEVATION = 1205+/-
       19           KM    MAXIMUM WATER LEVEL = 1200
       20           KM    USED 500 LF OF 96" PIPE (P203) FOR STORAGE IN LIEU OF 36" DIA. PIPE
       21           RS       1    STOR       0
       22           SV       0    0.57    1.55
       23           SE  1175.5    1191    1200
       24           SQ    0.01    0.01    0.01
       25           WP    1189      22  1175.5
       26           WP    1191      50    1182
       27           WP    1193      50    1183
       28           WP    1194      50    1184
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(P1-57)

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            29          WP    1195      50    1185
            30          ZZ
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             MAY   1991                *
*           VERSION 4.0.1E              *
*                                       *
*  RUN DATE  02/11/94  TIME  10:46:38   *
*                                       *
*****************************************

                                                    ***************************************
                                                    *                                     *
                                                    *   U.S. ARMY CORPS OF ENGINEERS      *
                                                    *   HYDROLOGIC ENGINEERING CENTER     *
                                                    *         609 SECOND STREET           *
                                                    *      DAVIS, CALIFORNIA 95616        *
                                                    *          (916) 551-1748             *
                                                    *                                     *
                                                    ***************************************

                          FILE: SYS2_D2G.DAT
                          DATE: JAN. 1994
                          SANTAN FREEWAY - DOBSON ROAD TO GILBERT ROAD / ON-SITE DRAINAGE
                          MCQUEEN PUMP STATION PIPE STORAGE ANALYSIS
                          INPUT HYDROGRAPH FROM ADOT HYDROLOGY MANUAL TABLE 2.2
                          DRAINAGE AREA FROM STA. 1688+50 TO STA. 1758+50

  8 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          2  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          2  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1   0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        240  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1   0  ENDING DATE
                     NDTIME       0758  ENDING TIME
                      ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL    0.03 HOURS
                      TOTAL TIME BASE    7.97 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


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


          **************
          *            *
  9 KK    *     PUMP   *     IN
          *            *
          **************
                      INFLOW HYDROGRAPH FOR MCQUEEN PUMP STATION

 12 IN          TIME DATA FOR INPUT TIME SERIES
                     JXMIN         15  TIME INTERVAL IN MINUTES
                    JXDATE      1   0  STARTING DATE
                    JXTIME          0  STARTING TIME

            SUBBASIN RUNOFF DATA
```

11 BA SUBBASIN CHARACTERISTICS
TAREA 0.10 SUBBASIN AREA

***

HYDROGRAPH AT STATION PUMP

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0200	61	95.	1		0400	121	16.	1		0600	181	8.
1		0002	2	0.	1		0202	62	119.	1		0402	122	16.	1		0602	182	7.
1		0004	3	1.	1		0204	63	143.	1		0404	123	16.	1		0604	183	7.
1		0006	4	1.	1		0206	64	167.	1		0406	124	16.	1		0606	184	7.
1		0008	5	1.	1		0208	65	190.	1		0408	125	15.	1		0608	185	7.
1		0010	6	1.	1		0210	66	214.	1		0410	126	15.	1		0610	186	7.
1		0012	7	2.	1		0212	67	238.	1		0412	127	15.	1		0612	187	7.
1		0014	8	2.	1		0214	68	262.	1		0414	128	15.	1		0614	188	7.
1		0016	9	2.	1		0216	69	261.	1		0416	129	15.	1		0616	189	7.
1		0018	10	2.	1		0218	70	236.	1		0418	130	15.	1		0618	190	7.
1		0020	11	3.	1		0220	71	211.	1		0420	131	15.	1		0620	191	7.
1		0022	12	3.	1		0222	72	186.	1		0422	132	15.	1		0622	192	7.
1		0024	13	3.	1		0224	73	161.	1		0424	133	14.	1		0624	193	7.
1		0026	14	3.	1		0226	74	135.	1		0426	134	14.	1		0626	194	7.
1		0028	15	4.	1		0228	75	110.	1		0428	135	14.	1		0628	195	7.
1		0030	16	4.	1		0230	76	85.	1		0430	136	14.	1		0630	196	7.
1		0032	17	4.	1		0232	77	80.	1		0432	137	14.	1		0632	197	6.
1		0034	18	5.	1		0234	78	75.	1		0434	138	14.	1		0634	198	6.
1		0036	19	5.	1		0236	79	69.	1		0436	139	14.	1		0636	199	6.
1		0038	20	5.	1		0238	80	64.	1		0438	140	13.	1		0638	200	6.
1		0040	21	5.	1		0240	81	59.	1		0440	141	13.	1		0640	201	6.
1		0042	22	6.	1		0242	82	54.	1		0442	142	13.	1		0642	202	6.
1		0044	23	6.	1		0244	83	49.	1		0444	143	13.	1		0644	203	6.
1		0046	24	6.	1		0246	84	45.	1		0446	144	13.	1		0646	204	6.
1		0048	25	6.	1		0248	85	44.	1		0448	145	13.	1		0648	205	6.
1		0050	26	7.	1		0250	86	42.	1		0450	146	13.	1		0650	206	6.
1		0052	27	7.	1		0252	87	41.	1		0452	147	13.	1		0652	207	6.
1		0054	28	7.	1		0254	88	39.	1		0454	148	12.	1		0654	208	6.
1		0056	29	7.	1		0256	89	38.	1		0456	149	12.	1		0656	209	6.
1		0058	30	8.	1		0258	90	36.	1		0458	150	12.	1		0658	210	6.
1		0100	31	8.	1		0300	91	35.	1		0500	151	12.	1		0700	211	6.
1		0102	32	9.	1		0302	92	33.	1		0502	152	12.	1		0702	212	5.
1		0104	33	9.	1		0304	93	32.	1		0504	153	11.	1		0704	213	5.
1		0106	34	10.	1		0306	94	30.	1		0506	154	11.	1		0706	214	5.
1		0108	35	11.	1		0308	95	29.	1		0508	155	11.	1		0708	215	5.
1		0110	36	11.	1		0310	96	27.	1		0510	156	11.	1		0710	216	5.
1		0112	37	12.	1		0312	97	25.	1		0512	157	10.	1		0712	217	5.
1		0114	38	13.	1		0314	98	24.	1		0514	158	10.	1		0714	218	5.
1		0116	39	13.	1		0316	99	23.	1		0516	159	10.	1		0716	219	5.
1		0118	40	13.	1		0318	100	22.	1		0518	160	10.	1		0718	220	5.
1		0120	41	14.	1		0320	101	22.	1		0520	161	10.	1		0720	221	4.
1		0122	42	14.	1		0322	102	22.	1		0522	162	10.	1		0722	222	4.
1		0124	43	14.	1		0324	103	21.	1		0524	163	9.	1		0724	223	4.
1		0126	44	14.	1		0326	104	21.	1		0526	164	9.	1		0726	224	4.
1		0128	45	15.	1		0328	105	20.	1		0528	165	9.	1		0728	225	3.
1		0130	46	15.	1		0330	106	20.	1		0530	166	9.	1		0730	226	3.
1		0132	47	21.	1		0332	107	20.	1		0532	167	9.	1		0732	227	3.
1		0134	48	27.	1		0334	108	19.	1		0534	168	9.	1		0734	228	3.
1		0136	49	33.	1		0336	109	19.	1		0536	169	9.	1		0736	229	3.
1		0138	50	39.	1		0338	110	18.	1		0538	170	8.	1		0738	230	3.
1		0140	51	45.	1		0340	111	18.	1		0540	171	8.	1		0740	231	3.
1		0142	52	51.	1		0342	112	18.	1		0542	172	8.	1		0742	232	3.
1		0144	53	57.	1		0344	113	17.	1		0544	173	8.	1		0744	233	3.

```
    1    0146   54      62.   *   1    0346  114      17.   *   1    0546  174       8.   *   1    0746  234       3.
    1    0148   55      67.   *   1    0348  115      17.   *   1    0548  175       8.   *   1    0748  235       3.
    1    0150   56      72.   *   1    0350  116      17.   *   1    0550  176       8.   *   1    0750  236       3.
    1    0152   57      76.   *   1    0352  117      17.   *   1    0552  177       8.   *   1    0752  237       3.
    1    0154   58      81.   *   1    0354  118      16.   *   1    0554  178       8.   *   1    0754  238       3.
    1    0156   59      86.   *   1    0356  119      16.   *   1    0556  179       8.   *   1    0756  239       3.
    1    0158   60      90.   *   1    0358  120      16.   *   1    0558  180       8.   *   1    0758  240       3.
                                *                           *                                *
*****************************************************************************************************************

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      7.97-HR
+   (CFS)       (HR)
                                    (CFS)
+    262.       2.23                  34.         26.         26.         26.
                                (INCHES)        3.111       3.224       3.224       3.224
                                 (AC-FT)          17.         17.         17.         17.

                            CUMULATIVE AREA =    0.10 SQ MI


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


            **************
            *            *
  17 KK     *     PUMP   *      REACH
            *            *
            **************
                              STORAGE ANALYSIS / MINIMUM ROADWAY ELEVATION = 1205+/-
                              MAXIMUM WATER LEVEL = 1200
                              USED 500 LF OF 96" PIPE (P203) FOR STORAGE IN LIEU OF 36" DIA. PIPE

              HYDROGRAPH ROUTING DATA

  21 RS         STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC       0.00  INITIAL CONDITION
                          X       0.00 WORKING R AND D COEFFICIENT

  22 SV           STORAGE         0.0       0.6       1.5

  23 SE         ELEVATION     1175.50   1191.00   1200.00

  24 SQ         DISCHARGE          0.        0.        0.

  25 WP         PUMPING DATA

                  PUMP ON    PUMPING    PUMP OFF
                 ELEVATION     RATE    ELEVATION

                   1189.0       22.      1175.5
                   1191.0       50.      1182.0
                   1193.0       50.      1183.0
                   1194.0       50.      1184.0
                   1195.0       50.      1185.0

                    ISTAD              PUMP FLOW HYDROGRAPH IDENTIFICATION
                                                          ***
*****************************************************************************************************************

                                          HYDROGRAPH AT STATION     PUMP
```

DA	MON	HRMN	ORD	PUMP Q	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	PUMP Q	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	0.	0.0	1175.5	1		0400	121	22.	0.	0.0	1175.5
1		0002	2	0.	0.	0.0	1175.5	1		0402	122	0.	0.	0.0	1176.7
1		0004	3	0.	0.	0.0	1175.5	1		0404	123	0.	0.	0.1	1177.9
1		0006	4	0.	0.	0.0	1175.6	1		0406	124	0.	0.	0.1	1179.0
1		0008	5	0.	0.	0.0	1175.7	1		0408	125	0.	0.	0.2	1180.2
1		0010	6	0.	0.	0.0	1175.7	1		0410	126	0.	0.	0.2	1181.4
1		0012	7	0.	0.	0.0	1175.9	1		0412	127	0.	0.	0.3	1182.5
1		0014	8	0.	0.	0.0	1176.0	1		0414	128	0.	0.	0.3	1183.6
1		0016	9	0.	0.	0.0	1176.1	1		0416	129	0.	0.	0.3	1184.8
1		0018	10	0.	0.	0.0	1176.3	1		0418	130	0.	0.	0.4	1185.9
1		0020	11	0.	0.	0.0	1176.5	1		0420	131	0.	0.	0.4	1187.0
1		0022	12	0.	0.	0.0	1176.7	1		0422	132	0.	0.	0.5	1188.1
1		0024	13	0.	0.	0.1	1176.9	1		0424	133	0.	0.	0.5	1189.2
1		0026	14	0.	0.	0.1	1177.2	1		0426	134	22.	0.	0.5	1188.6
1		0028	15	0.	0.	0.1	1177.4	1		0428	135	22.	0.	0.5	1188.0
1		0030	16	0.	0.	0.1	1177.7	1		0430	136	22.	0.	0.4	1187.4
1		0032	17	0.	0.	0.1	1178.0	1		0432	137	22.	0.	0.4	1186.8
1		0034	18	0.	0.	0.1	1178.4	1		0434	138	22.	0.	0.4	1186.2
1		0036	19	0.	0.	0.1	1178.7	1		0436	139	22.	0.	0.4	1185.6
1		0038	20	0.	0.	0.1	1179.1	1		0438	140	22.	0.	0.3	1184.9
1		0040	21	0.	0.	0.1	1179.5	1		0440	141	22.	0.	0.3	1184.3
1		0042	22	0.	0.	0.2	1179.9	1		0442	142	22.	0.	0.3	1183.6
1		0044	23	0.	0.	0.2	1180.3	1		0444	143	22.	0.	0.3	1183.0
1		0046	24	0.	0.	0.2	1180.8	1		0446	144	22.	0.	0.2	1182.3
1		0048	25	0.	0.	0.2	1181.2	1		0448	145	22.	0.	0.2	1181.6
1		0050	26	0.	0.	0.2	1181.7	1		0450	146	22.	0.	0.2	1180.9
1		0052	27	0.	0.	0.2	1182.2	1		0452	147	22.	0.	0.2	1180.2
1		0054	28	0.	0.	0.3	1182.8	1		0454	148	22.	0.	0.1	1179.5
1		0056	29	0.	0.	0.3	1183.3	1		0456	149	22.	0.	0.1	1178.8
1		0058	30	0.	0.	0.3	1183.9	1		0458	150	22.	0.	0.1	1178.0
1		0100	31	0.	0.	0.3	1184.5	1		0500	151	22.	0.	0.1	1177.3
1		0102	32	0.	0.	0.4	1185.1	1		0502	152	22.	0.	0.0	1176.5
1		0104	33	0.	0.	0.4	1185.8	1		0504	153	22.	0.	0.0	1175.7
1		0106	34	0.	0.	0.4	1186.5	1		0506	154	22.	0.	0.0	1175.5
1		0108	35	0.	0.	0.4	1187.3	1		0508	155	0.	0.	0.0	1176.3
1		0110	36	0.	0.	0.5	1188.1	1		0510	156	0.	0.	0.1	1177.1
1		0112	37	0.	0.	0.5	1189.0	1		0512	157	0.	0.	0.1	1177.9
1		0114	38	0.	0.	0.5	1189.9	1		0514	158	0.	0.	0.1	1178.7
1		0116	39	22.	0.	0.5	1189.2	1		0516	159	0.	0.	0.1	1179.4
1		0118	40	22.	0.	0.5	1188.5	1		0518	160	0.	0.	0.2	1180.2
1		0120	41	22.	0.	0.5	1187.9	1		0520	161	0.	0.	0.2	1180.9
1		0122	42	22.	0.	0.4	1187.3	1		0522	162	0.	0.	0.2	1181.6
1		0124	43	22.	0.	0.4	1186.7	1		0524	163	0.	0.	0.3	1182.3
1		0126	44	22.	0.	0.4	1186.1	1		0526	164	0.	0.	0.3	1183.0
1		0128	45	22.	0.	0.4	1185.6	1		0528	165	0.	0.	0.3	1183.7
1		0130	46	22.	0.	0.4	1185.0	1		0530	166	0.	0.	0.3	1184.4
1		0132	47	22.	0.	0.3	1184.7	1		0532	167	0.	0.	0.4	1185.1
1		0134	48	22.	0.	0.3	1184.9	1		0534	168	0.	0.	0.4	1185.7
1		0136	49	22.	0.	0.4	1185.5	1		0536	169	0.	0.	0.4	1186.4
1		0138	50	22.	0.	0.4	1186.5	1		0538	170	0.	0.	0.4	1187.0
1		0140	51	22.	0.	0.5	1188.0	1		0540	171	0.	0.	0.4	1187.6
1		0142	52	22.	0.	0.5	1190.0	1		0542	172	0.	0.	0.5	1188.3
1		0144	53	22.	0.	0.6	1191.5	1		0544	173	0.	0.	0.5	1188.9
1		0146	54	72.	0.	0.6	1191.1	1		0546	174	0.	0.	0.5	1189.5
1		0148	55	72.	0.	0.6	1190.9	1		0548	175	22.	0.	0.5	1188.4
1		0150	56	72.	0.	0.6	1190.7	1		0550	176	22.	0.	0.4	1187.4
1		0152	57	72.	0.	0.6	1190.8	1		0552	177	22.	0.	0.4	1186.3
1		0154	58	72.	0.	0.6	1191.1	1		0554	178	22.	0.	0.4	1185.2
1		0156	59	72.	0.	0.6	1191.4	1		0556	179	22.	0.	0.3	1184.2
1		0158	60	72.	0.	0.7	1191.8	1		0558	180	22.	0.	0.3	1183.1
1		0200	61	72.	0.	0.7	1192.3	1		0600	181	22.	0.	0.2	1182.0
1		0202	62	72.	0.	0.8	1193.2	1		0602	182	22.	0.	0.2	1180.9

1	0204	63	122.	0.	0.8	1193.4	*	1	0604	183	22.	0.	0.2	1179.8
1	0206	64	122.	0.	0.9	1194.3	*	1	0606	184	22.	0.	0.1	1178.7
1	0208	65	172.	0.	0.9	1194.4	*	1	0608	185	22.	0.	0.1	1177.6
1	0210	66	172.	0.	1.0	1195.2	*	1	0610	186	22.	0.	0.0	1176.5
1	0212	67	222.	0.	1.0	1195.3	*	1	0612	187	22.	0.	0.0	1175.5
1	0214	68	222.	0.	1.1	1196.0	*	1	0614	188	0.	0.	0.0	1175.5
1	0216	69	222.	0.	1.2	1197.0	*	1	0616	189	0.	0.	0.0	1176.0
1	0218	70	222.	0.	1.3	1197.7	*	1	0618	190	0.	0.	0.0	1176.5
1	0220	71	222.	0.	1.3	1197.7	*	1	0620	191	0.	0.	0.1	1177.1
1	0222	72	222.	0.	1.2	1197.1	*	1	0622	192	0.	0.	0.1	1177.6
1	0224	73	222.	0.	1.1	1195.9	*	1	0624	193	0.	0.	0.1	1178.1
1	0226	74	222.	0.	0.9	1194.0	*	1	0626	194	0.	0.	0.1	1178.6
1	0228	75	222.	0.	0.6	1191.5	*	1	0628	195	0.	0.	0.1	1179.1
1	0230	76	222.	0.	0.3	1183.2	*	1	0630	196	0.	0.	0.1	1179.5
1	0232	77	122.	0.	0.2	1180.2	*	1	0632	197	0.	0.	0.2	1180.0
1	0234	78	22.	0.	0.3	1184.4	*	1	0634	198	0.	0.	0.2	1180.5
1	0236	79	22.	0.	0.5	1188.1	*	1	0636	199	0.	0.	0.2	1181.0
1	0238	80	22.	0.	0.6	1191.2	*	1	0638	200	0.	0.	0.2	1181.5
1	0240	81	72.	0.	0.6	1190.7	*	1	0640	201	0.	0.	0.2	1181.9
1	0242	82	72.	0.	0.5	1189.5	*	1	0642	202	0.	0.	0.3	1182.4
1	0244	83	72.	0.	0.5	1188.0	*	1	0644	203	0.	0.	0.3	1182.8
1	0246	84	72.	0.	0.4	1186.1	*	1	0646	204	0.	0.	0.3	1183.3
1	0248	85	72.	0.	0.3	1184.0	*	1	0648	205	0.	0.	0.3	1183.7
1	0250	86	72.	0.	0.2	1181.9	*	1	0650	206	0.	0.	0.3	1184.2
1	0252	87	22.	0.	0.3	1183.3	*	1	0652	207	0.	0.	0.3	1184.6
1	0254	88	22.	0.	0.3	1184.7	*	1	0654	208	0.	0.	0.4	1185.0
1	0256	89	22.	0.	0.4	1185.9	*	1	0656	209	0.	0.	0.4	1185.4
1	0258	90	22.	0.	0.4	1187.1	*	1	0658	210	0.	0.	0.4	1185.9
1	0300	91	22.	0.	0.5	1188.1	*	1	0700	211	0.	0.	0.4	1186.3
1	0302	92	22.	0.	0.5	1189.0	*	1	0702	212	0.	0.	0.4	1186.7
1	0304	93	22.	0.	0.5	1189.8	*	1	0704	213	0.	0.	0.4	1187.1
1	0306	94	22.	0.	0.6	1190.5	*	1	0706	214	0.	0.	0.4	1187.5
1	0308	95	22.	0.	0.6	1191.0	*	1	0708	215	0.	0.	0.5	1187.9
1	0310	96	22.	0.	0.6	1191.1	*	1	0710	216	0.	0.	0.5	1188.3
1	0312	97	72.	0.	0.5	1188.0	*	1	0712	217	0.	0.	0.5	1188.7
1	0314	98	72.	0.	0.3	1184.4	*	1	0714	218	0.	0.	0.5	1189.0
1	0316	99	72.	0.	0.2	1180.8	*	1	0716	219	22.	0.	0.5	1187.8
1	0318	100	22.	0.	0.2	1180.8	*	1	0718	220	22.	0.	0.4	1186.5
1	0320	101	22.	0.	0.2	1180.9	*	1	0720	221	22.	0.	0.4	1185.2
1	0322	102	22.	0.	0.2	1180.8	*	1	0722	222	22.	0.	0.3	1183.8
1	0324	103	22.	0.	0.2	1180.8	*	1	0724	223	22.	0.	0.3	1182.5
1	0326	104	22.	0.	0.2	1180.7	*	1	0726	224	22.	0.	0.2	1181.1
1	0328	105	22.	0.	0.2	1180.6	*	1	0728	225	22.	0.	0.2	1179.7
1	0330	106	22.	0.	0.2	1180.5	*	1	0730	226	22.	0.	0.1	1178.3
1	0332	107	22.	0.	0.2	1180.3	*	1	0732	227	22.	0.	0.0	1176.9
1	0334	108	22.	0.	0.2	1180.1	*	1	0734	228	22.	0.	0.0	1175.5
1	0336	109	22.	0.	0.2	1179.9	*	1	0736	229	0.	0.	0.0	1175.5
1	0338	110	22.	0.	0.2	1179.6	*	1	0738	230	0.	0.	0.0	1175.7
1	0340	111	22.	0.	0.1	1179.4	*	1	0740	231	0.	0.	0.0	1175.9
1	0342	112	22.	0.	0.1	1179.0	*	1	0742	232	0.	0.	0.0	1176.2
1	0344	113	22.	0.	0.1	1178.7	*	1	0744	233	0.	0.	0.0	1176.4
1	0346	114	22.	0.	0.1	1178.3	*	1	0746	234	0.	0.	0.0	1176.6
1	0348	115	22.	0.	0.1	1177.9	*	1	0748	235	0.	0.	0.0	1176.8
1	0350	116	22.	0.	0.1	1177.5	*	1	0750	236	0.	0.	0.1	1177.1
1	0352	117	22.	0.	0.1	1177.1	*	1	0752	237	0.	0.	0.1	1177.3
1	0354	118	22.	0.	0.0	1176.7	*	1	0754	238	0.	0.	0.1	1177.5
1	0356	119	22.	0.	0.0	1176.3	*	1	0756	239	0.	0.	0.1	1177.7
1	0358	120	22.	0.	0.0	1175.9	*	1	0758	240	0.	0.	0.1	1178.0
							*							

****

PEAK OUTFLOW IS 0. AT TIME 0.00 HOURS

***** PUMP FLOW HYDROGRAPH *****

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	7.97-HR

```
+   (CFS)       (HR)
                          (CFS)
+     222.      2.20                34.        26.        26.        26.
                        (INCHES)    3.094      3.206      3.206      3.206
                         (AC-FT)     17.        17.        17.        17.

 ***** OUTFLOW HYDROGRAPH *****

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR      72-HR      7.97-HR
+   (CFS)       (HR)
                          (CFS)
+       0.      0.03                 0.         0.         0.         0.
                        (INCHES)    0.001      0.001      0.001      0.001
                         (AC-FT)     0.         0.         0.         0.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR      72-HR      7.97-HR
+  (AC-FT)      (HR)
       1.       2.33                 0.         0.         0.         0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR      72-HR      7.97-HR
+   (FEET)      (HR)
   1197.73      2.33              1184.45    1183.30    1183.30    1183.30

                         CUMULATIVE AREA =    0.10 SQ MI

1
                                    RUNOFF SUMMARY
                                FLOW IN CUBIC FEET PER SECOND
                              TIME IN HOURS,  AREA IN SQUARE MILES

                                   PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD    BASIN    MAXIMUM    TIME OF
          OPERATION     STATION    FLOW    PEAK                                       AREA     STAGE     MAX STAGE
+                                                     6-HOUR     24-HOUR    72-HOUR
          HYDROGRAPH AT
+                         PUMP     262.    2.23        34.        26.        26.      0.10
          PUMP FLOW TO
+                                  222.    2.20        34.        26.        26.      0.10
          HYDROGRAPH AT
+                         PUMP       0.    0.03         0.         0.         0.      0.10
+                                                                                              1197.73     2.33

 *** NORMAL END OF HEC-1 ***
```

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1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             MAY   1991               *
*           VERSION 4.0.1E             *
*                                      *
*  RUN DATE  02/11/94  TIME  10:54:40  *
*                                      *
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****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 551-1748             *
*                                      *
****************************************
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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

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

    1           ID    FILE: SYS3_D2G.DAT
    2           ID    DATE: JAN. 1994
    3           ID    SANTAN FREEWAY - DOBSON ROAD TO GILBERT ROAD / ON-SITE DRAINAGE
    4           ID    COOPER PUMP STATION PIPE STORAGE ANALYSIS
    5           ID    INPUT HYDROGRAPH FROM ADOT HYDROLOGY MANUAL TABLE 2.2
    6           ID    DRAINAGE AREA FROM STA. 1758+50 TO STA. 1865+00
    7           IT       2                    240
    8           IO       2

    9           KK    PUMPIN
   10           KM    INFLOW HYDROGRAPH FOR COOPER PUMP STATION
   11           BA  0.1514
   12           IN      15
   13           QI       0       3       5       8      10      14      17      30      75     315
   14           QI     229     115      55      41      34      26      23      22      20      17
   15           QI      15      13      12      11    10.5      10     9.5       9       7       5
   16           QI       3       0

   17           KK    PUMP REACH
   18           KM    STORAGE ANALYSIS / MINIMUM ROADWAY ELEVATION = 1220+/-
   19           KM    MAXIMUM WATER LEVEL = 1215 / 3-96" X 600 LF STORAGE PIPES
   20           RS       1    STOR       0
   21           SV       0    0.57    3.04
   22           SE  1190.5    1206    1215
   23           SQ    0.01    0.01    0.01
   24           WP    1204      22  1190.5
   25           WP    1206      50    1197
   26           WP    1208      50    1198
   27           WP    1209      50    1199
   28           WP    1210      50    1200
```

```
            29          ZZ
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              MAY   1991               *
*            VERSION 4.0.1E             *
*                                       *
*  RUN DATE  02/11/94  TIME  10:54:40   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

```
                         FILE: SYS3_D2G.DAT
                         DATE: JAN. 1994
                         SANTAN FREEWAY - DOBSON ROAD TO GILBERT ROAD / ON-SITE DRAINAGE
                         COOPER PUMP STATION PIPE STORAGE ANALYSIS
                         INPUT HYDROGRAPH FROM ADOT HYDROLOGY MANUAL TABLE 2.2
                         DRAINAGE AREA FROM STA. 1758+50 TO STA. 1865+00

  8 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          2  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          2  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1   0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        240  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1   0  ENDING DATE
                     NDTIME       0758  ENDING TIME
                      ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL    0.03 HOURS
                      TOTAL TIME BASE    7.97 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


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


           **************
           *            *
  9 KK     *     PUMP   *     IN
           *            *
           **************
                         INFLOW HYDROGRAPH FOR COOPER PUMP STATION

 12 IN          TIME DATA FOR INPUT TIME SERIES
                     JXMIN         15  TIME INTERVAL IN MINUTES
                    JXDATE      1   0  STARTING DATE
                    JXTIME          0  STARTING TIME

             SUBBASIN RUNOFF DATA
```

11 BA SUBBASIN CHARACTERISTICS
TAREA 0.15 SUBBASIN AREA

***

HYDROGRAPH AT STATION PUMP

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0200	61	75.	1		0400	121	23.	1		0600	181	11.
1		0002	2	0.	1		0202	62	107.	1		0402	122	23.	1		0602	182	10.
1		0004	3	1.	1		0204	63	139.	1		0404	123	23.	1		0604	183	10.
1		0006	4	1.	1		0206	64	171.	1		0406	124	23.	1		0606	184	10.
1		0008	5	2.	1		0208	65	203.	1		0408	125	22.	1		0608	185	10.
1		0010	6	2.	1		0210	66	235.	1		0410	126	22.	1		0610	186	10.
1		0012	7	2.	1		0212	67	267.	1		0412	127	22.	1		0612	187	10.
1		0014	8	3.	1		0214	68	299.	1		0414	128	22.	1		0614	188	10.
1		0016	9	3.	1		0216	69	309.	1		0416	129	22.	1		0616	189	10.
1		0018	10	3.	1		0218	70	298.	1		0418	130	22.	1		0618	190	10.
1		0020	11	4.	1		0220	71	286.	1		0420	131	21.	1		0620	191	10.
1		0022	12	4.	1		0222	72	275.	1		0422	132	21.	1		0622	192	10.
1		0024	13	4.	1		0224	73	263.	1		0424	133	21.	1		0624	193	10.
1		0026	14	4.	1		0226	74	252.	1		0426	134	21.	1		0626	194	10.
1		0028	15	5.	1		0228	75	240.	1		0428	135	20.	1		0628	195	10.
1		0030	16	5.	1		0230	76	229.	1		0430	136	20.	1		0630	196	10.
1		0032	17	5.	1		0232	77	214.	1		0432	137	20.	1		0632	197	9.
1		0034	18	6.	1		0234	78	199.	1		0434	138	19.	1		0634	198	9.
1		0036	19	6.	1		0236	79	183.	1		0436	139	19.	1		0636	199	9.
1		0038	20	7.	1		0238	80	168.	1		0438	140	18.	1		0638	200	9.
1		0040	21	7.	1		0240	81	153.	1		0440	141	18.	1		0640	201	9.
1		0042	22	7.	1		0242	82	138.	1		0442	142	18.	1		0642	202	9.
1		0044	23	8.	1		0244	83	123.	1		0444	143	17.	1		0644	203	9.
1		0046	24	8.	1		0246	84	111.	1		0446	144	17.	1		0646	204	9.
1		0048	25	8.	1		0248	85	103.	1		0448	145	17.	1		0648	205	9.
1		0050	26	9.	1		0250	86	95.	1		0450	146	16.	1		0650	206	8.
1		0052	27	9.	1		0252	87	87.	1		0452	147	16.	1		0652	207	8.
1		0054	28	9.	1		0254	88	79.	1		0454	148	16.	1		0654	208	8.
1		0056	29	9.	1		0256	89	71.	1		0456	149	16.	1		0656	209	8.
1		0058	30	10.	1		0258	90	63.	1		0458	150	15.	1		0658	210	7.
1		0100	31	10.	1		0300	91	55.	1		0500	151	15.	1		0700	211	7.
1		0102	32	11.	1		0302	92	53.	1		0502	152	15.	1		0702	212	7.
1		0104	33	11.	1		0304	93	51.	1		0504	153	14.	1		0704	213	6.
1		0106	34	12.	1		0306	94	49.	1		0506	154	14.	1		0706	214	6.
1		0108	35	12.	1		0308	95	48.	1		0508	155	14.	1		0708	215	6.
1		0110	36	13.	1		0310	96	46.	1		0510	156	14.	1		0710	216	6.
1		0112	37	13.	1		0312	97	44.	1		0512	157	13.	1		0712	217	5.
1		0114	38	14.	1		0314	98	42.	1		0514	158	13.	1		0714	218	5.
1		0116	39	14.	1		0316	99	41.	1		0516	159	13.	1		0716	219	5.
1		0118	40	15.	1		0318	100	40.	1		0518	160	13.	1		0718	220	5.
1		0120	41	15.	1		0320	101	39.	1		0520	161	13.	1		0720	221	4.
1		0122	42	15.	1		0322	102	38.	1		0522	162	13.	1		0722	222	4.
1		0124	43	16.	1		0324	103	37.	1		0524	163	12.	1		0724	223	4.
1		0126	44	16.	1		0326	104	36.	1		0526	164	12.	1		0726	224	4.
1		0128	45	17.	1		0328	105	35.	1		0528	165	12.	1		0728	225	3.
1		0130	46	17.	1		0330	106	34.	1		0530	166	12.	1		0730	226	3.
1		0132	47	19.	1		0332	107	33.	1		0532	167	12.	1		0732	227	3.
1		0134	48	20.	1		0334	108	32.	1		0534	168	12.	1		0734	228	3.
1		0136	49	22.	1		0336	109	31.	1		0536	169	12.	1		0736	229	3.
1		0138	50	24.	1		0338	110	30.	1		0538	170	11.	1		0738	230	3.
1		0140	51	26.	1		0340	111	29.	1		0540	171	11.	1		0740	231	3.
1		0142	52	27.	1		0342	112	28.	1		0542	172	11.	1		0742	232	3.
1		0144	53	29.	1		0344	113	27.	1		0544	173	11.	1		0744	233	3.
1		0146	54	33.	1		0346	114	26.	1		0546	174	11.	1		0746	234	3.

```
    1    0148   55      39.  *   1    0348  115      25.  *   1    0548  175      11.  *   1    0748  235      3.
    1    0150   56      45.  *   1    0350  116      25.  *   1    0550  176      11.  *   1    0750  236      3.
    1    0152   57      51.  *   1    0352  117      25.  *   1    0552  177      11.  *   1    0752  237      3.
    1    0154   58      57.  *   1    0354  118      24.  *   1    0554  178      11.  *   1    0754  238      3.
    1    0156   59      63.  *   1    0356  119      24.  *   1    0556  179      11.  *   1    0756  239      3.
    1    0158   60      69.  *   1    0358  120      23.  *   1    0558  180      11.  *   1    0758  240      3.
                             *                         *                         *
*****************************************************************************************************************

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR      7.97-HR
+  (CFS)       (HR)
                          (CFS)
+    309.      2.27                 47.         37.         37.         37.
                        (INCHES)   2.897       2.988       2.988       2.988
                         (AC-FT)    23.         24.         24.

                       CUMULATIVE AREA =    0.15 SQ MI


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


            **************
            *            *
 17 KK      *    PUMP    *      REACH
            *            *
            **************
                          STORAGE ANALYSIS / MINIMUM ROADWAY ELEVATION = 1220+/-
                          MAXIMUM WATER LEVEL = 1215 / 3-96" X 600 LF STORAGE PIPES

              HYDROGRAPH ROUTING DATA

 20 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       STOR  TYPE OF INITIAL CONDITION
                    RSVRIC       0.00  INITIAL CONDITION
                         X       0.00 WORKING R AND D COEFFICIENT

 21 SV          STORAGE        0.0       0.6       3.0

 22 SE          ELEVATION    1190.50   1206.00   1215.00

 23 SQ          DISCHARGE        0.        0.        0.

 24 WP          PUMPING DATA

                  PUMP ON    PUMPING    PUMP OFF
                 ELEVATION     RATE    ELEVATION

                   1204.0       22.      1190.5
                   1206.0       50.      1197.0
                   1208.0       50.      1198.0
                   1209.0       50.      1199.0
                   1210.0       50.      1200.0

                    ISTAD              PUMP FLOW HYDROGRAPH IDENTIFICATION
                                                    ***
*****************************************************************************************************************

                                          HYDROGRAPH AT STATION     PUMP
*****************************************************************************************************************
```

DA	MON	HRMN	ORD	PUMP Q	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	0.	0.0	1190.5
1		0002	2	0.	0.	0.0	1190.5
1		0004	3	0.	0.	0.0	1190.6
1		0006	4	0.	0.	0.0	1190.6
1		0008	5	0.	0.	0.0	1190.7
1		0010	6	0.	0.	0.0	1190.9
1		0012	7	0.	0.	0.0	1191.0
1		0014	8	0.	0.	0.0	1191.2
1		0016	9	0.	0.	0.0	1191.5
1		0018	10	0.	0.	0.0	1191.7
1		0020	11	0.	0.	0.1	1192.0
1		0022	12	0.	0.	0.1	1192.2
1		0024	13	0.	0.	0.1	1192.5
1		0026	14	0.	0.	0.1	1192.9
1		0028	15	0.	0.	0.1	1193.2
1		0030	16	0.	0.	0.1	1193.6
1		0032	17	0.	0.	0.1	1194.0
1		0034	18	0.	0.	0.1	1194.4
1		0036	19	0.	0.	0.2	1194.8
1		0038	20	0.	0.	0.2	1195.3
1		0040	21	0.	0.	0.2	1195.8
1		0042	22	0.	0.	0.2	1196.4
1		0044	23	0.	0.	0.2	1196.9
1		0046	24	0.	0.	0.3	1197.5
1		0048	25	0.	0.	0.3	1198.1
1		0050	26	0.	0.	0.3	1198.8
1		0052	27	0.	0.	0.3	1199.4
1		0054	28	0.	0.	0.4	1200.1
1		0056	29	0.	0.	0.4	1200.8
1		0058	30	0.	0.	0.4	1201.5
1		0100	31	0.	0.	0.4	1202.3
1		0102	32	0.	0.	0.5	1203.0
1		0104	33	0.	0.	0.5	1203.9
1		0106	34	0.	0.	0.5	1204.7
1		0108	35	22.	0.	0.5	1203.9
1		0110	36	22.	0.	0.5	1203.2
1		0112	37	22.	0.	0.4	1202.5
1		0114	38	22.	0.	0.4	1201.9
1		0116	39	22.	0.	0.4	1201.3
1		0118	40	22.	0.	0.4	1200.7
1		0120	41	22.	0.	0.4	1200.2
1		0122	42	22.	0.	0.3	1199.7
1		0124	43	22.	0.	0.3	1199.2
1		0126	44	22.	0.	0.3	1198.7
1		0128	45	22.	0.	0.3	1198.3
1		0130	46	22.	0.	0.3	1197.9
1		0132	47	22.	0.	0.3	1197.6
1		0134	48	22.	0.	0.3	1197.4
1		0136	49	22.	0.	0.3	1197.4
1		0138	50	22.	0.	0.3	1197.5
1		0140	51	22.	0.	0.3	1197.7
1		0142	52	22.	0.	0.3	1198.0
1		0144	53	22.	0.	0.3	1198.5
1		0146	54	22.	0.	0.3	1199.2
1		0148	55	22.	0.	0.4	1200.2
1		0150	56	22.	0.	0.4	1201.7
1		0152	57	22.	0.	0.5	1203.7
1		0154	58	22.	0.	0.6	1206.0
1		0156	59	72.	0.	0.5	1205.1
1		0158	60	72.	0.	0.5	1204.7
1		0200	61	72.	0.	0.5	1204.7
1		0202	62	72.	0.	0.6	1206.0
1		0204	63	72.	0.	0.7	1206.5
1		0206	64	72.	0.	0.9	1207.4

DA	MON	HRMN	ORD	PUMP Q	OUTFLOW	STORAGE	STAGE
1		0400	121	22.	0.	0.3	1199.1
1		0402	122	22.	0.	0.3	1199.1
1		0404	123	22.	0.	0.3	1199.2
1		0406	124	22.	0.	0.3	1199.2
1		0408	125	22.	0.	0.3	1199.3
1		0410	126	22.	0.	0.3	1199.3
1		0412	127	22.	0.	0.3	1199.3
1		0414	128	22.	0.	0.3	1199.3
1		0416	129	22.	0.	0.3	1199.3
1		0418	130	22.	0.	0.3	1199.3
1		0420	131	22.	0.	0.3	1199.3
1		0422	132	22.	0.	0.3	1199.2
1		0424	133	22.	0.	0.3	1199.1
1		0426	134	22.	0.	0.3	1199.0
1		0428	135	22.	0.	0.3	1198.9
1		0430	136	22.	0.	0.3	1198.8
1		0432	137	22.	0.	0.3	1198.6
1		0434	138	22.	0.	0.3	1198.4
1		0436	139	22.	0.	0.3	1198.2
1		0438	140	22.	0.	0.3	1197.9
1		0440	141	22.	0.	0.3	1197.7
1		0442	142	22.	0.	0.3	1197.3
1		0444	143	22.	0.	0.2	1197.0
1		0446	144	22.	0.	0.2	1196.6
1		0448	145	22.	0.	0.2	1196.2
1		0450	146	22.	0.	0.2	1195.8
1		0452	147	22.	0.	0.2	1195.4
1		0454	148	22.	0.	0.2	1194.9
1		0456	149	22.	0.	0.1	1194.4
1		0458	150	22.	0.	0.1	1193.9
1		0500	151	22.	0.	0.1	1193.4
1		0502	152	22.	0.	0.1	1192.9
1		0504	153	22.	0.	0.1	1192.3
1		0506	154	22.	0.	0.0	1191.8
1		0508	155	22.	0.	0.0	1191.2
1		0510	156	22.	0.	0.0	1190.6
1		0512	157	22.	0.	0.0	1190.5
1		0514	158	0.	0.	0.0	1191.5
1		0516	159	0.	0.	0.1	1192.5
1		0518	160	0.	0.	0.1	1193.4
1		0520	161	0.	0.	0.1	1194.4
1		0522	162	0.	0.	0.2	1195.3
1		0524	163	0.	0.	0.2	1196.3
1		0526	164	0.	0.	0.2	1197.2
1		0528	165	0.	0.	0.3	1198.1
1		0530	166	0.	0.	0.3	1199.0
1		0532	167	0.	0.	0.3	1199.9
1		0534	168	0.	0.	0.4	1200.8
1		0536	169	0.	0.	0.4	1201.7
1		0538	170	0.	0.	0.4	1202.5
1		0540	171	0.	0.	0.5	1203.4
1		0542	172	0.	0.	0.5	1204.2
1		0544	173	22.	0.	0.5	1203.4
1		0546	174	22.	0.	0.4	1202.6
1		0548	175	22.	0.	0.4	1201.7
1		0550	176	22.	0.	0.4	1200.9
1		0552	177	22.	0.	0.4	1200.1
1		0554	178	22.	0.	0.3	1199.2
1		0556	179	22.	0.	0.3	1198.4
1		0558	180	22.	0.	0.3	1197.5
1		0600	181	22.	0.	0.2	1196.7
1		0602	182	22.	0.	0.2	1195.8
1		0604	183	22.	0.	0.2	1194.9
1		0606	184	22.	0.	0.1	1194.0

1	0208	65	72.	0.	1.3	1208.5	*	1	0608	185	22.	0.	0.1	1193.2
1	0210	66	122.	0.	1.5	1209.5	*	1	0610	186	22.	0.	0.1	1192.3
1	0212	67	172.	0.	1.7	1210.3	*	1	0612	187	22.	0.	0.0	1191.4
1	0214	68	222.	0.	1.9	1210.9	*	1	0614	188	22.	0.	0.0	1190.5
1	0216	69	222.	0.	2.1	1211.7	*	1	0616	189	0.	0.	0.0	1190.5
1	0218	70	222.	0.	2.4	1212.5	*	1	0618	190	0.	0.	0.0	1191.2
1	0220	71	222.	0.	2.6	1213.2	*	1	0620	191	0.	0.	0.1	1192.0
1	0222	72	222.	0.	2.7	1213.8	*	1	0622	192	0.	0.	0.1	1192.7
1	0224	73	222.	0.	2.8	1214.3	*	1	0624	193	0.	0.	0.1	1193.4
1	0226	74	222.	0.	2.9	1214.7	*	1	0626	194	0.	0.	0.1	1194.2
1	0228	75	222.	0.	3.0	1214.9	*	1	0628	195	0.	0.	0.2	1194.9
1	0230	76	222.	0.	3.0	1215.0	*	1	0630	196	0.	0.	0.2	1195.6
1	0232	77	222.	0.	3.0	1215.0	*	1	0632	197	0.	0.	0.2	1196.3
1	0234	78	222.	0.	3.0	1214.9	*	1	0634	198	0.	0.	0.2	1197.0
1	0236	79	222.	0.	2.9	1214.6	*	1	0636	199	0.	0.	0.3	1197.7
1	0238	80	222.	0.	2.8	1214.1	*	1	0638	200	0.	0.	0.3	1198.4
1	0240	81	222.	0.	2.6	1213.5	*	1	0640	201	0.	0.	0.3	1199.1
1	0242	82	222.	0.	2.4	1212.7	*	1	0642	202	0.	0.	0.3	1199.8
1	0244	83	222.	0.	2.2	1211.8	*	1	0644	203	0.	0.	0.4	1200.5
1	0246	84	222.	0.	1.9	1210.7	*	1	0646	204	0.	0.	0.4	1201.1
1	0248	85	222.	0.	1.6	1209.6	*	1	0648	205	0.	0.	0.4	1201.8
1	0250	86	222.	0.	1.2	1208.3	*	1	0650	206	0.	0.	0.4	1202.4
1	0252	87	222.	0.	0.9	1207.0	*	1	0652	207	0.	0.	0.5	1203.0
1	0254	88	222.	0.	0.5	1203.2	*	1	0654	208	0.	0.	0.5	1203.6
1	0256	89	222.	0.	0.1	1192.2	*	1	0656	209	0.	0.	0.5	1204.2
1	0258	90	0.	0.	0.0	1190.5	*	1	0658	210	22.	0.	0.5	1203.1
1	0300	91	0.	0.	0.2	1194.9	*	1	0700	211	22.	0.	0.4	1202.0
1	0302	92	0.	0.	0.3	1199.0	*	1	0702	212	22.	0.	0.4	1200.8
1	0304	93	0.	0.	0.5	1202.9	*	1	0704	213	22.	0.	0.3	1199.7
1	0306	94	0.	0.	0.6	1206.1	*	1	0706	214	22.	0.	0.3	1198.5
1	0308	95	72.	0.	0.5	1204.9	*	1	0708	215	22.	0.	0.3	1197.3
1	0310	96	72.	0.	0.5	1203.0	*	1	0710	216	22.	0.	0.2	1196.1
1	0312	97	72.	0.	0.4	1200.9	*	1	0712	217	22.	0.	0.2	1194.9
1	0314	98	72.	0.	0.3	1198.8	*	1	0714	218	22.	0.	0.1	1193.6
1	0316	99	72.	0.	0.2	1196.4	*	1	0716	219	22.	0.	0.1	1192.3
1	0318	100	22.	0.	0.3	1197.8	*	1	0718	220	22.	0.	0.0	1191.1
1	0320	101	22.	0.	0.3	1199.1	*	1	0720	221	22.	0.	0.0	1190.5
1	0322	102	22.	0.	0.4	1200.3	*	1	0722	222	0.	0.	0.0	1190.5
1	0324	103	22.	0.	0.4	1201.4	*	1	0724	223	0.	0.	0.0	1190.8
1	0326	104	22.	0.	0.4	1202.5	*	1	0726	224	0.	0.	0.0	1191.1
1	0328	105	22.	0.	0.5	1203.5	*	1	0728	225	0.	0.	0.0	1191.3
1	0330	106	22.	0.	0.5	1204.4	*	1	0730	226	0.	0.	0.0	1191.6
1	0332	107	22.	0.	0.5	1205.3	*	1	0732	227	0.	0.	0.0	1191.8
1	0334	108	22.	0.	0.6	1206.0	*	1	0734	228	0.	0.	0.1	1192.0
1	0336	109	72.	0.	0.5	1203.0	*	1	0736	229	0.	0.	0.1	1192.2
1	0338	110	72.	0.	0.3	1199.9	*	1	0738	230	0.	0.	0.1	1192.5
1	0340	111	72.	0.	0.2	1196.7	*	1	0740	231	0.	0.	0.1	1192.7
1	0342	112	22.	0.	0.2	1197.1	*	1	0742	232	0.	0.	0.1	1192.9
1	0344	113	22.	0.	0.3	1197.5	*	1	0744	233	0.	0.	0.1	1193.1
1	0346	114	22.	0.	0.3	1197.8	*	1	0746	234	0.	0.	0.1	1193.3
1	0348	115	22.	0.	0.3	1198.1	*	1	0748	235	0.	0.	0.1	1193.6
1	0350	116	22.	0.	0.3	1198.3	*	1	0750	236	0.	0.	0.1	1193.8
1	0352	117	22.	0.	0.3	1198.5	*	1	0752	237	0.	0.	0.1	1194.0
1	0354	118	22.	0.	0.3	1198.7	*	1	0754	238	0.	0.	0.1	1194.2
1	0356	119	22.	0.	0.3	1198.9	*	1	0756	239	0.	0.	0.1	1194.5
1	0358	120	22.	0.	0.3	1199.0	*	1	0758	240	0.	0.	0.2	1194.7
							*							

****

PEAK OUTFLOW IS 0. AT TIME 0.00 HOURS

***** PUMP FLOW HYDROGRAPH *****

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR (CFS)	24-HR	72-HR	7.97-HR
+					

```
+     222.      2.23                    47.        36.        36.        36.
                          (INCHES)    2.886      2.938      2.938      2.938
                           (AC-FT)      23.        24.        24.        24.

 ***** OUTFLOW HYDROGRAPH *****

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR      72-HR     7.97-HR
+   (CFS)       (HR)
                                    (CFS)
+      0.       0.03                    0.         0.         0.         0.
                          (INCHES)   0.001      0.001      0.001      0.001
                           (AC-FT)      0.         0.         0.         0.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR      72-HR     7.97-HR
+  (AC-FT)      (HR)
      3.        2.50                     1.         0.         0.         0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR      72-HR     7.97-HR
+   (FEET)      (HR)
   1215.03      2.50                 1200.48    1198.92    1198.92    1198.92

                          CUMULATIVE AREA =    0.15 SQ MI

1
                                          RUNOFF SUMMARY
                                     FLOW IN CUBIC FEET PER SECOND
                                   TIME IN HOURS,  AREA IN SQUARE MILES

                                   PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD     BASIN    MAXIMUM    TIME OF
          OPERATION      STATION   FLOW    PEAK                                         AREA     STAGE    MAX STAGE
+                                                     6-HOUR     24-HOUR    72-HOUR

          HYDROGRAPH AT
+                          PUMP     309.   2.27        47.        37.        37.       0.15
          PUMP FLOW TO
+                                   222.   2.23        47.        36.        36.       0.15
          HYDROGRAPH AT
+                          PUMP       0.   0.03         0.         0.         0.       0.15
+                                                                                               1215.03     2.50

 *** NORMAL END OF HEC-1 ***
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APPENDIX 3

Santan Freeway

Detention Basin HEC-1 Models (Basins K and L)

BASIN K

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1                                   HEC-1 INPUT                                                    PAGE 39

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

1540          KK  PUMPIN
1541          KM    INFLOW HYDROGRAPH FOR MCQUEEN PUMP STATION
1542          BA  0.1014
1543          IN      15
1544          QI       0       2       4       6       8      13      15      60      95     274
1545          QI      85      46      35      23      20      17      16      15      14      13
1546          QI      12      10       9       8     7.5       7     6.5       6     5.5       5
1547          QI       3       0

1548          KK    PUMP REACH
1549          KM    STORAGE ANALYSIS / MINIMUM ROADWAY ELEVATION = 1205+/-
1550          KM    MAXIMUM WATER LEVEL = 1200
1551          KM    USED 500 LF OF 96" PIPE (P203) FOR STORAGE IN LIEU OF 36" DIA. PIPE
1552          RS       1    STOR       0
1553          SV       0    0.57    1.55
1554          SE  1175.5    1191    1200
1555          SQ    0.01    0.01    0.01
1556          WP    1189      22  1175.5   PUMPO
1557          WP    1191      50    1182   PUMPO
1558          WP    1193      50    1183   PUMPO
1559          WP    1194      50    1184   PUMPO
1560          WP    1195      50    1185   PUMPO
              *

1561          KK   PUMPO
1562          WR   PUMPO
              *

1563          KK   HCPMP
1564          KM   COMBINE PUMP HYDROGRAPHS
1565          HC       2
              *

1566          KK    RDGD
1567          KM    RETRIEVE THE GRAVITY DRAIN FLOWS FROM BASIN L
1568          DR    DL-K
              *

1569          KK    RL-K
1570          KM    ROUTE GRAVITY DRAIN FLOWS TO BASIN K
1571          RD    6000   0.001   0.013            CIRC       4
              *
              *

1572          KK    HC48
1573          KM   COMBINE RUNOFF HYDROGRAPH FROM SUB48 WITH ROUTED FLOWS FROM SUB48A
1574          KM   AND WITH GRAVITY DRAIN FLOWS FROM BASIN L AND FREEWAY CHANNEL FLOWS
1575          KM      NOTE:  50-YR MCQUEEN PUMP STATION FLOWS INCLUDED
1576          KM             SUB48A FLOWS NOT ROUTED THROUGH BASIN "K" IN HDR PLAN 02/94
1577          HC       3
              *
1                                   HEC-1 INPUT                                                    PAGE 40

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

1578          KK    BASK
1579          KM    APPROXIMATE RESERVOIR ROUTING OF PROPOSED ADOT BASIN K FROM
1580          KM    DAMES & MOORE TECHNICAL MEMORANDUM NO. 1 DRAINAGE CONCEPTS
1581          KM    SOUTHEAST LOOP HIGHWAY STATE ROUTE 220 JULY 19, 1988 STAMPED 8/2/88
1582          KM    AND APPENDIX A OF THE DESIGN CONCEPT REPORT STAMPED 8/3/88
1583          KM    BASIN DESIGN VOLUME 58.7 AC-FT WITH A 4 FT. DIAMETER GRAVITY DRAIN
```

```
KM    AND A 5.7 ACRE SURFACE AREA WITH 4:1 SIDESLOPES AND ASSUMED DEPTH
KM    FROM SURFACE OF 19 FT WITH STORAGE ONLY TO 15 FT.
KM    OUTFLOWS ABOVE 58.7 ACRE-FEET ARE ASSUMED TO FLOW IN THE FREEWAY CHANNEL
KM    UP TO ITS CAPACITY THEN OVERTOP AND CONTINUE SOUTH TOWARD GERMANN ROAD
KM    GRAVITY DRAIN FLOWS IN PIPE TO PROPOSED ADOT BASIN J.
KM     NOTE:  IN HDR PLAN 02/94, BASIN "K" IS DESIGNED NOT TO OVERFLOW
KM            AND DK-JCH SHOULD BE EMPTY
KM            BASIN K INTERCEPTS ONLY PART OF BASIN 48, BUT MODELED AS IF
KM            ALL IS INTERCEPTED.
KM            IN HDR PLAN 02/94 BASIN K HAS 3:1 SIDE SLOPES, 26 AC-FT AT DHW
KM           AND 24" OUTLET TO ONSITE STORM DRAIN
RS      1    STOR      0
SV      0      13      26      43      50
SQ      0      25      37      43    1500
*

KK   DIVGD
KM     SEPARATE GRAVITY DRAIN FLOWS FROM OVERFLOWS
DT    DK-J
DI      0      25      37   10000
DQ      0      25      37      43
*

KK   DIVCH
KM    DIVERT FREEWAY CHANNEL FLOWS
KM    CAPACITY FROM DAMES AND MOORE TECH. MEMO. NO. 1 JULY,1988
KM    TABLE NO. 4 CHANNEL NUMBER 12.
DT  DK-JCH
DI      0     170   10000
DQ      0     170     170
*

KK  RDDUMB
KM    DUMMY RETRIEVAL OF GRAVITY DRAIN FLOWS IN ORDER TO WRITE THEM TO DSS
DR    DK-J
ZW       A=GCADMSFUTURE   B=GRAVITY DRAIN K TO J   C=FLOW  F=24HR CLU FWY
*

KK  DIVALL
KM    DIVERT ALL FLOWS FROM DUMMY RETRIEVAL
DT   DUMMY
DI      0   10000
DQ      0   10000
*
```

Approx 450 x 300 = 3 AC + 30' Buffer


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

KK   HCMTY
KM    COMBINE EMPTY CONTINUING HYDROGRAPH WITH BASIN K OVERFLOWS
HC       2
*

KK  RDDUMB
KM    DUMMY RETRIEVAL OF FREEWAY CHANNEL FLOWS IN ORDER TO WRITE THEM TO DSS
DR  DK-JCH
ZW       A=GCADMSFUTURE   B=CHANNEL K TO J   C=FLOW  F=24HR CLU FWY
*

KK  DIVALL
KM    DIVERT ALL FLOWS FROM DUMMY RETRIEVAL
DT   DUMMY
DI      0   10000
DQ      0   10000
*
```

```
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                              (CFS)
+     37.      28.25                    37.         37.         36.         31.
                          (INCHES)    0.000       0.000       0.000       0.000
                           (AC-FT)     18.         73.        214.        422.

                          CUMULATIVE AREA =    0.00 SQ MI


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


              **************
              *            *
1572 KK       *     HC48   *
              *            *
              **************
                          COMBINE RUNOFF HYDROGRAPH FROM SUB48 WITH ROUTED FLOWS FROM SUB48A
                          AND WITH GRAVITY DRAIN FLOWS FROM BASIN L AND FREEWAY CHANNEL FLOWS
                             NOTE:  50-YR MCQUEEN PUMP STATION FLOWS INCLUDED
                                    SUB48A FLOWS NOT ROUTED THROUGH BASIN "K" IN HDR PLAN 02/94

1577 HC          HYDROGRAPH COMBINATION
                       ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                  ***

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

                        HYDROGRAPH AT STATION     HC48

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                              (CFS)
+    343.      13.08                    82.         50.         43.         37.
                          (INCHES)    0.923       2.264       5.793      11.613
                           (AC-FT)     40.         99.        254.        509.

                          CUMULATIVE AREA =    0.82 SQ MI


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


              **************
              *            *
1578 KK       *   BASIN    *
              *            *
              **************
                          APPROXIMATE RESERVOIR ROUTING OF PROPOSED ADOT BASIN K FROM
                          DAMES & MOORE TECHNICAL MEMORANDUM NO. 1 DRAINAGE CONCEPTS
                          SOUTHEAST LOOP HIGHWAY STATE ROUTE 220 JULY 19, 1988 STAMPED 8/2/88
                          AND APPENDIX A OF THE DESIGN CONCEPT REPORT STAMPED 8/3/88
                          BASIN DESIGN VOLUME 58.7 AC-FT WITH A 4 FT. DIAMETER GRAVITY DRAIN
                          AND A 5.7 ACRE SURFACE AREA WITH 4:1 SIDESLOPES AND ASSUMED DEPTH
                          FROM SURFACE OF 19 FT WITH STORAGE ONLY TO 15 FT.
                          OUTFLOWS ABOVE 58.7 ACRE-FEET ARE ASSUMED TO FLOW IN THE FREEWAY CHANNEL
                          UP TO ITS CAPACITY THEN OVERTOP AND CONTINUE SOUTH TOWARD GERMANN ROAD
                          GRAVITY DRAIN FLOWS IN PIPE TO PROPOSED ADOT BASIN J.
                           NOTE:  IN HDR PLAN 02/94, BASIN "K" IS DESIGNED NOT TO OVERFLOW
                                  AND DK-JCH SHOULD BE EMPTY
```

BASIN K INTERCEPTS ONLY PART OF BASIN 48, BUT MODELED AS IF
ALL IS INTERCEPTED.
IN HDR PLAN 02/94 BASIN K HAS 3:1 SIDE SLOPES, 26 AC-FT AT DHW
AND ~~36"~~ 24" OUTLET TO ~~BASIN J~~. ONSITE SYSTEM

HYDROGRAPH ROUTING DATA

```
1595 RS        STORAGE ROUTING
                    NSTPS          1  NUMBER OF SUBREACHES
                     ITYP       STOR  TYPE OF INITIAL CONDITION
                   RSVRIC       0.00  INITIAL CONDITION
                        X       0.00 WORKING R AND D COEFFICIENT

1596 SV          STORAGE        0.0      13.0      26.0      43.0      50.0

1597 SQ         DISCHARGE        0.       25.       37.       43.     1500.
                                                                  ***

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

                     HYDROGRAPH AT STATION     BASK

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)      (HR)
                          (CFS)
+     40.     15.33        40.        40.        40.         36.
                      (INCHES)      0.451      1.799      5.371      11.227
                       (AC-FT)       20.        79.       235.        492.

 PEAK STORAGE  TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR    166.58-HR
+  (AC-FT)     (HR)
+     36.     15.33        34.        34.        33.         27.

                     CUMULATIVE AREA =    0.82 SQ MI


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


            **************
            *            *
1598 KK     *     DIVGD  *
            *            *
            **************
                     SEPARATE GRAVITY DRAIN FLOWS FROM OVERFLOWS

     DT         DIVERSION
                     ISTAD       DK-J  DIVERSION HYDROGRAPH IDENTIFICATION

     DI            INFLOW       0.00      25.00      37.00   10000.00

     DQ      DIVERTED FLOW      0.00      25.00      37.00      43.00
                                                                  ***

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

                     DIVERSION HYDROGRAPH     DK-J

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR    166.58-HR
+   (CFS)      (HR)
```

```
+     37.     14.00          (CFS)
                                37.          37.          37.          34.
                       (INCHES)  0.419       1.675        5.026       10.837
                        (AC-FT)   18.         73.         220.         475.
                       CUMULATIVE AREA =    0.82 SQ MI

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

                       HYDROGRAPH AT STATION    DIVGD

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR        72-HR     166.58-HR
+   (CFS)       (HR)
                          (CFS)
+      3.       15.33                3.           3.           3.           1.
                       (INCHES)  0.033       0.123        0.345        0.390
                        (AC-FT)   1.          5.          15.          17.
                       CUMULATIVE AREA =    0.82 SQ MI


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


            **************
            *            *
1603 KK     *     DIVCH  *
            *            *
            **************
                       DIVERT FREEWAY CHANNEL FLOWS
                       CAPACITY FROM DAMES AND MOORE TECH. MEMO. NO. 1 JULY,1988
                       TABLE NO. 4 CHANNEL NUMBER 12.

     DT          DIVERSION
                      ISTAD      DK-JCH  DIVERSION HYDROGRAPH IDENTIFICATION

     DI       .      INFLOW      0.00    170.00  10000.00

     DQ      DIVERTED FLOW       0.00    170.00    170.00

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

                       DIVERSION HYDROGRAPH   DK-JCH

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR        72-HR     166.58-HR
+   (CFS)       (HR)
                          (CFS)
+      3.       15.33                3.           3.           3.           1.
                       (INCHES)  0.033       0.123        0.345        0.390
                        (AC-FT)   1.          5.          15.          17.
                       CUMULATIVE AREA =    0.82 SQ MI

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

                       HYDROGRAPH AT STATION    DIVCH

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR        72-HR     166.58-HR
```

```
1                                                HEC-1 INPUT                                                    PAGE 23
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 883          KK    RDGD
 884          KM    RETRIEVE THE GRAVITY DRAIN FLOWS FROM BASIN O
 885          DR    DO-L
              *

 886          KK    RO-L
 887          KM    ROUTE GRAVITY DRAIN FLOWS TO BASIN L
 888          KM    BASIN O DRAIN DISCHARGES TO FREEWAY CHANNEL AT GILBERT ROAD BUT
 889          KM    ROUTED AS IF DISCHARGED TO BASIN L
 890          RD   14000   0.003   0.013            CIRC       3
              *

 891          KK   HCBAL
 892          KM   COMBINE PUMPOUT AND BASIN DRAIN FLOWS
 893          HC       2
              *

 894          KK    BASL
 895          KM    APPROXIMATE RESERVOIR ROUTING OF PROPOSED ADOT BASIN L FROM
 896          KM    DAMES & MOORE TECHNICAL MEMORANDUM NO. 1 DRAINAGE CONCEPTS
 897          KM    SOUTHEAST LOOP HIGHWAY STATE ROUTE 220 JULY 19, 1988 STAMPED 8/2/88
 898          KM    AND APPENIX A OF THE DESIGN CONCEPT REPORT STAMPED 8/3/88
 899          KM    BASIN DESIGN VOLUME 45 AC-FT WITH A 3 FT. DIAMETER GRAVITY DRAIN
 900          KM    AND A 4.6 ACRE SURFACE AREA WITH 4:1 SIDESLOPES AND ASSUMED DEPTH
 901          KM    FROM SURFACE OF 19 FT WITH STORAGE ONLY TO 15 FT.
 902          KM    OUTFLOWS ABOVE 45 ACRE-FEET ARE ASSUMED TO OVERTOP TOWARD THE CONSOLIDATED
 903          KM    CANAL AND CONTINUE SOUTH TOWARD GERMANN ROAD ONCE THE FREEWAY CHANNEL
 904          KM    CAPACITY IS ALSO EXCEEDED
 905          KM    GRAVITY DRAIN FLOWS IN PIPE TO PROPOSED ADOT BASIN K.
 906          KM    NOTE:  BASIN "L" DESIGNED NOT TO OVERFLOW IN HDR PLAN 02/94
 907          KM           BASIN L REDUCED TO 38 AC-FT AT DHW AND 3:1 SIDE SLOPES
 908          KM           OTHERWISE SAME AS ABOVE  2 FT. DIA. DRAIN TO ONSITE
 909          RS       1    STOR       0                                SYSTEM.
 910          SV       0      18      38      53    49.6
 911          SQ       0      25      37      43    1350
              *

 912          KK   DIVGD
 913          KM     SEPARATE GRAVITY DRAIN FLOWS FROM OVERFLOWS
 914          DT    DL-K
 915          DI       0      25      37   10000
 916          DQ       0      25      37      43
              *

 917          KK   DIVCH
 918          KM    DIVERT FREEWAY CHANNEL FLOWS
 919          KM    CAPACITY FROM DAMES AND MOORE TECH. MEMO. NO. 1 JULY,1988
 920          KM    TABLE NO. 4 CHANNEL NUMBER 13.
 921          KM    CONTINUING FLOWS FLOW TOWARD THE CONSOLIDATED CANAL AND GERMANN ROAD
 922          KM    NOTE: HDR BASIN L DESIGNED NOT TO OVERFLOW (PLAN 02/94)
 923          DT  DL-KCH
 924          DI       0     340   10000
 925          DQ       0     340     340
              *
```

BASIN L

460x460 ≅ 4.9 AC

OVERFLOWS TO CC DITCH

```
1                                                HEC-1 INPUT                                                    PAGE 24
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 926          KK   HC39A
 927          KM    COMBINE ROUTED HYDROGRAPH DIV38, BIF39A AND SUB39A WITH EMPTY OVERFLOW
```

```
                 **************
                 *            *
894 KK           *     BASL   *
                 *            *
                 **************
                                APPROXIMATE RESERVOIR ROUTING OF PROPOSED ADOT BASIN L FROM
                                DAMES & MOORE TECHNICAL MEMORANDUM NO. 1 DRAINAGE CONCEPTS
                                SOUTHEAST LOOP HIGHWAY STATE ROUTE 220 JULY 19, 1988 STAMPED 8/2/88
                                AND APPENIX A OF THE DESIGN CONCEPT REPORT STAMPED 8/3/88
                                BASIN DESIGN VOLUME 45 AC-FT WITH A 3 FT. DIAMETER GRAVITY DRAIN
                                AND A 4.6 ACRE SURFACE AREA WITH 4:1 SIDESLOPES AND ASSUMED DEPTH
                                FROM SURFACE OF 19 FT WITH STORAGE ONLY TO 15 FT.
                                OUTFLOWS ABOVE 45 ACRE-FEET ARE ASSUMED TO OVERTOP TOWARD THE CONSOLIDATED
                                CANAL AND CONTINUE SOUTH TOWARD GERMANN ROAD ONCE THE FREEWAY CHANNEL
                                CAPACITY IS ALSO EXCEEDED
                                GRAVITY DRAIN FLOWS IN PIPE TO PROPOSED ADOT BASIN K.
                                NOTE:  BASIN "L" DESIGNED NOT TO OVERFLOW IN HDR PLAN 02/94
                                       BASIN L REDUCED TO 38 AC-FT AT DHW AND 3:1 SIDE SLOPES ~~BUT~~
                                       ~~OTHERWISE SAME AS ABOVE~~ 24" Drain to Onsite System
                HYDROGRAPH ROUTING DATA

909 RS            STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       STOR  TYPE OF INITIAL CONDITION
                      RSVRIC       0.00  INITIAL CONDITION
                           X       0.00  WORKING R AND D COEFFICIENT

910 SV            STORAGE        0.0      18.0      38.0      53.0      49.6

911 SQ           DISCHARGE        0.       25.       37.       43.     1350.
                                                                ***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      43. TO     1350.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                      HYDROGRAPH AT STATION     BASL

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    166.58-HR
+  (CFS)       (HR)
                              (CFS)
+   102.       27.92            81.         68.         49.          37.
                         (INCHES)   4.992     16.703      36.132      63.491
                          (AC-FT)     40.        135.        292.        513.

 PEAK STORAGE  TIME                          MAXIMUM AVERAGE STORAGE
                                    6-HR       24-HR       72-HR    166.58-HR
+ (AC-FT)      (HR)
   53.        33.92             53.         53.         53.          48.

                      CUMULATIVE AREA =    0.15 SQ MI


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

                 **************
                 *            *
```

```
912 KK      *     DIVGD  *
            *            *
            **************
```

SEPARATE GRAVITY DRAIN FLOWS FROM OVERFLOWS

DT	DIVERSION ISTAD	DL-K	DIVERSION HYDROGRAPH IDENTIFICATION		
DI	INFLOW	0.00	25.00	37.00	10000.00
DQ	DIVERTED FLOW	0.00	25.00	37.00	43.00
					***

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

DIVERSION HYDROGRAPH DL-K

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	166.58-HR
+ 37.	27.92	(CFS)	37.	37.	36.	31.
		(INCHES)	2.274	9.093	26.483	52.486
		(AC-FT)	18.	73.	214.	424.

CUMULATIVE AREA = 0.15 SQ MI

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

HYDROGRAPH AT STATION DIVGD

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	166.58-HR
+ 65.	27.92	(CFS)	44.	31.	13.	6.
		(INCHES)	2.718	7.609	9.687	11.005
		(AC-FT)	22.	61.	78.	89.

CUMULATIVE AREA = 0.15 SQ MI

*** ***

```
            **************
            *            *
917 KK      *    DIVCH   *
            *            *
            **************
```

DIVERT FREEWAY CHANNEL FLOWS
CAPACITY FROM DAMES AND MOORE TECH. MEMO. NO. 1 JULY,1988
TABLE NO. 4 CHANNEL NUMBER 13.
CONTINUING FLOWS FLOW TOWARD THE CONSOLIDATED CANAL AND GERMANN ROAD
NOTE: HDR BASIN L DESIGNED NOT TO OVERFLOW (PLAN 02/94)

DT	DIVERSION ISTAD	DL-KCH	DIVERSION HYDROGRAPH IDENTIFICATION	
DI	INFLOW	0.00	340.00	10000.00
DQ	DIVERTED FLOW	0.00	340.00	340.00

BASIN O

```
*

KK   RDQGD
KM    RETRIEVE GRAVITY DRAIN FLOWS OUTLETTING FROM BASIN Q
BA    7.34
ZR   =QI    A=GCADMSFUTURE  B=GRAVITY DRAIN Q TO O  C=FLOW  F=24HR CLU FWY
*

KK   RQTOO
KM    ROUTE GRAVITY DRAIN FLOWS FROM BASIN Q TO O
RD   18000  0.0005   0.013            CIRC       4
*

KK   HC33A
KM     COMBINE RUNOFF HYDROGRAPH FROM SUB33A WITH ROUTED HYDROGRAPH FROM SUB32A
KM     AND SUB32 AND GRAVITY DRAIN FLOWS
KM     NOTE: SUB32A NOT ROUTED THROUGH BASIN IN HDR PLAN 02/94
HC       3
*
```



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

KK   BASO
KM    APPROXIMATE RESERVOIR ROUTING OF PROPOSED ADOT BASIN O FROM
KM    DAMES & MOORE TECHNICAL MEMORANDUM NO. 1 DRAINAGE CONCEPTS
KM    SOUTHEAST LOOP HIGHWAY STATE ROUTE 220 JULY 19, 1988 STAMPED 8/2/88
KM    AND APPENIX A OF THE DESIGN CONCEPT REPORT STAMPED 8/3/88
KM    BASIN DESIGN VOLUME 175 AC-FT WITH A 4 FT. DIAMETER GRAVITY DRAIN
KM    AND A 14.7 ACRE SURFACE AREA WITH 4:1 SIDESLOPES AND ASSUMED DEPTH
KM    FROM SURFACE OF 19 FT WITH STORAGE ONLY TO 15 FT.
KM    GRAVITY DRAIN FLOWS IN PIPE TO PROPOSED ADOT BASIN L.
KM    HDR PLAN 02/94 11.2 AC BASIN (460' X 1060' RW)
KM    WITH 100 AC-FT DESIGN VOLUME AND 3:1 SIDESLOPES
KM    TOTAL DEPTH=19' WITH 4' FB AND 142 AC-FT TOTAL VOLUME
KM    BERM ELEV 1263+/- **** BOT. ELEV 1244
KM    D=48" OUTLET TO FREEWAY CHANNEL AT GILBERT ROAD
RS       1  STOR       0
SV       0      52     100     142     189.7
SQ       0      53      80      92      2400
*

KK   DIVGD
KM     SEPARATE GRAVITY DRAIN FLOWS FROM OVERFLOWS
DT    DO-L
DI       0      53      80   10000
DQ       0      53      80      92
*
*     REMOVED FROM RUN IN HDR PLAN 02/94
*     KK DIVCH
*     KM  DIVERT FLOWS WHICH FIT IN THE FREEWAY CHANNEL.
*     KM  CAPACITY FROM DAMES AND MOORE TECH. MEMO. NO. 1 JULY,1988
*     KM  TABLE NO. 4 CHANNEL NUMBER 16.
*     KM  CONTINUING FLOWS FLOW TOWARD THE EASTERN CANAL AND GERMANN ROAD
*     KM  NOTE:  BASIN "O" OVERFLOWS DISCHARGED TO DITCH ALONG EASTERN CANAL
*     DTDO-LCH
*     DI      0     330   10000
*     DQ      0     330     330
*

KK  SUB33B
KM   BASIN SUB33B
KM    SOUTH HALF SUB33 TO BASIN "O" IN HDR PLAN 02/94
KM    NOTE: SUB33 SPLIT EQUALLY INTO SUB33A AND SUB33B IN HDR PLAN 02/94
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L= 4.2  Lca= 1.9   S=  14.1   Kn= .085   LAG= 164.0
```

Outlet not shown on plans.

```
                                                                  ***
     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION    HC33A

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                                  (CFS)
+    532.      14.83                316.        112.         59.          37.
                              (INCHES)       0.301       0.426       0.669        0.991
                               (AC-FT)        157.        222.        349.         516.

                        CUMULATIVE AREA =    9.77 SQ MI


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


            **************
            *            *
  342 KK    *      BASO  *
            *            *
            **************
                          APPROXIMATE RESERVOIR ROUTING OF PROPOSED ADOT BASIN O FROM
                          DAMES & MOORE TECHNICAL MEMORANDUM NO. 1 DRAINAGE CONCEPTS
                          SOUTHEAST LOOP HIGHWAY STATE ROUTE 220 JULY 19, 1988 STAMPED 8/2/88
                          AND APPENIX A OF THE DESIGN CONCEPT REPORT STAMPED 8/3/88
                          BASIN DESIGN VOLUME 175 AC-FT WITH A 4 FT. DIAMETER GRAVITY DRAIN
                          AND A 14.7 ACRE SURFACE AREA WITH 4:1 SIDESLOPES AND ASSUMED DEPTH
                          FROM SURFACE OF 19 FT WITH STORAGE ONLY TO 15 FT.
                          GRAVITY DRAIN FLOWS IN PIPE TO PROPOSED ADOT BASIN L.
                          HDR PLAN 02/94 11.2 AC BASIN (460' X 1060' RW)
                          WITH 100 AC-FT DESIGN VOLUME AND 3:1 SIDESLOPES
                          TOTAL DEPTH 19' WITH 4' FB AND 142 AC-FT TOTAL VOLUME
                          BERM ELEV 1263+/- **** BOT. ELEV 1244
                          D=48" OUTLET TO FREEWAY CHANNEL AT GILBERT ROAD

            HYDROGRAPH ROUTING DATA

  356 RS          STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       STOR  TYPE OF INITIAL CONDITION
                      RSVRIC       0.00  INITIAL CONDITION
                           X       0.00 WORKING R AND D COEFFICIENT

  357 SV            STORAGE        0.0      52.0      100.0      142.0      189.7

  358 SQ           DISCHARGE        0.       53.        80.        92.       2400.
                                                                  ***
     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION     BASO

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                                  (CFS)
+     88.       20.25               87.         78.         54.          37.
                              (INCHES)       0.083       0.297       0.612        0.966
                               (AC-FT)         43.        155.        319.         503.
```

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	166.58-HR
+ 128.	20.25	125.	101.	61.	40.

CUMULATIVE AREA = 9.77 SQ MI

*** ***

```
              **************
              *            *
359 KK        *     DIVGD  *
              *            *
              **************
```

SEPARATE GRAVITY DRAIN FLOWS FROM OVERFLOWS

	DIVERSION ISTAD	DO-L	DIVERSION HYDROGRAPH IDENTIFICATION		
DT					
DI	INFLOW	0.00	53.00	80.00	10000.00
DQ	DIVERTED FLOW	0.00	53.00	80.00	92.00

***

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

DIVERSION HYDROGRAPH DO-L

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	166.58-HR
		(CFS)				
+ 80.	20.17		80.	75.	53.	36.
		(INCHES)	0.076	0.287	0.602	0.956
		(AC-FT)	40.	150.	314.	498.

CUMULATIVE AREA = 9.77 SQ MI

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

HYDROGRAPH AT STATION DIVGD

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	166.58-HR
		(CFS)				
+ 8.	20.25		7.	3.	1.	0.
		(INCHES)	0.007	0.010	0.010	0.010
		(AC-FT)	4.	5.	5.	5.

CUMULATIVE AREA = 9.77 SQ MI

*** ***

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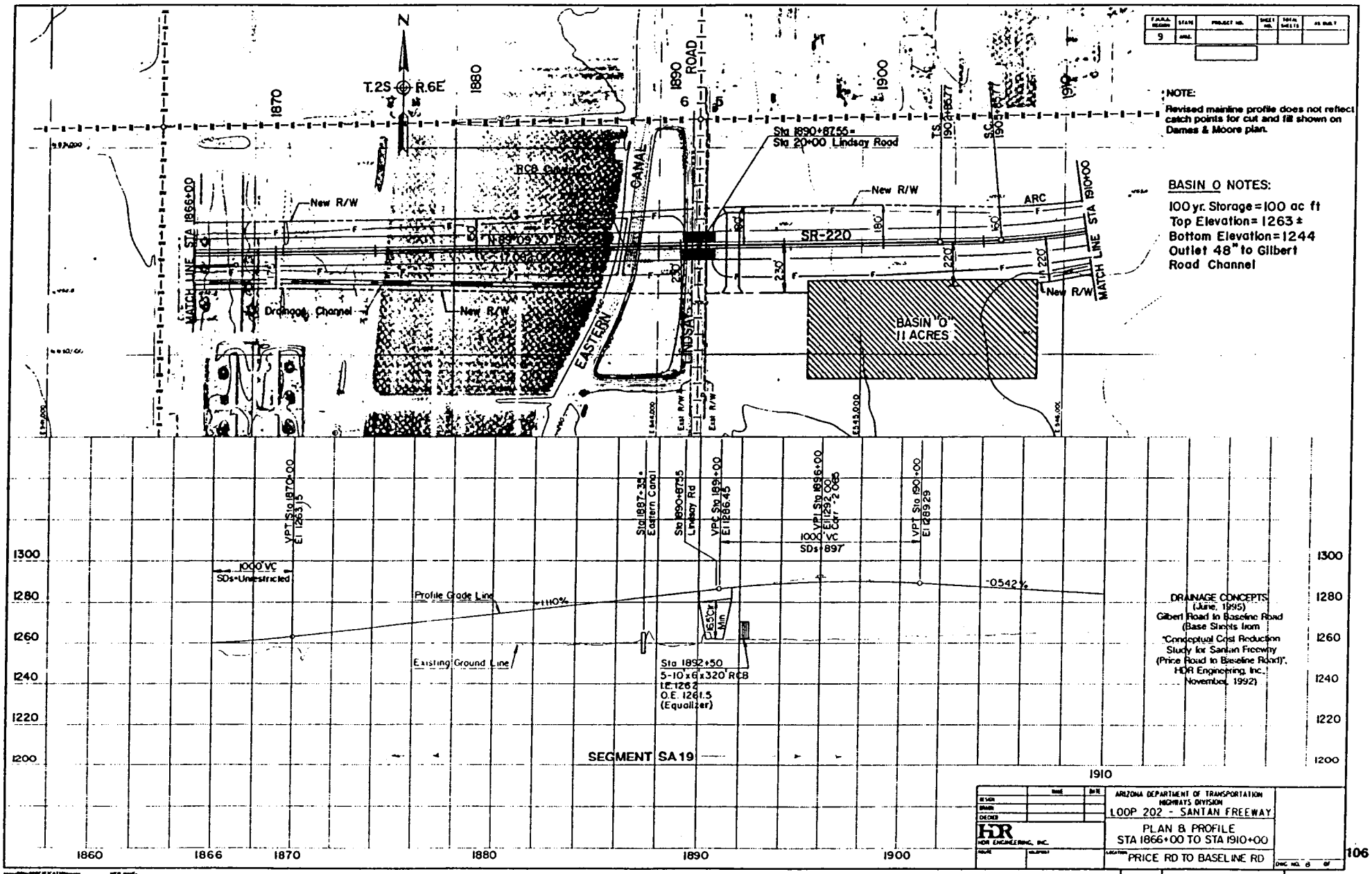
              **************
              *            *
```

APPENDIX 4

PRELIMINARY DRAINAGE CONCEPTS

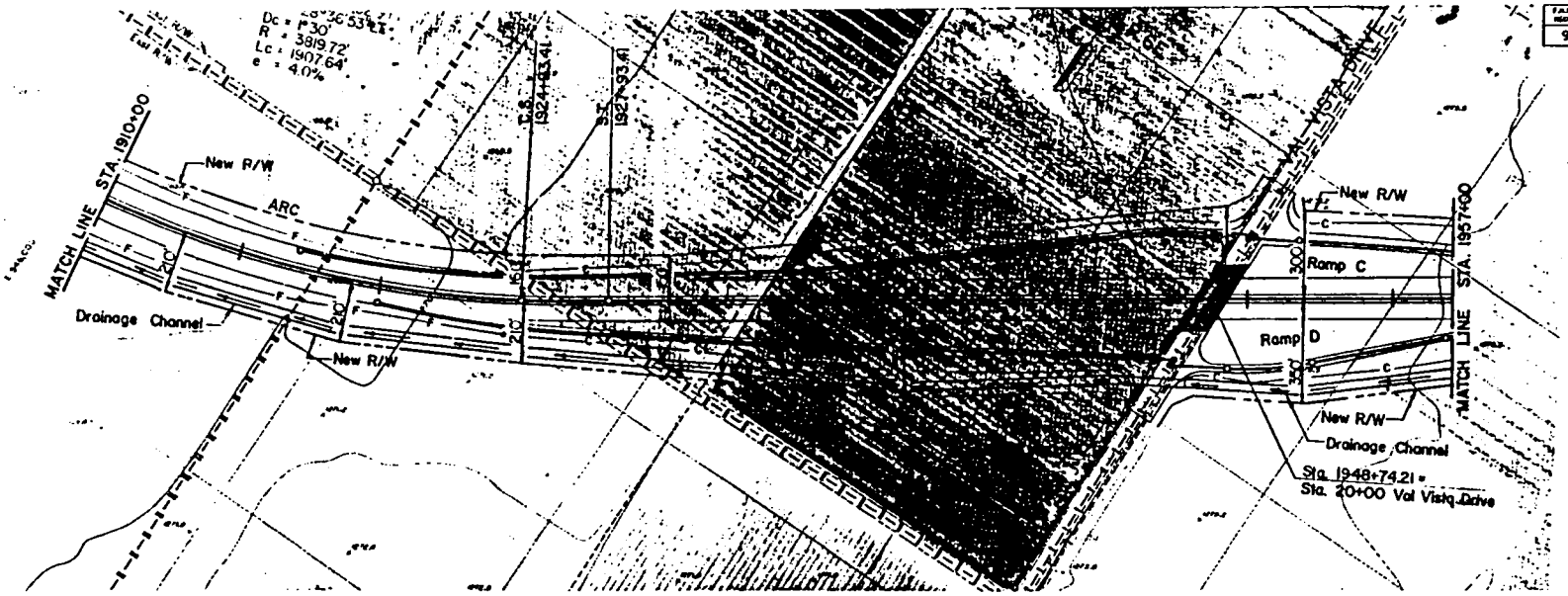
Santan Freeway

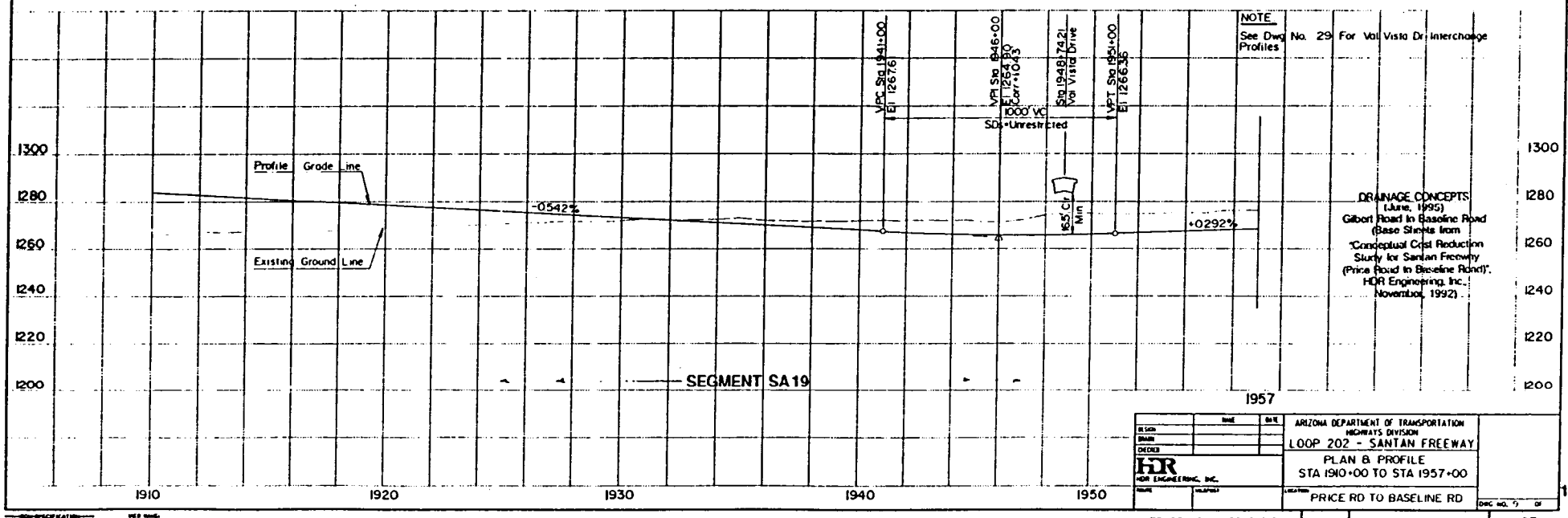
Gilbert Road to Baseline Road


NOTE:
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.
BASIN O NOTES:
100 yr. Storage = 100 ac ft
Top Elevation = 1263 ±
Bottom Elevation = 1244
Outlet 48" to Gilbert Road Channel
T.2S R.6E
N
SR-220
ARC
New R/W
BASIN "O"
11 ACRES
EASTERN CANAL
LINDSAY ROAD
Drainage Channel
RCB Culvert
MATCH LINE STA 1866+00
MATCH LINE STA 1910+00
Sta 1890+87.55 = Sta 20+00 Lindsay Road
VPT Sta 1870+00 El 1263.15
1000' VC SDs=Unrestricted
Sta 1887.35 Eastern Canal
Sta 1890+87.5 Lindsay Rd
VPC Sta 189+00 El 1266.45
VPI Sta 1896+00 El 1292.00 Curr = 2.065
1000' VC SDs=897'
VPT Sta 190+00 El 1289.29
Profile Grade Line
+1.10%
-0.542%
Existing Ground Line
Sta 1892+50
5-10'x6'x320' RCB
I.E. 1262
O.E. 1261.5
(Equalizer)
SEGMENT SA19
DRAINAGE CONCEPTS
(June, 1995)
Gilbert Road to Baseline Road
(Base Sheets from "Conceptual Cost Reduction Study for Santan Freeway (Price Road to Baseline Road)", HDR Engineering, Inc., November, 1992)
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 1866+00 TO STA 1910+00
PRICE RD TO BASELINE RD
HDR ENGINEERING, INC.
TRACS NO. H-2222-01D
106

FAHPA REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

NOTE:
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.





DRAINAGE CONCEPTS
(June, 1995)
Gilbert Road to Baseline Road
(Base Sheets from
"Conceptual Cost Reduction
Study for Santan Freeway
(Price Road to Baseline Road)".
HDR Engineering, Inc.,
November, 1992).

	NAME	DATE
DESIGN		
DRAWN		
CHECKED		

HDR ENGINEERING, INC.

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 1910+00 TO STA 1957+00
LOCATION: PRICE RD TO BASELINE RD

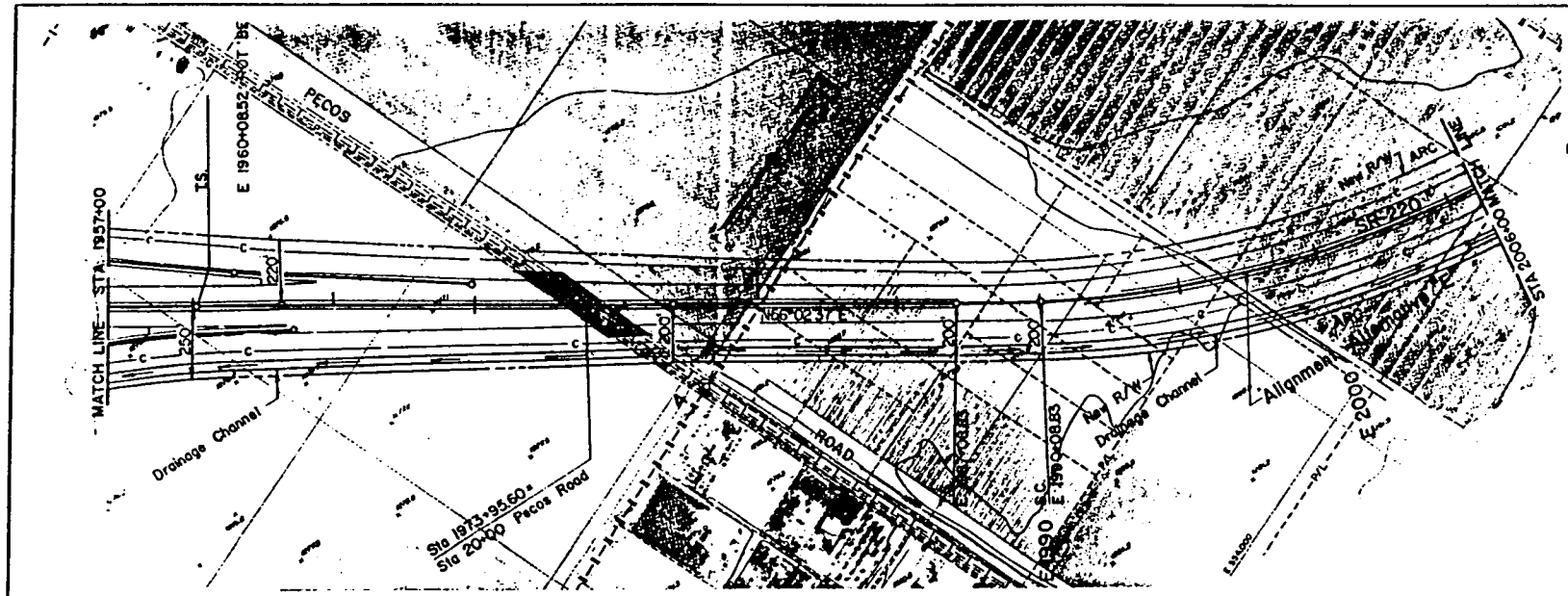
TRACS NO. H-2222-01D

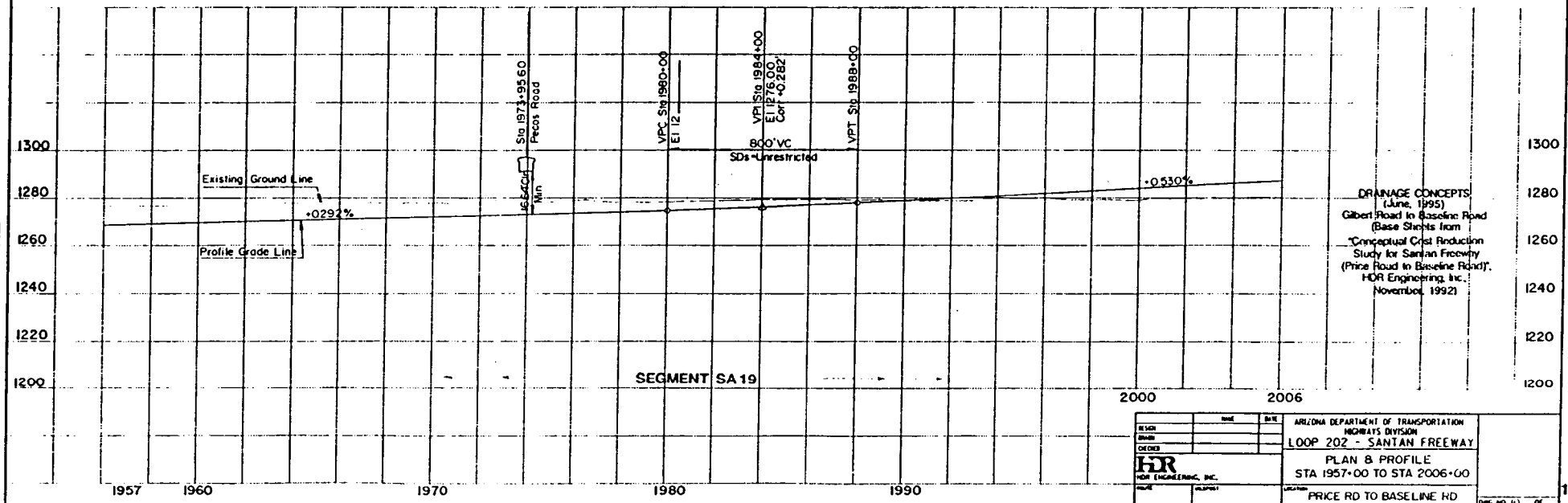
DWG NO. 7 OF ___ OF ___

FAUA REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

NOTE:

Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.





DRAINAGE CONCEPTS
(June, 1995)
Gilbert Road to Baseline Road
(Base Sheets from
"Conceptual Cost Reduction
Study for Santan Freeway
(Price Road to Baseline Road)",
HDR Engineering, Inc.,
November, 1992)

	NAME	DATE
DESIGN		
DRAWN		
CHECKED		

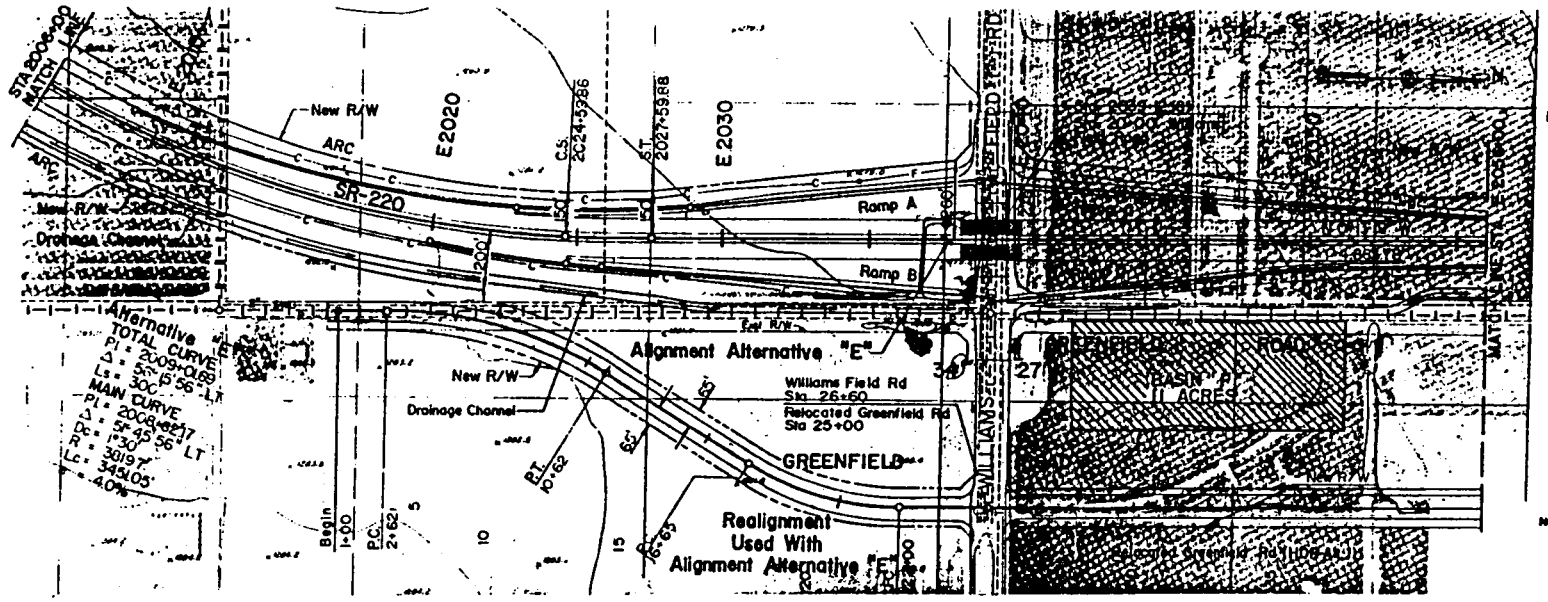
HDR
HDR ENGINEERING, INC.

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 1957+00 TO STA 2006+00
PRICE RD TO BASELINE RD

DWG NO. 10 OF

TRACS NO. H-2222-010

OF



NOTE:

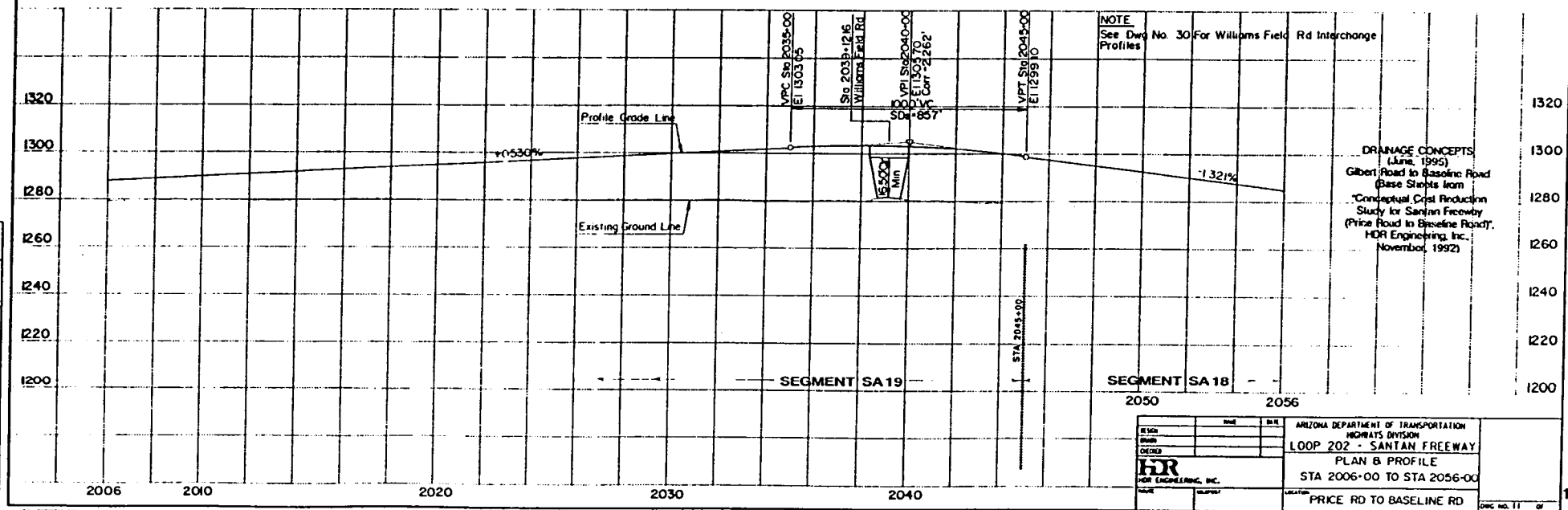
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.

BASIN P NOTES:

100 yr Storage = 100 ac ft
Top Elevation = 1281
Bottom Elevation = 1262
Outlet 48" to Basin O

NOTE:

FOR RELOCATED GREENFIELD ROAD (HDR - ALT. 1)
SEE DWG Nos. 36 & 37



DRAINAGE CONCEPTS
(June, 1995)
Gilbert Road to Baseline Road
(Base Sheets from
"Conceptual Cost Reduction Study for Santan Freeway (Price Road to Baseline Road)", HDR Engineering, Inc., November, 1992)

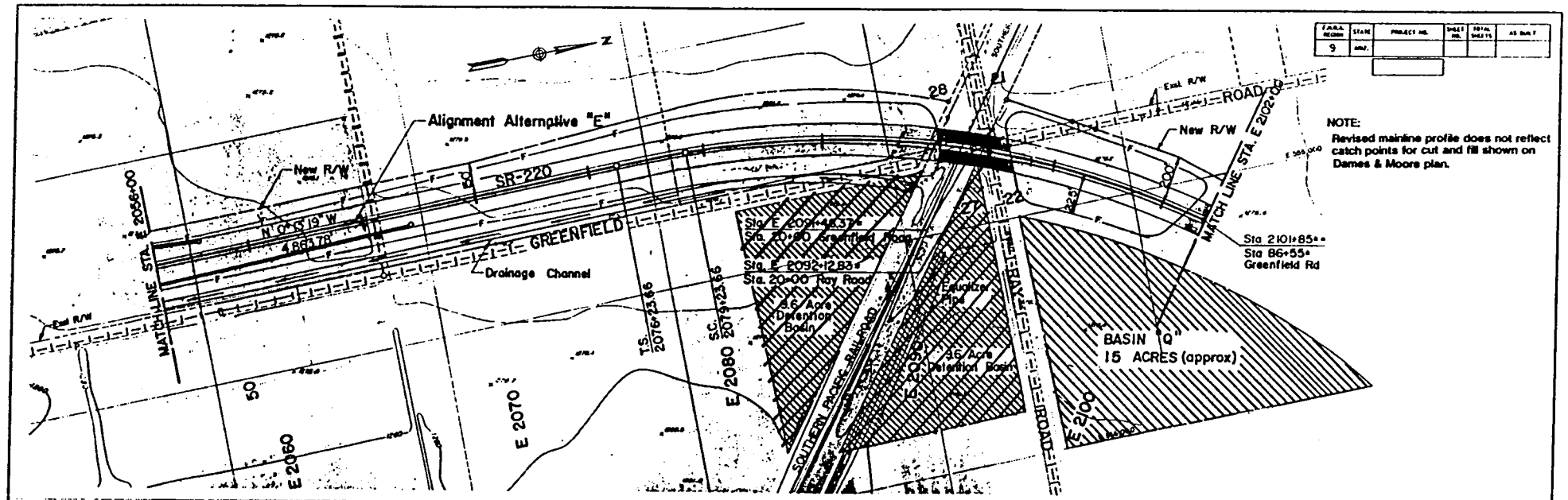
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 2006+00 TO STA 2056+00
PRICE RD TO BASELINE RD

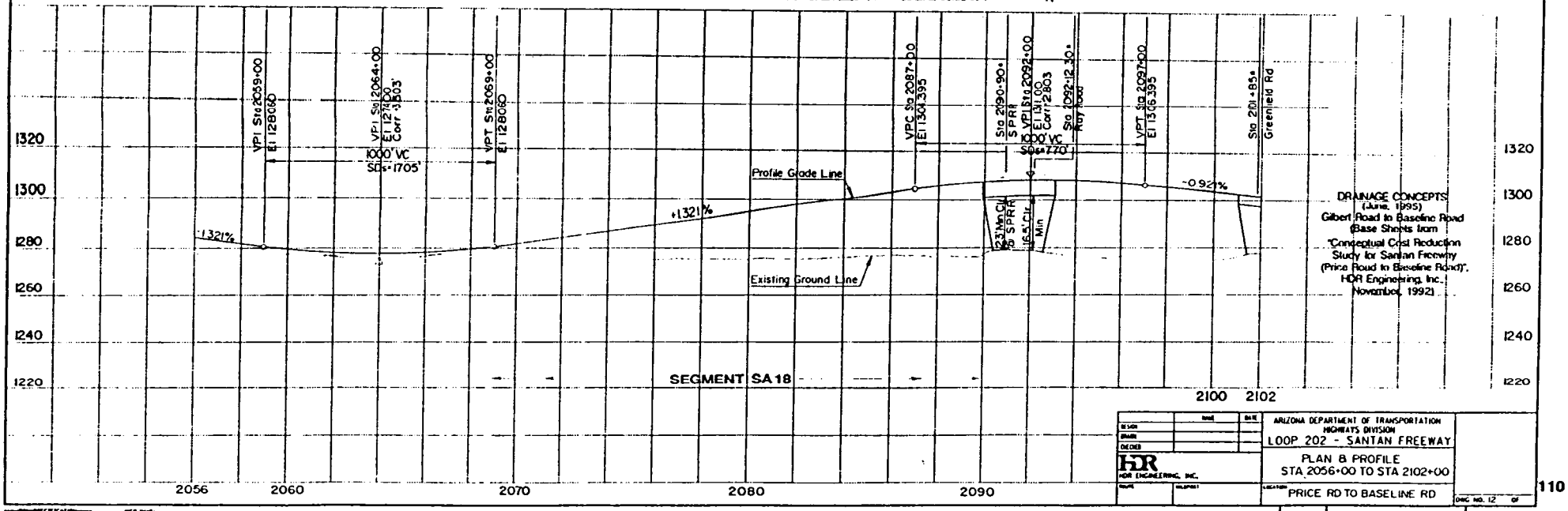
HDR ENGINEERING, INC.

TRACS NO. H-2222-01D

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

NOTE:
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.





DRAINAGE CONCEPTS
(June, 1995)
Gilbert Road to Baseline Road
(Base Sheets from
"Conceptual Cost Reduction
Study for Santan Freeway
(Price Road to Baseline Road)",
HDR Engineering, Inc.,
November, 1992)

DESIGN			ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
DRAWN			LOOP 202 - SANTAN FREEWAY
CHECKED			PLAN & PROFILE STA 2056+00 TO STA 2102+00
HDR ENGINEERING, INC.			PRICE RD TO BASELINE RD

DWG NO. 12 OF ___

TRACS NO. H-2222-01D

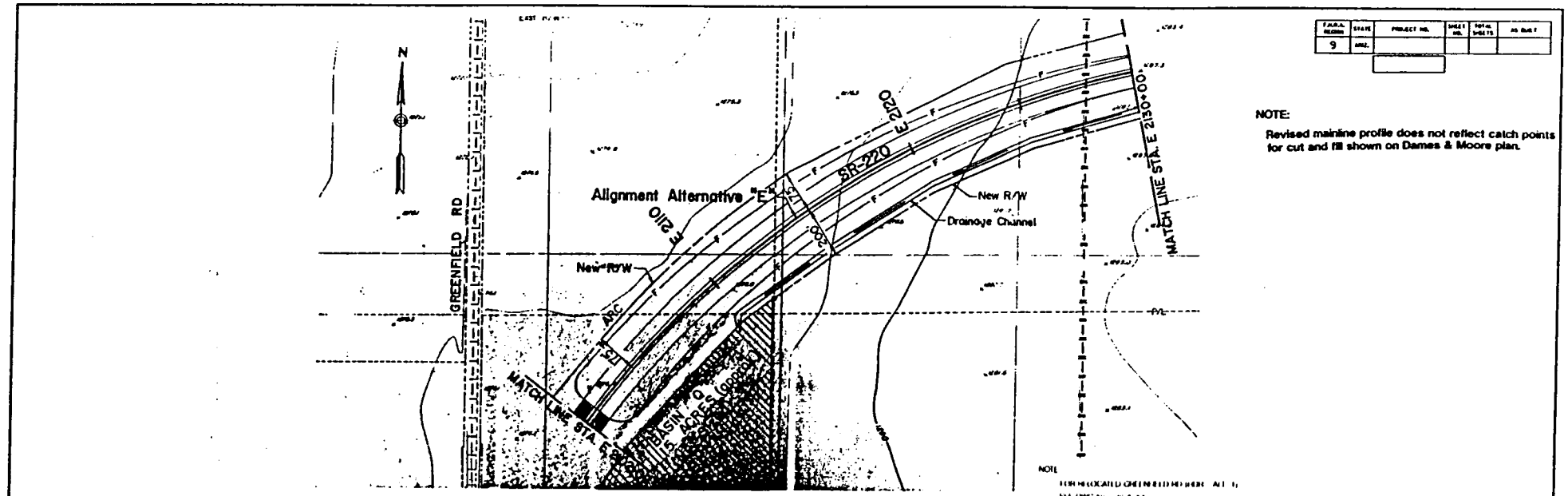
110

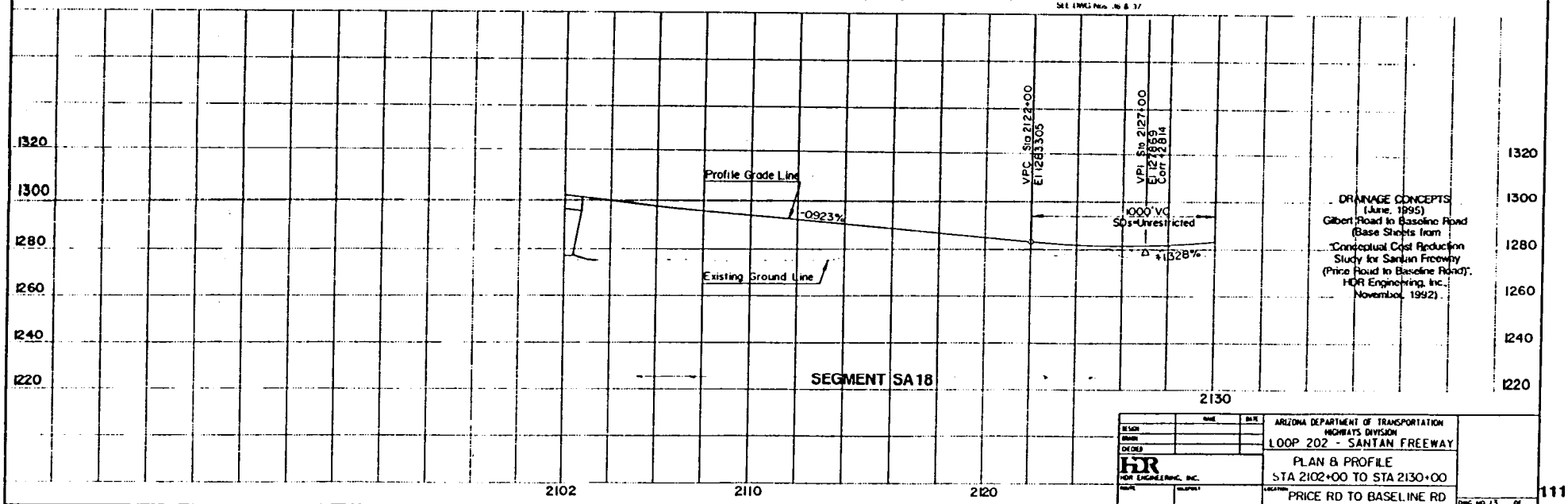
OF ___

F.A.P.N. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

NOTE:

Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.





DRAINAGE CONCEPTS
(June, 1995)
Gilbert Road to Baseline Road
(Base Sheets from
"Conceptual Cost Reduction
Study for Santan Freeway
(Price Road to Baseline Road)",
HDR Engineering, Inc.,
November, 1992).

	NAME	DATE
DESIGN		
DRAWN		
CHECKED		

HDR
HDR ENGINEERING, INC.

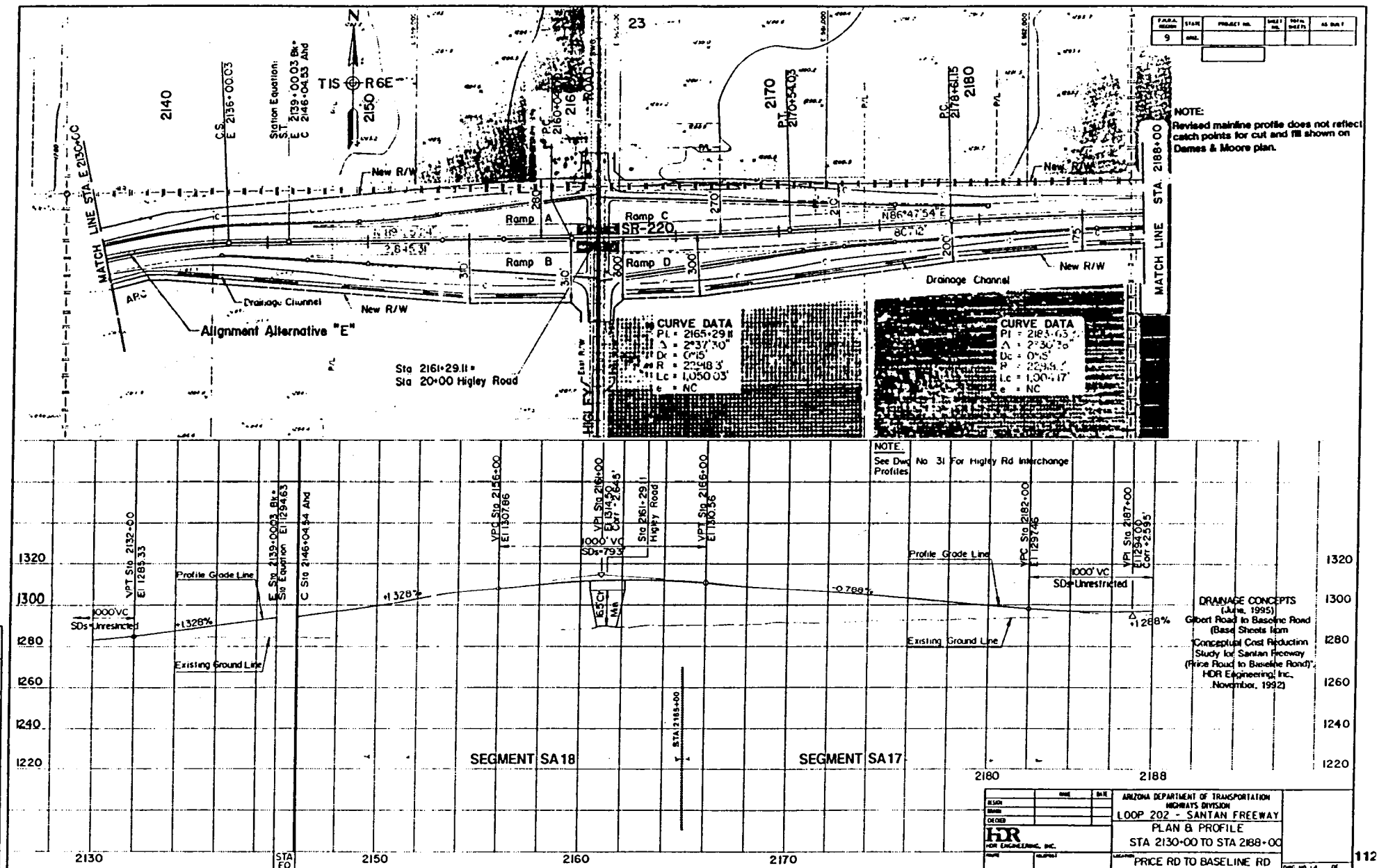
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 2102+00 TO STA 2130+00
PRICE RD TO BASELINE RD

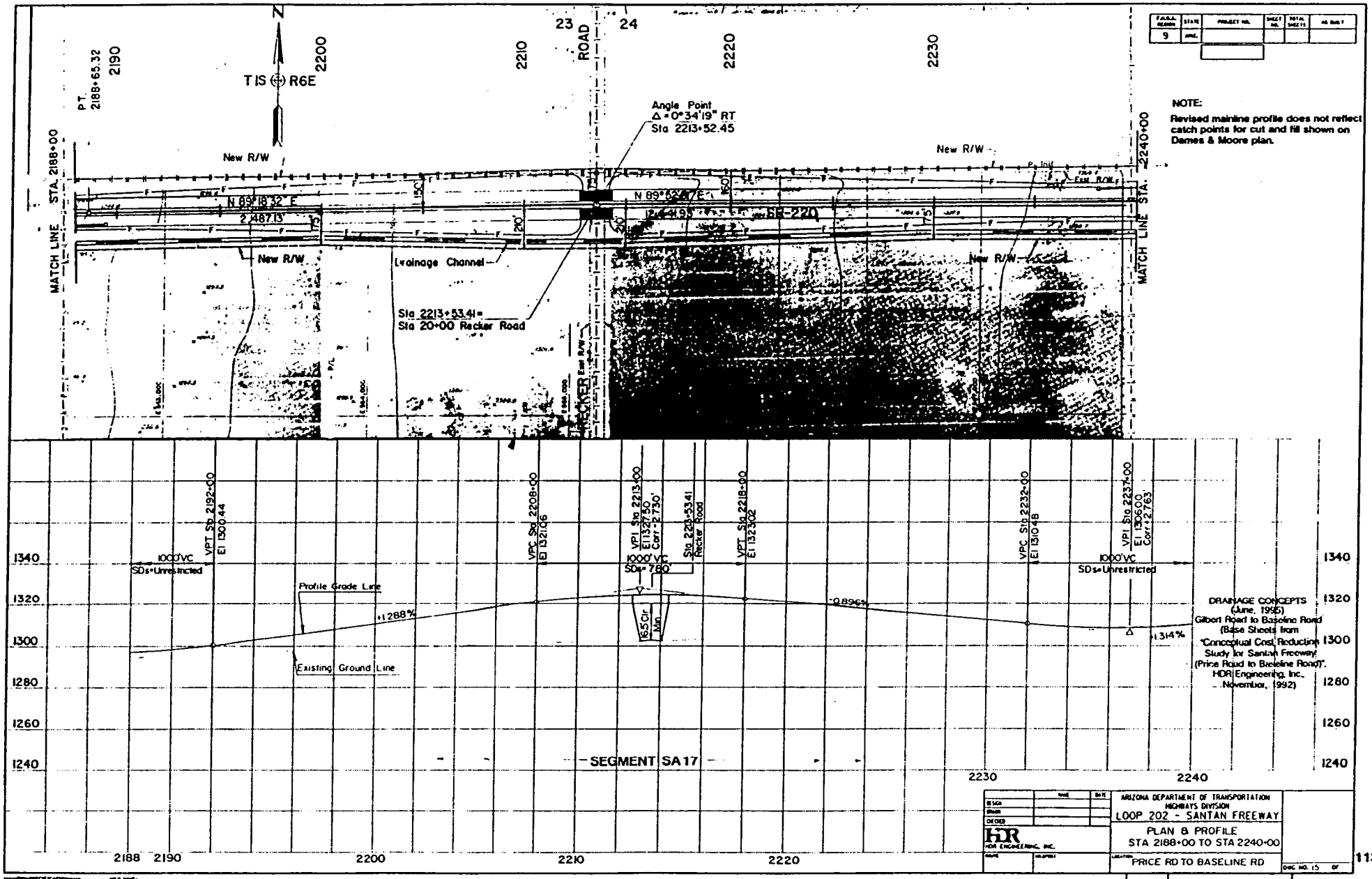
DWG NO. 13 OF

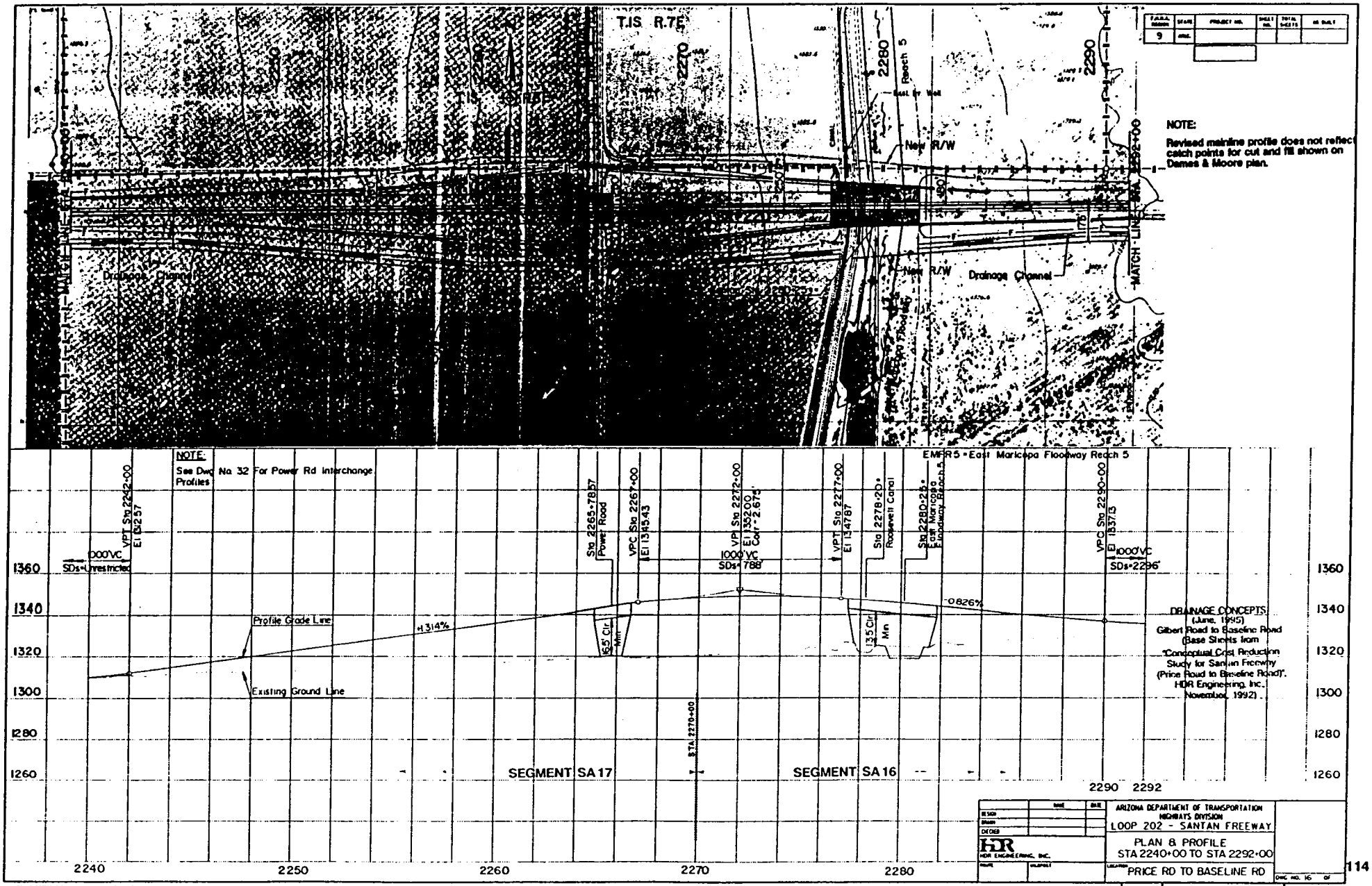
TRACS NO. H-2222-01D

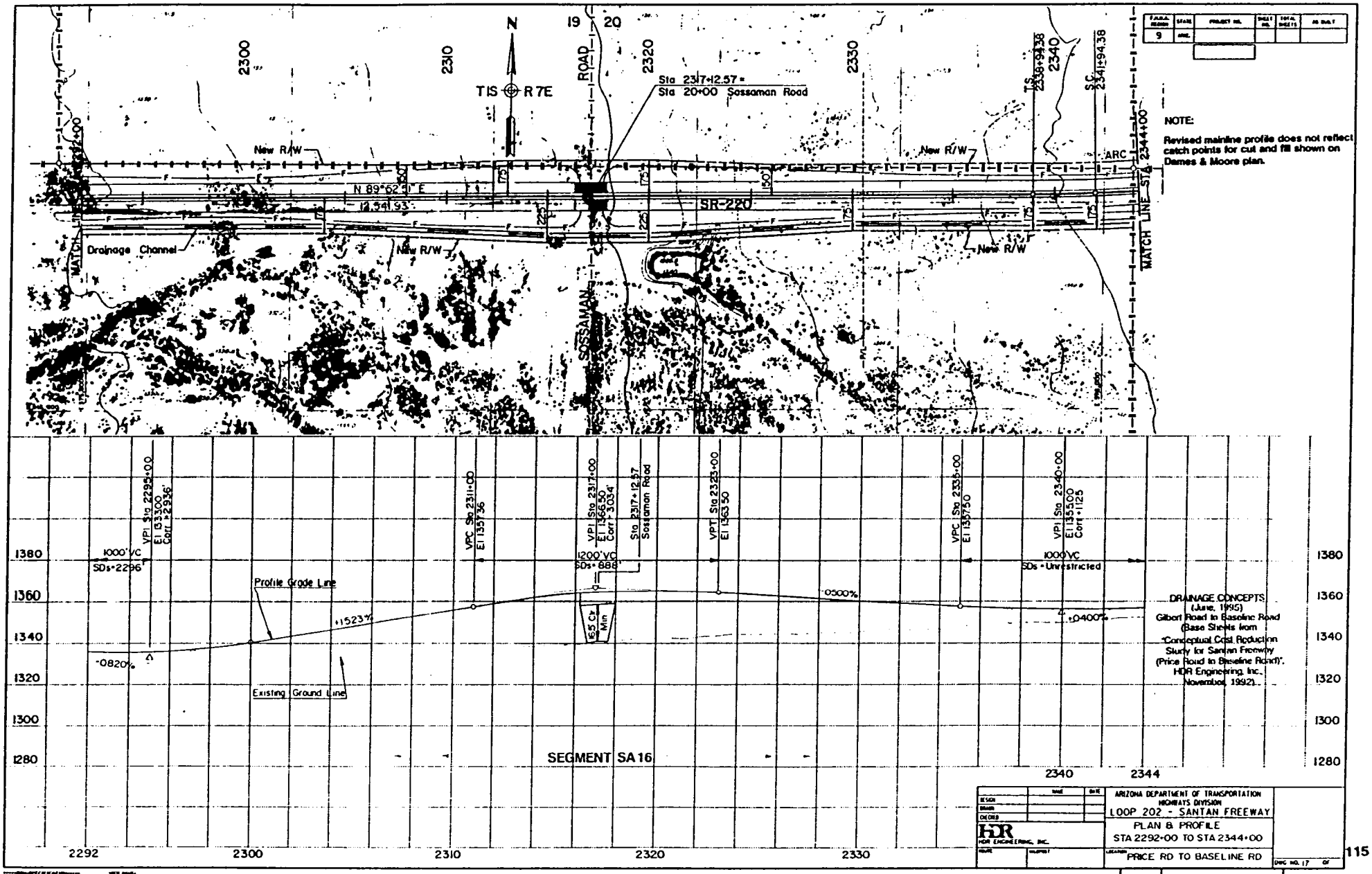
OF

111

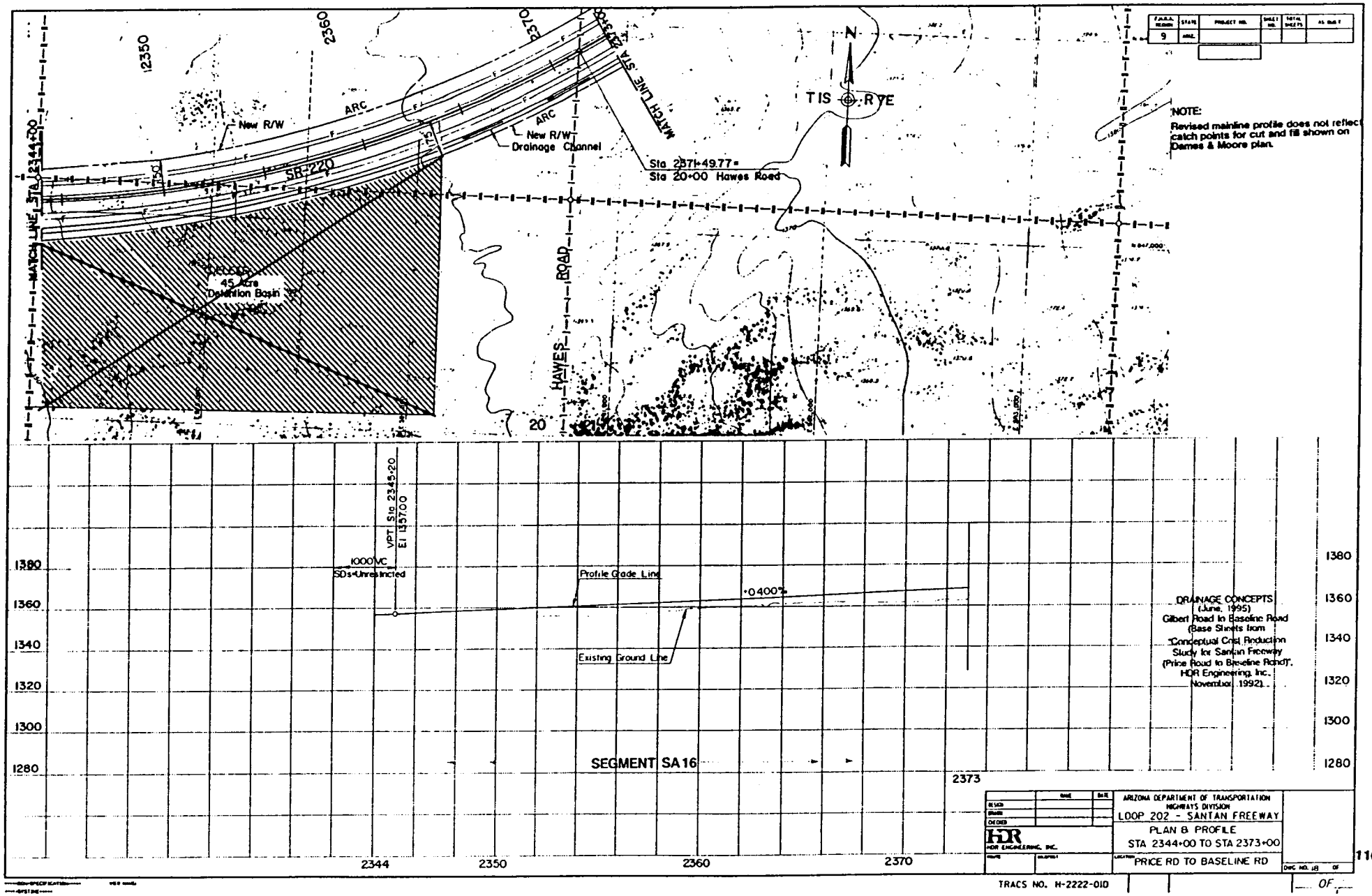

N
T1S R6E
2140
2150
2170
2180
23
Station Equation:
S.T. E 2139+00.03 Bk=
C 2146+04.53 Ahd
C.S. E 2136+00.03
P.C. 2160+00
P.T. 2170+54.03
P.C. 2178+61.15
MATCH LINE STA. E 2130+00
MATCH LINE STA. 2188+00
New R/W
Ramp A
Ramp B
Ramp C
Ramp D
SR-220
N86°47'54"E
2,845.31'
Drainage Channel
Alignment Alternative "E"
Sta 2161+29.11 =
Sta 20+00 Higley Road
HIGLEY
CURVE DATA
PI = 2165+29.11
Δ = 2°37'30"
Dc = 0°15'
R = 22948.3'
Lc = 1,050.03'
e = NC
CURVE DATA
PI = 2183+63.
Δ = 2°30'76"
Dc = 0°15'
R = 22948.
Lc = 1,00.17'
e = NC
NOTE:
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.
NOTE:
See Dwg No 31 For Higley Rd Interchange Profiles
VPT Sta 2132+00
El 1285.33
1000' VC
SDs=Unrestricted
Profile Grade Line
+1.328%
Existing Ground Line
E Sta 2139+00.03 Bk=
Sta Equation El 1294.63
C Sta 2146+04.54 Ahd
VPC Sta 2156+00
El 1307.86
VPI Sta 2161+00
El 1314.50
Curve = 2845'
1000' VC
SDs=793'
Sta 2161+29.11
Higley Road
VPT Sta 2166+00
El 1330.56
65' Ch
Min
-0.788%
VPC Sta 2182+00
El 1297.46
1000' VC
SDs=Unrestricted
VPI Sta 2187+00
El 1294.00
Curve = 2595'
+1.288%
STA 2165+00
SEGMENT SA18
SEGMENT SA17
1320
1300
1280
1260
1240
1220
2130
STA EQ
2150
2160
2170
2180
2188
DRAINAGE CONCEPTS
(June, 1995)
Gilbert Road to Baseline Road
(Base Sheets from
"Conceptual Cost Reduction
Study for Santan Freeway
(Price Road to Baseline Road)",
HDR Engineering, Inc.,
November, 1992)
HDR
HDR ENGINEERING, INC.
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 2130+00 TO STA 2188+00
PRICE RD TO BASELINE RD
TRACS NO. H-2222-01D
112


T1S R6E
N
23
24
ROAD
2190
2200
2210
2220
2230
P.T.
2188+65.32
STA. 2188+00
STA. 2240+00
MATCH LINE
New R/W
Angle Point
Δ = 0°34'19" RT
Sta 2213+52.45
N 89°18'32" E
2,487.13
N 89°53'47" E
2,441.95
SR-270
Drainage Channel
Sta 2213+53.41 =
Sta 20+00 Recker Road
RECKER
NOTE:
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.
VPT Sta 2192+00
El 1300.44
1000'VC
SDs=Unrestricted
VPC Sta 2208+00
El 1321.06
VPI Sta 2213+00
El 1327.50
Corr=2.730'
1000'VC
SDs=780'
Sta 2213+53.41
Recker Road
VPT Sta 2218+00
El 1323.02
VPC Sta 2232+00
El 1310.48
VPI Sta 2237+00
El 1306.00
Corr=2.763
1000'VC
SDs=Unrestricted
Profile Grade Line
+1.288%
-0.896%
+1.314%
Existing Ground Line
16.5' Clr Min
1340
1320
1300
1280
1260
1240
SEGMENT SA17
2188
2190
2200
2210
2220
2230
2240
DRAINAGE CONCEPTS
(June, 1995)
Gilbert Road to Baseline Road
(Base Sheets from
"Conceptual Cost Reduction
Study for Santan Freeway
(Price Road to Baseline Road)".
HDR Engineering, Inc.
November, 1992)
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 2188+00 TO STA 2240+00
PRICE RD TO BASELINE RD
HDR ENGINEERING, INC.
TRACS NO. H-2222-01D
DWG NO. 15 OF


T.1S R.7E
T.1S R.8E
2270
2280
2290
Reach 5
East to West
New R/W
Drainage Channel
MATCH LINE STA. 2292+00
NOTE:
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.
NOTE:
See Dwg No. 32 For Power Rd Interchange Profiles
EMF R5 - East Maricopa Floodway Reach 5
VPT Sta 2242+00
El 1362.57
1000'VC
SDs=Unrestricted
Sta 2265+78.57
Power Road
VPC Sta 2267+00
El 1345.43
VPI Sta 2272+00
El 1352.00
Corr = 2.67'
1000'VC
SDs=788'
VPT Sta 2277+00
El 1347.87
Sta 2278+20±
Roosevelt Canal
Sta 2280+25±
East Maricopa Floodway Reach 5
VPC Sta 2290+00
El 1357.13
1000'VC
SDs=2296'
1360
1340
1320
1300
1280
1260
Profile Grade Line
+3.14%
-0.826%
Existing Ground Line
165 Cir Min
135 Cir Min
STA 2270+00
SEGMENT SA 17
SEGMENT SA 16
2240
2250
2260
2270
2280
2290
2292
DRAINAGE CONCEPTS
(June, 1995)
Gilbert Road to Baseline Road
(Base Sheets from
"Conceptual Cost Reduction
Study for Santan Freeway
(Price Road to Baseline Road)",
HDR Engineering, Inc.,
November, 1992).
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 2240+00 TO STA 2292+00
PRICE RD TO BASELINE RD
HDR ENGINEERING, INC.
TRACS NO. H-2222-010



TRACS NO. H-2222-01D


F.A.P.N. REGION 9
STATE ARIZ.
PROJECT NO.
SHEET NO.
TOTAL SHEETS
AS BUILT
N
T1S R1E
NOTE:
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.
2350
2360
2370
ARC
New R/W
New R/W
Drainage Channel
SR-220
MATCH LINE STA 2344+00
MATCH LINE STA 2373+00
Sta 2371+49.77 =
Sta 20+00 Hawes Road
HAWES ROAD
DELETED
45 Acre
Detention Basin
20
21
VPT Sta 2345+20
El 1357.00
1000' VC
SDs=Unrestricted
Profile Grade Line
-0.400%
Existing Ground Line
SEGMENT SA16
2373
1380
1360
1340
1320
1300
1280
2344
2350
2360
2370
DRAINAGE CONCEPTS
(June, 1995)
Gilbert Road to Baseline Road
(Base Sheets from
"Conceptual Cost Reduction
Study for Santan Freeway
(Price Road to Baseline Road)",
HDR Engineering, Inc.,
November, 1992).
DESIGN
DRAWN
CHECKED
DATE
HDR
HDR ENGINEERING, INC.
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 2344+00 TO STA 2373+00
PRICE RD TO BASELINE RD
DOC NO. 18
OF
TRACS NO. H-2222-01D
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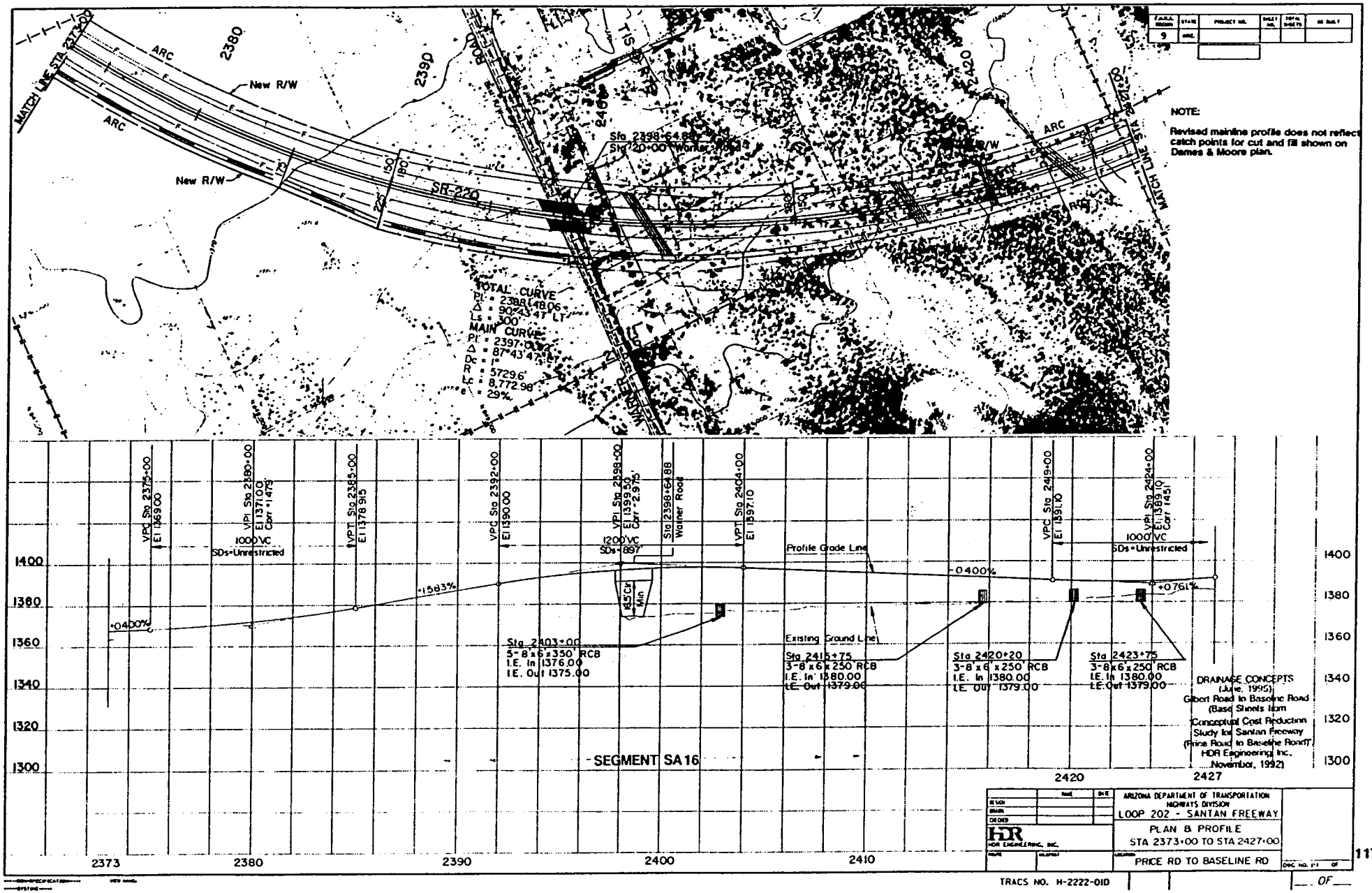
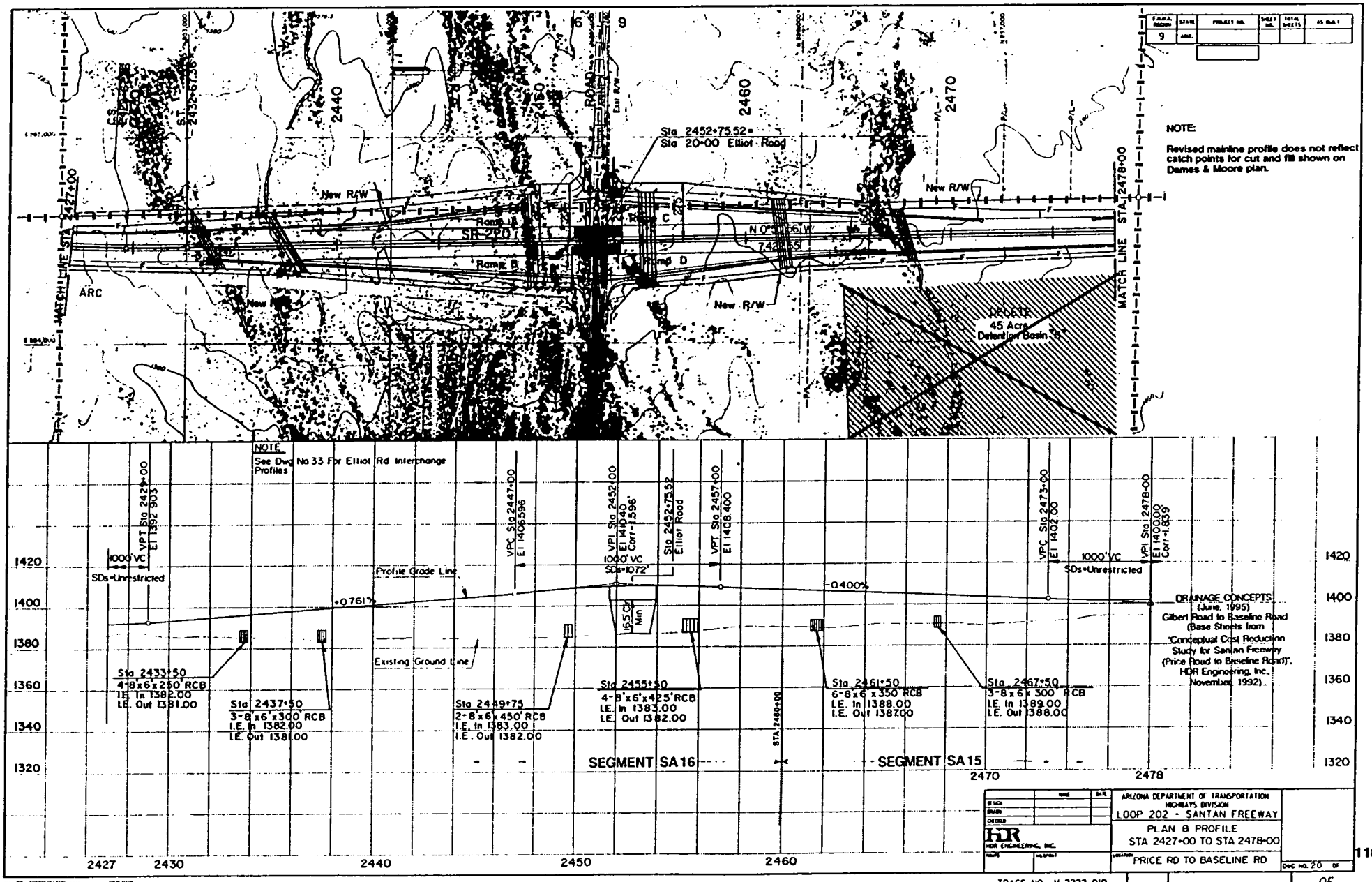
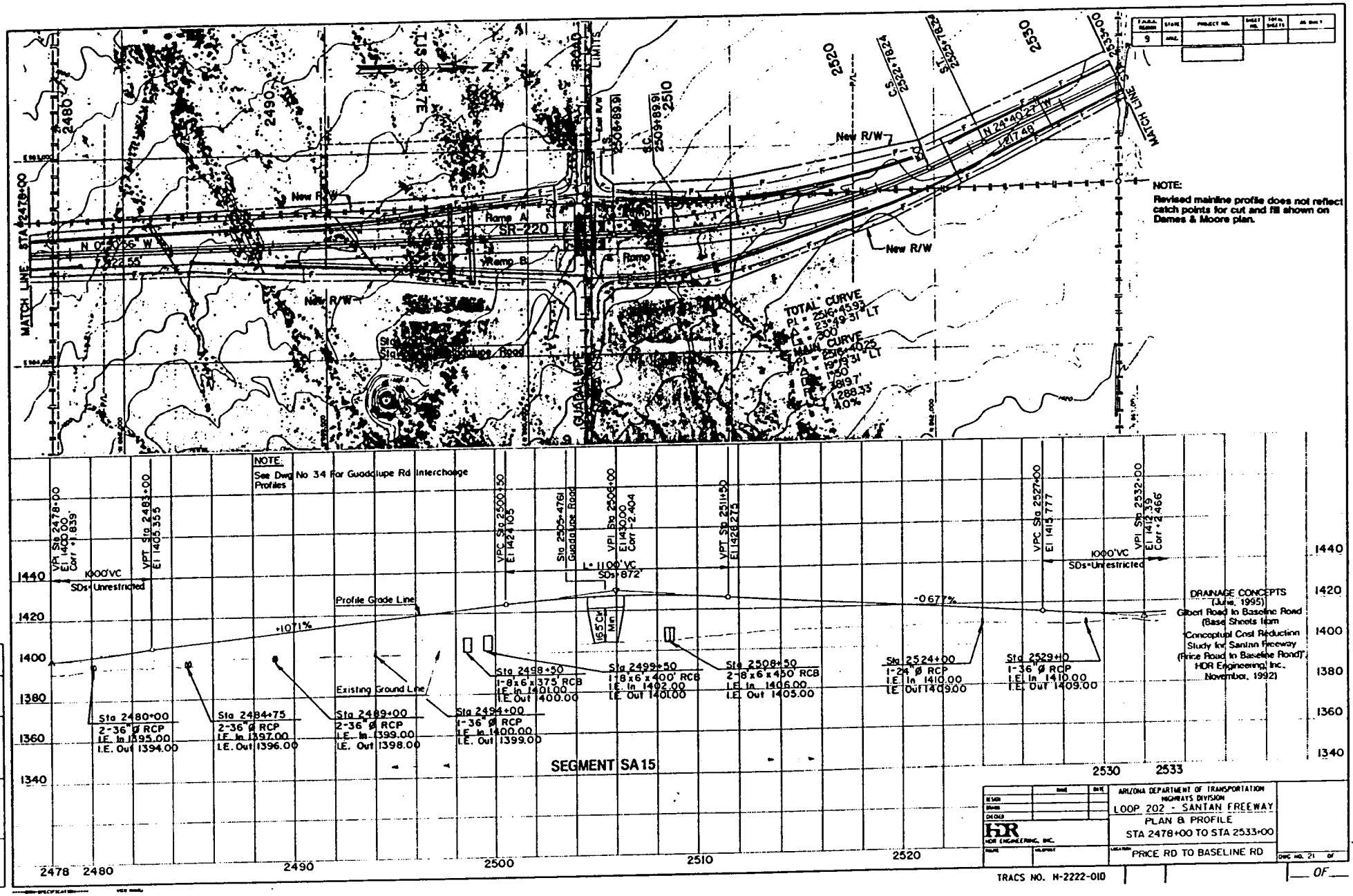
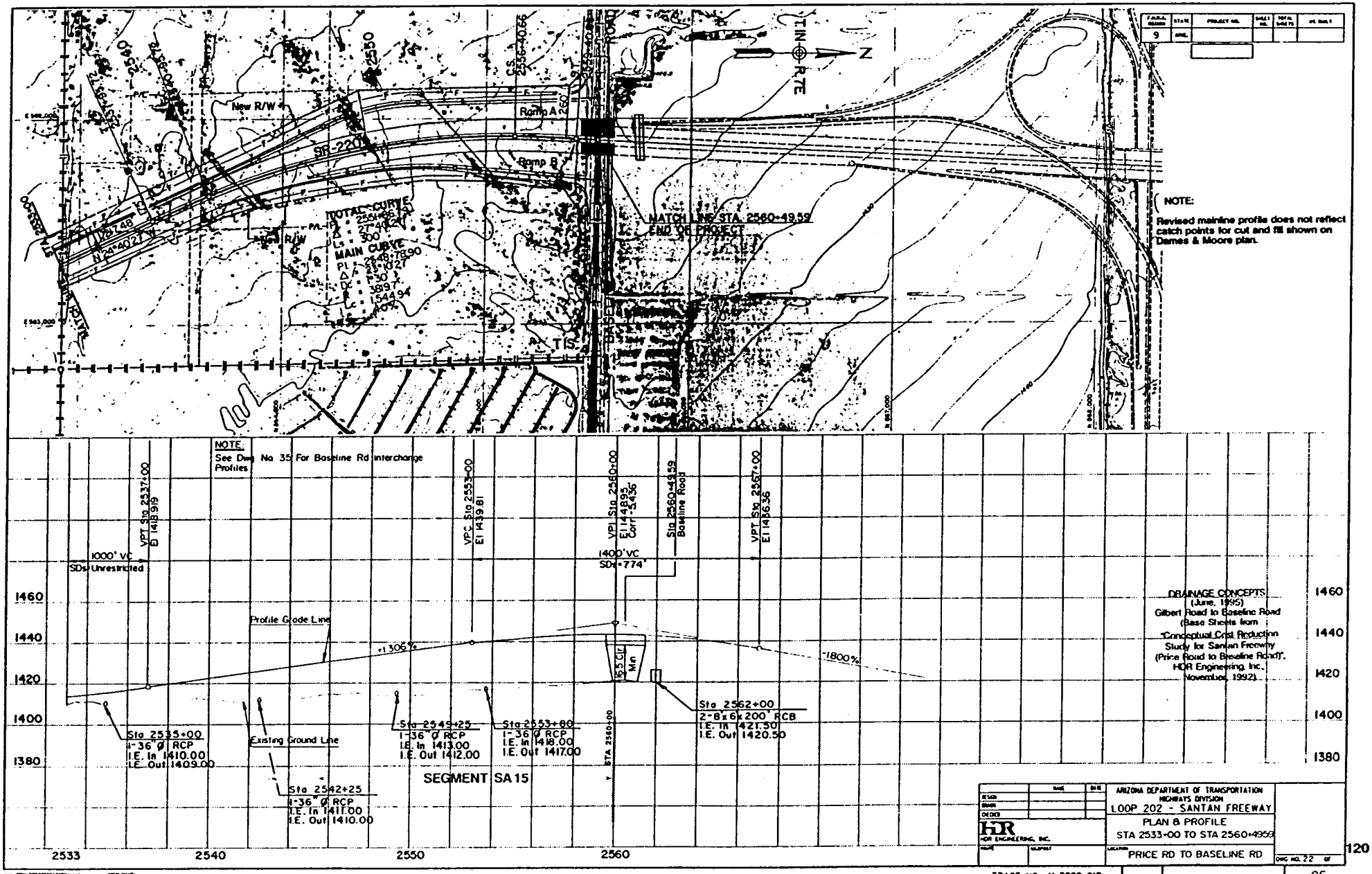
OF


MATCH LINE STA 2373+00
ARC
New R/W
SR-220
Sta 2398+64.88
Sta 2420+00 Warner Road
TOTAL CURVE
PI = 2388+48.06
Δ = 90°43'47" LT
Ls = 300'
MAIN CURVE
PI = 2397+00
Δ = 87°43'47"
Dc = 1°
R = 5729.6'
Lc = 8,772.96'
e = 29%
NOTE:
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.
VPC Sta 2375+00 El 1369.00
VPI Sta 2380+00 El 1371.00 Corr +1.475'
1000' VC SDs=Unrestricted
VPT Sta 2385+00 El 1378.915
VPC Sta 2392+00 El 1390.00
VPI Sta 2398+00 El 1399.50 Corr +2.975'
1200' VC SDs=897'
Sta 2398+64.88 Warner Road
VPT Sta 2404+00 El 1397.10
VPC Sta 2419+00 El 1391.10
VPI Sta 2424+00 El 1389.10 Corr 1.451'
1000' VC SDs=Unrestricted
Profile Grade Line
+0.400%
+1.583%
+0.761%
1.45' Cr Min
Sta 2403+00
5-8'x6'x350' RCB
I.E. In 1376.00
I.E. Out 1375.00
Existing Ground Line
Sta 2415+75
3-8'x6'x250' RCB
I.E. In 1380.00
I.E. Out 1379.00
Sta 2420+20
3-8'x6'x250' RCB
I.E. In 1380.00
I.E. Out 1379.00
Sta 2423+75
3-8'x6'x250' RCB
I.E. In 1380.00
I.E. Out 1379.00
SEGMENT SA16
DRAINAGE CONCEPTS (June, 1995) Gilbert Road to Baseline Road (Base Sheets from "Conceptual Cost Reduction Study for Santan Freeway (Price Road to Baseline Road)" HDR Engineering Inc., November, 1992)
1400
1380
1360
1340
1320
1300
2373
2380
2390
2400
2410
2420
2427
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 2373+00 TO STA 2427+00
PRICE RD TO BASELINE RD
HDR ENGINEERING, INC.
TRACS NO. H-2222-01D


NOTE:
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.
Sta 2452+75.52 = Sta 20+00 Elliot Road
New R/W
Ramp A
Ramp B
Ramp C
Ramp D
SR 202
N 0°30'56"W
743.85'
MATCH LINE STA 2427+00
MATCH LINE STA 2478+00
ARC
DELETE 45 Acre Detention Basin
2440
2450
2460
2470
NOTE
See Dwg No 33 For Elliot Rd Interchange Profiles
VPT Sta 2429+00 El 1392.903
1000' VC SDs=Unrestricted
VPC Sta 2447+00 El 1406.596
VPI Sta 2452+00 El 1410.40 Corr=1.596'
1000' VC SDs=1072'
Sta 2452+75.52 Elliot Road
VPT Sta 2457+00 El 1408.400
VPC Sta 2473+00 El 1402.00
1000' VC SDs=Unrestricted
VPI Sta 2478+00 El 1400.00 Corr=1.839'
Profile Grade Line
+0.761%
-0.400%
16.5' Clr Min
Existing Ground Line
Sta 2433+50 4-8'x6'x250' RCB I.E. In 1382.00 I.E. Out 1381.00
Sta 2437+50 3-8'x6'x300' RCB I.E. In 1382.00 I.E. Out 1381.00
Sta 2449+75 2-8'x6'x450' RCB I.E. In 1383.00 I.E. Out 1382.00
Sta 2455+50 4-8'x6'x425' RCB I.E. In 1383.00 I.E. Out 1382.00
Sta 2461+50 6-8'x6'x350' RCB I.E. In 1388.00 I.E. Out 1387.00
Sta 2467+50 3-8'x6'x300' RCB I.E. In 1389.00 I.E. Out 1388.00
STA 2460+00
SEGMENT SA16
SEGMENT SA15
DRAINAGE CONCEPTS (June, 1995) Gilbert Road to Baseline Road (Base Sheets from "Conceptual Cost Reduction Study for Santan Freeway (Price Road to Baseline Road)", HDR Engineering, Inc., November, 1992)
1420
1400
1380
1360
1340
1320
2427
2430
2440
2450
2460
2470
2478
ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 2427+00 TO STA 2478+00
PRICE RD TO BASELINE RD
HDR ENGINEERING, INC.
TRACS NO. H-2222-01D
DWG NO. 20 OF


MATCH LINE STA 2478+00
N 0°34'56" W
SR-220
Ramp A
Ramp B
Ramp
New R/W
Guadalupe Road
GUADALUPE ROAD
LIMITS
S.C. 2509+89.91
C.S. 2522+78.24
S.T. 2525+78.24
MATCH LINE STA 2533+00
N 24°40'27" W
1817.48
TOTAL CURVE
PI = 2516+43.93
Δ = 23°49'31" LT
D = 300
L = 1819.7'
T = 1288.33'
MAIN CURVE
PI = 2516+40.25
Δ = 19°19'31" LT
D = 1750
L = 1288.33'
T = 710%
NOTE:
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.
NOTE:
See Dwg No 34 for Guadalupe Rd Interchange Profiles
VPI Sta 2478+00 El 1400.00 Corr +1.839'
VPT Sta 2483+00 El 1405.355
1000'VC SDs=Unrestricted
VPC Sta 2500+50 El 1424.105
Sta 2505+47.61 Guadalupe Road
VPI Sta 2506+00 El 1430.00 Corr +2.404
L=1100'VC SDs=872'
VPT Sta 2511+50 El 1428.275
VPC Sta 2527+00 El 1415.777
VPI Sta 2532+00 El 1412.39 Corr +2.466'
1000'VC SDs=Unrestricted
Profile Grade Line
+1071%
-0.677%
165' Ch Min
Existing Ground Line
Sta 2480+00 2-36" Ø RCP I.E. In 1395.00 I.E. Out 1394.00
Sta 2484+75 2-36" Ø RCP I.E. In 1397.00 I.E. Out 1396.00
Sta 2489+00 2-36" Ø RCP I.E. In 1399.00 I.E. Out 1398.00
Sta 2494+00 1-36" Ø RCP I.E. In 1400.00 I.E. Out 1399.00
Sta 2498+50 1-8'x6'x375' RCB I.E. In 1401.00 I.E. Out 1400.00
Sta 2499+50 1-8'x6'x400' RCB I.E. In 1402.00 I.E. Out 1401.00
Sta 2508+50 2-8'x6'x450' RCB I.E. In 1406.00 I.E. Out 1405.00
Sta 2524+00 1-24" Ø RCP I.E. In 1410.00 I.E. Out 1409.00
Sta 2529+10 1-36" Ø RCP I.E. In 1410.00 I.E. Out 1409.00
SEGMENT SA15
DRAINAGE CONCEPTS (June, 1995) Gilbert Road to Baseline Road (Base Sheets from Conceptual Cost Reduction Study for Santan Freeway (Price Road to Baseline Road) HDR Engineering, Inc. November, 1992)
1440
1420
1400
1380
1360
1340
2478
2480
2490
2500
2510
2520
2530
2533
ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 2478+00 TO STA 2533+00
PRICE RD TO BASELINE RD
HDR ENGINEERING, INC.
TRACS NO. H-2222-010
DWG NO. 21 OF


New R/W
SR-220
Ramp A
Ramp B
MAIN CURVE
MATCH LINE STA. 2560+49.59
END OF PROJECT
T.1N
R.7E
N
NOTE:
Revised mainline profile does not reflect catch points for cut and fill shown on Dames & Moore plan.
NOTE:
See Dwg No 35 For Baseline Rd Interchange Profiles
VPT Sta 2537+00
El 1418.919
1000' VC
SDs Unrestricted
VPC Sta 2553+00
El 1439.81
VPI Sta 2560+00
El 1449.85
Corr -5.436
1400' VC
SDs=774'
Sta 2560+49.59
Baseline Road
VPT Sta 2567+00
El 1456.36
Profile Grade Line
+1.306%
-1.800%
165 Clr
Min
Sta 2535+00
1-36" Ø RCP
I.E. In 1410.00
I.E. Out 1409.00
Existing Ground Line
Sta 2542+25
1-36" Ø RCP
I.E. In 1417.00
I.E. Out 1410.00
Sta 2545+25
1-36" Ø RCP
I.E. In 1413.00
I.E. Out 1412.00
Sta 2553+00
1-36" Ø RCP
I.E. In 1418.00
I.E. Out 1417.00
STA 2560+00
Sta 2562+00
2-8'x6'x200' RCB
I.E. In 1421.50
I.E. Out 1420.50
SEGMENT SA 15
DRAINAGE CONCEPTS
(June, 1995)
Gilbert Road to Baseline Road
(Base Sheets from
"Conceptual Cost Production
Study for Santan Freeway
(Price Road to Baseline Road)".
HDR Engineering, Inc.,
November, 1992)
1460
1440
1420
1400
1380
2533
2540
2550
2560
ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LOOP 202 - SANTAN FREEWAY
PLAN & PROFILE
STA 2533+00 TO STA 2560+49.59
PRICE RD TO BASELINE RD
HDR ENGINEERING, INC.
DWG NO. 22 OF
TRACS NO. H-2222-01D
OF