JACOBS

Submitted to:

Flood Control District of Maricopa County

City of Peoria

Final Pre-Design Report **Volume 2 of 2**

83rd Avenue / Pinnacle Peak Road Drainage Improvements
FCDMC Contract No. 2003C060
Project Control No. 450.02.33

November, 2004

Submitted by:

JACOBS CIVIL INC.
875 West Elliot Road, Suite 201
Tempe, AZ 85284
480.763.8600 Fax 480.763.8601

A450.617

83rd Avenue/Pinnacle Peak Road Drainage Improvements

Prepared for:

Flood Control District of Maricopa County

City of Peoria

Final Pre-Design Report Volume 2 of 2

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Prepared by:
Jacobs Civil Inc.
875 West Elliot Road, Suite 201
Tempe, AZ 85284
480.763.8600
Fax 480.763.8601

In Conjunction with:
J2 Engineering and Environmental Design
8222 South 48th Street, Suite 135
Phoenix, AZ 85044
602.438.2221
Fax 602.438.2225

Appendix A

HEC-1 Analyses

Appendix A: Precipitation

Project:	**83rd Ave/Pinnacle Peak Drainage Improvements**	By:	**KBD**
Location :		Date:	**Aug-04**
Subject :	**Rainfall Values**	Project #:	**3077**

RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET
AND INTENSITY-DURATION-FREQUENCY (I-D-F)CURVES

Determine rainfall depths from the isopluvial maps

2-year, 6-hour	P2,6' =	1.2
2-year, 24-hour	P2,24' =	1.5
100-year, 6-hour	P100,6' =	3.2
100-year, 24-hour	P100,24' =	4
Short Duration Frequency Zone	Zone =	8

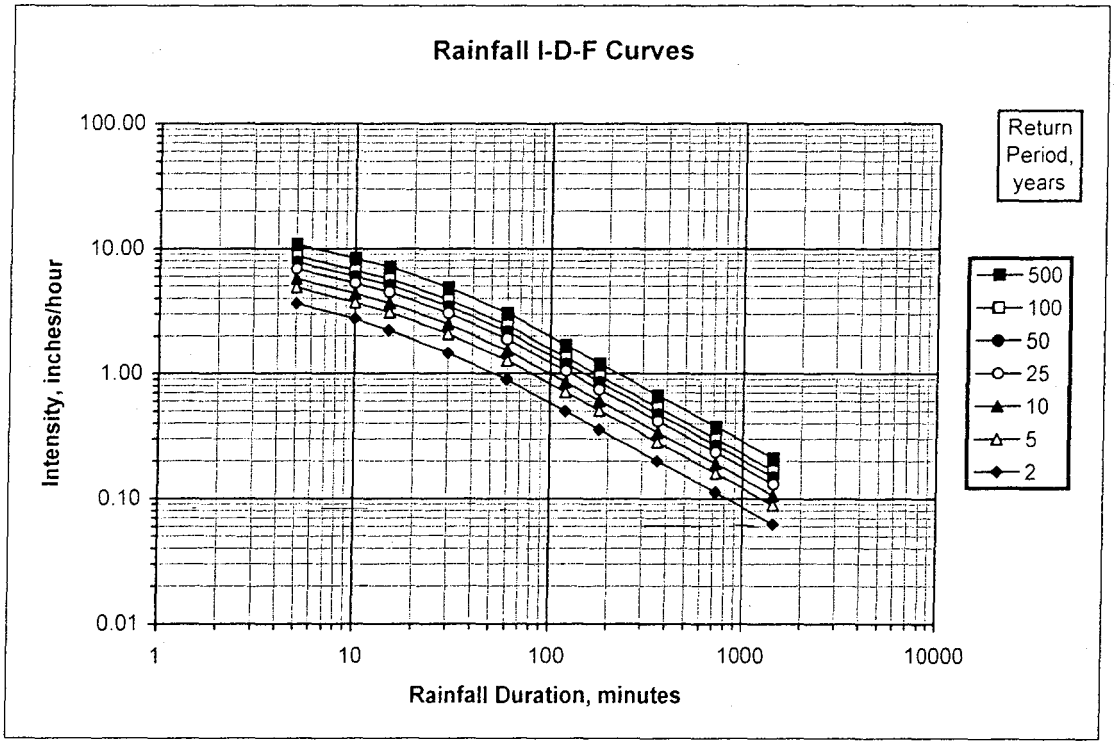
Depth - Duration - Frequency (DDF)

	Rainfall Depth, in inches						
	Frequency, in years						
Duration	**2**	**5**	**10**	**25**	**50**	**100**	**500**
5-min	0.30	0.41	0.48	0.58	0.65	0.73	0.90
10-min	0.46	0.62	0.73	0.88	1.00	1.12	1.39
15-min	0.55	0.77	0.92	1.12	1.28	1.43	1.79
30-min	0.73	1.03	1.24	1.51	1.73	1.94	2.43
1-hour	0.89	1.28	1.53	1.89	2.16	2.43	3.05
2-hour	1.00	1.42	1.70	2.09	2.39	2.69	3.38
3-hour	1.07	1.52	1.82	2.23	2.55	2.87	3.60
6-hour	1.20	1.70	2.03	2.49	2.85	3.20	4.01
12-hour	1.35	1.91	2.29	2.80	3.20	3.60	4.52
24-hour	1.50	2.12	2.54	3.12	3.56	4.00	5.02

Project:	83rd Ave/Pinnacle Peak Drainage Improvements	By:	KBD
Location :		Date:	Aug-04
Subject :	Rainfall Values	Project #:	3077

Intensity - Duration - Frequency (IDF)

Rainfall Intensity, in inches per hour								
		Frequency, in years						
Duration	minutes	2	5	10	25	50	100	500
5-min	5	3.64	4.89	5.73	6.91	7.83	8.74	10.84
10-min	10	2.73	3.70	4.36	5.28	5.99	6.70	8.33
15-min	15	2.22	3.09	3.67	4.48	5.11	5.73	7.16
30-min	30	1.47	2.07	2.47	3.03	3.46	3.88	4.87
1-hour	60	0.89	1.28	1.53	1.89	2.16	2.43	3.05
2-hour	120	0.50	0.71	0.85	1.05	1.20	1.35	1.69
3-hour	180	0.36	0.51	0.61	0.74	0.85	0.96	1.20
6-hour	360	0.20	0.28	0.34	0.42	0.47	0.53	0.67
12-hour	720	0.11	0.16	0.19	0.23	0.27	0.30	0.38
24-hour	1440	0.06	0.09	0.11	0.13	0.15	0.17	0.21



$P_{2\text{-}Yr,6\text{-}hr} = 1.20''$

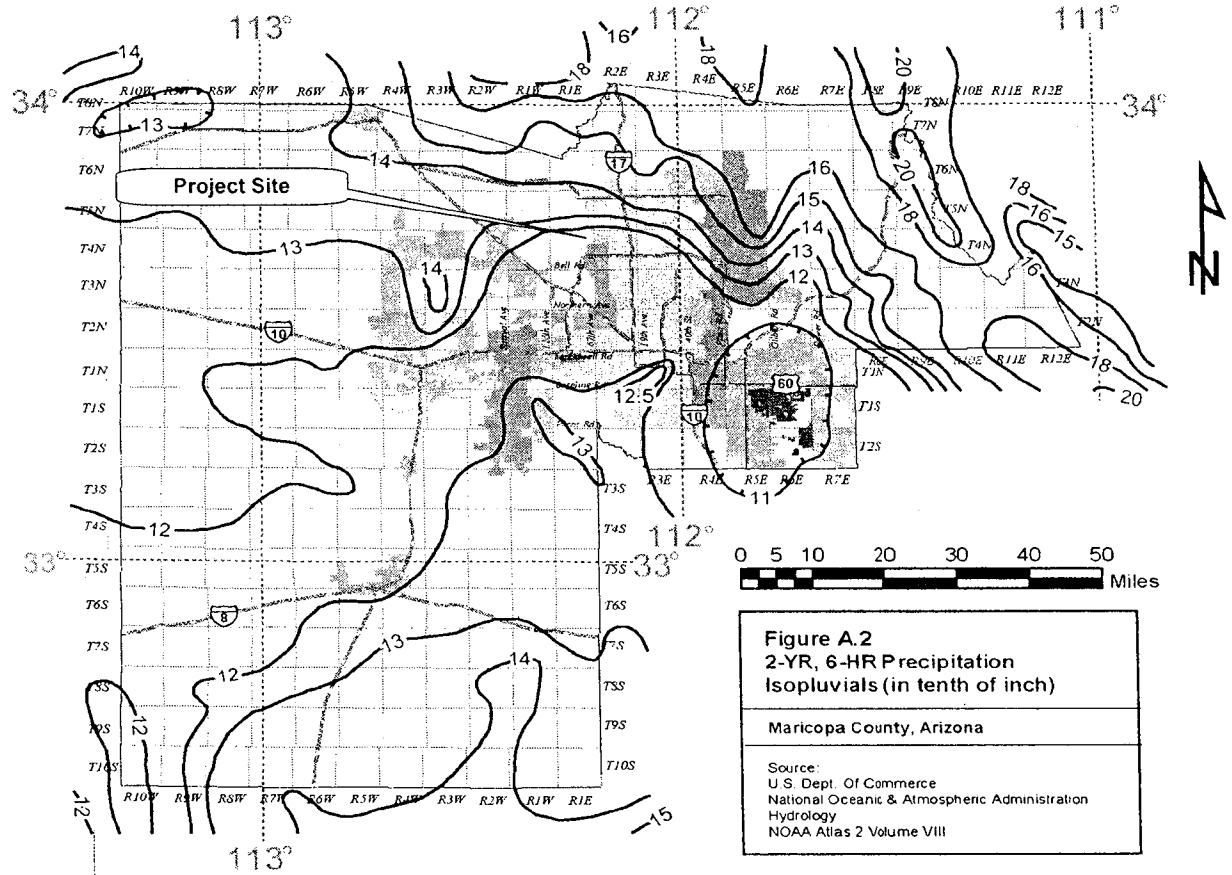


Figure A.2
2-YR, 6-HR Precipitation Isopluvials (in tenth of inch)

Maricopa County, Arizona

Source:
U.S. Dept. Of Commerce
National Oceanic & Atmospheric Administration
Hydrology
NOAA Atlas 2 Volume VIII

$P_{2\text{-}Yr,24\text{-}hr} = 1.50''$

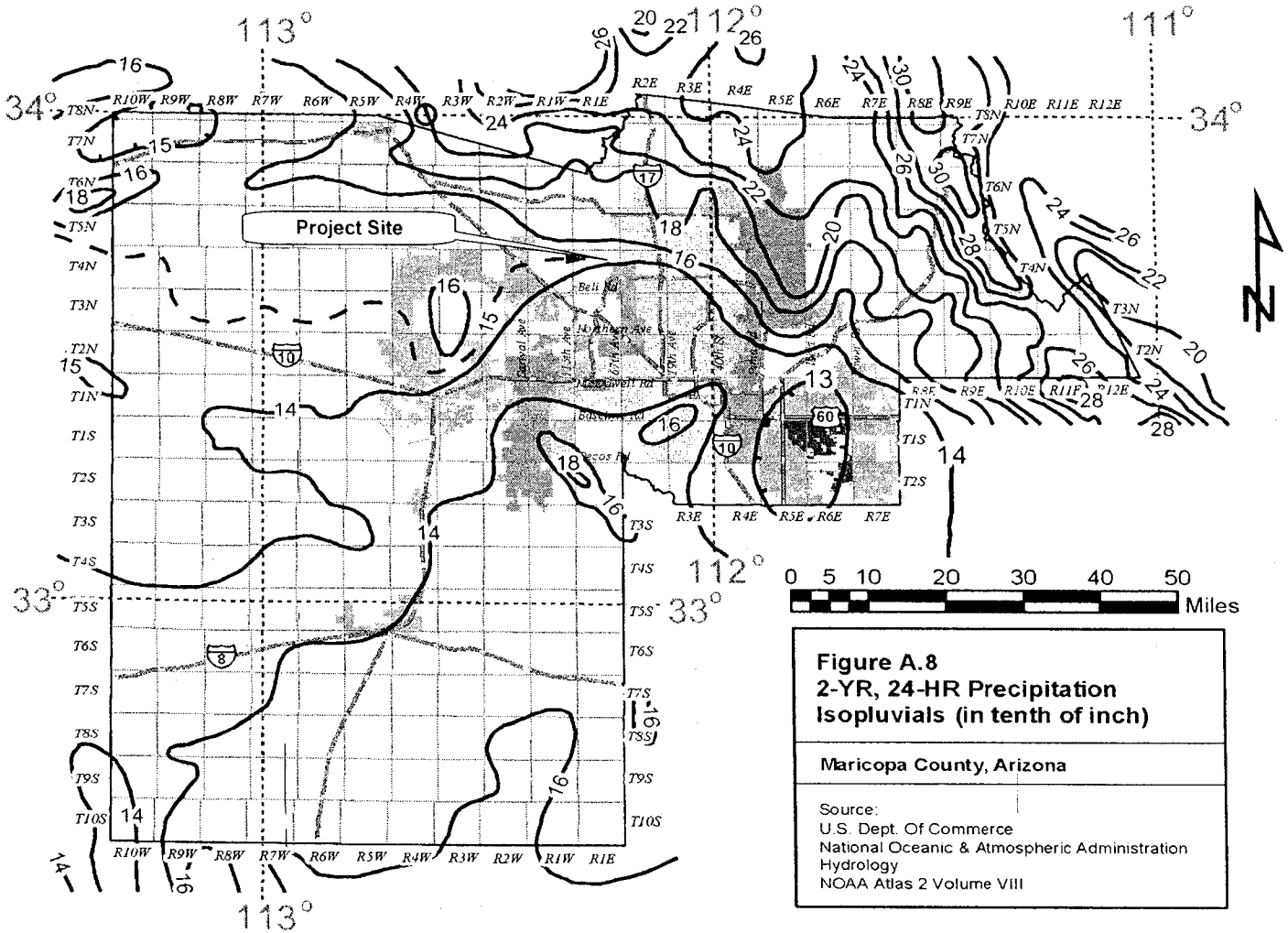


Figure A.8
2-YR, 24-HR Precipitation Isopluvials (in tenth of inch)

Maricopa County, Arizona

Source:
U.S. Dept. Of Commerce
National Oceanic & Atmospheric Administration
Hydrology
NOAA Atlas 2 Volume VIII

$P_{100\text{-}Yr,6\text{-}hr} = 3.20"$

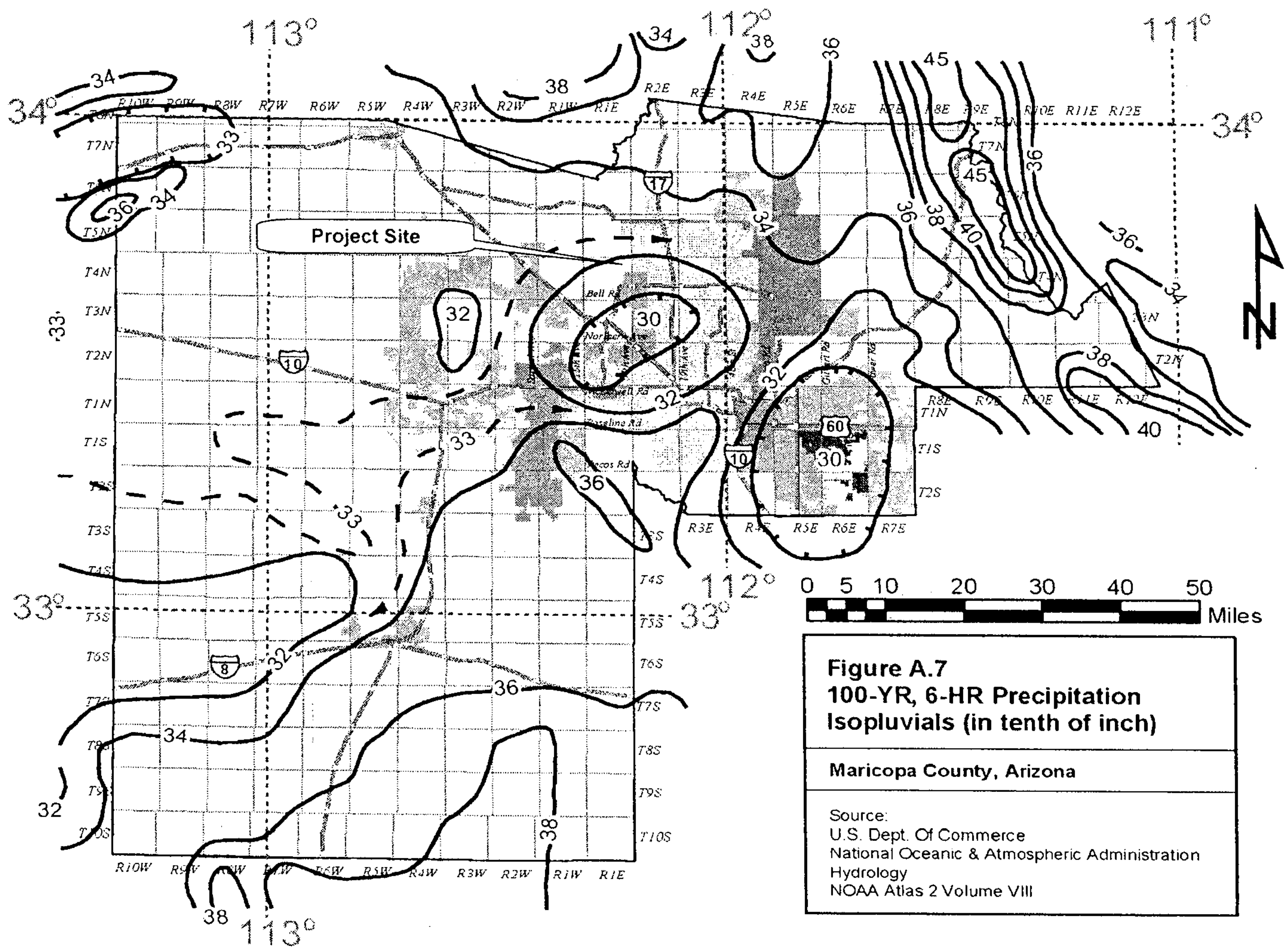


Figure A.7
100-YR, 6-HR Precipitation Isopluvials (in tenth of inch)

Maricopa County, Arizona

Source:
U.S. Dept. Of Commerce
National Oceanic & Atmospheric Administration
Hydrology
NOAA Atlas 2 Volume VIII

$P_{100\text{-}Yr,24\text{-}hr} = 4.00''$

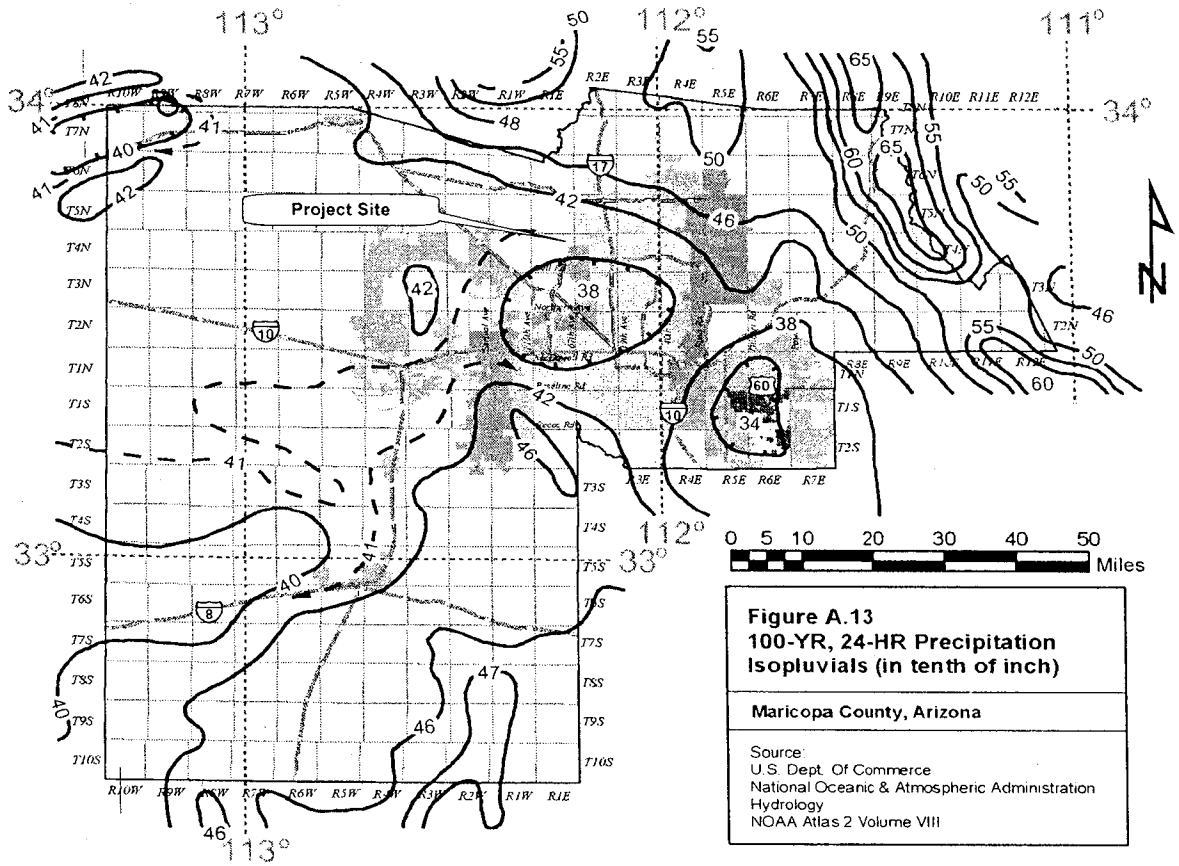
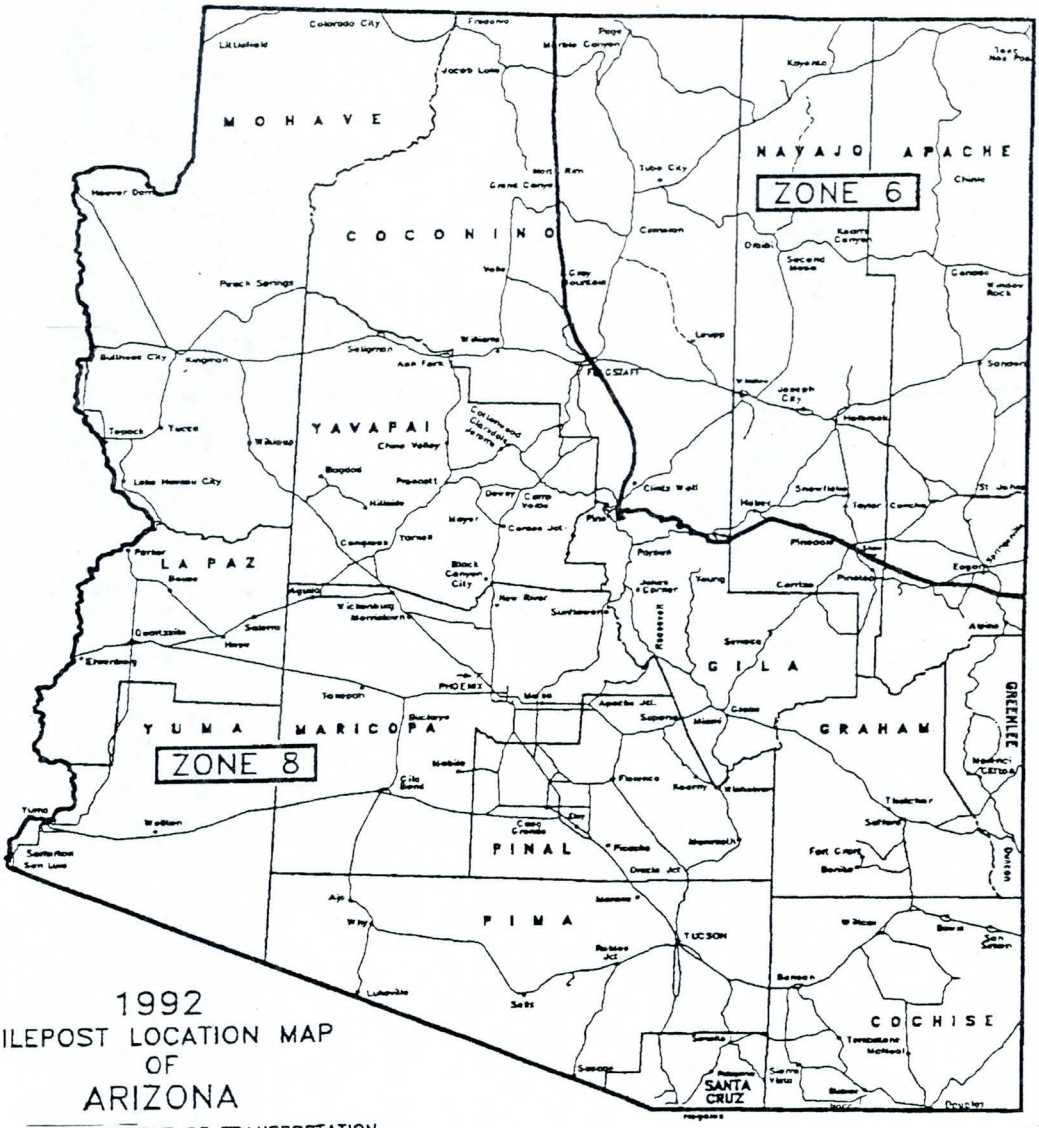


Figure A.13
100-YR, 24-HR Precipitation Isopluvials (in tenth of inch)

Maricopa County, Arizona

Source:
U.S. Dept. Of Commerce
National Oceanic & Atmospheric Administration
Hydrology
NOAA Atlas 2 Volume VIII

SHORT-DURATION RAINFALL RATIO ZONES FOR ARIZONA



1992
MILEPOST LOCATION MAP
OF
ARIZONA

ARIZONA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION PLANNING DIVISION

--------- STATE HIGHWAYS

0 25 50 75 100
MILES

Appendix B: Soils

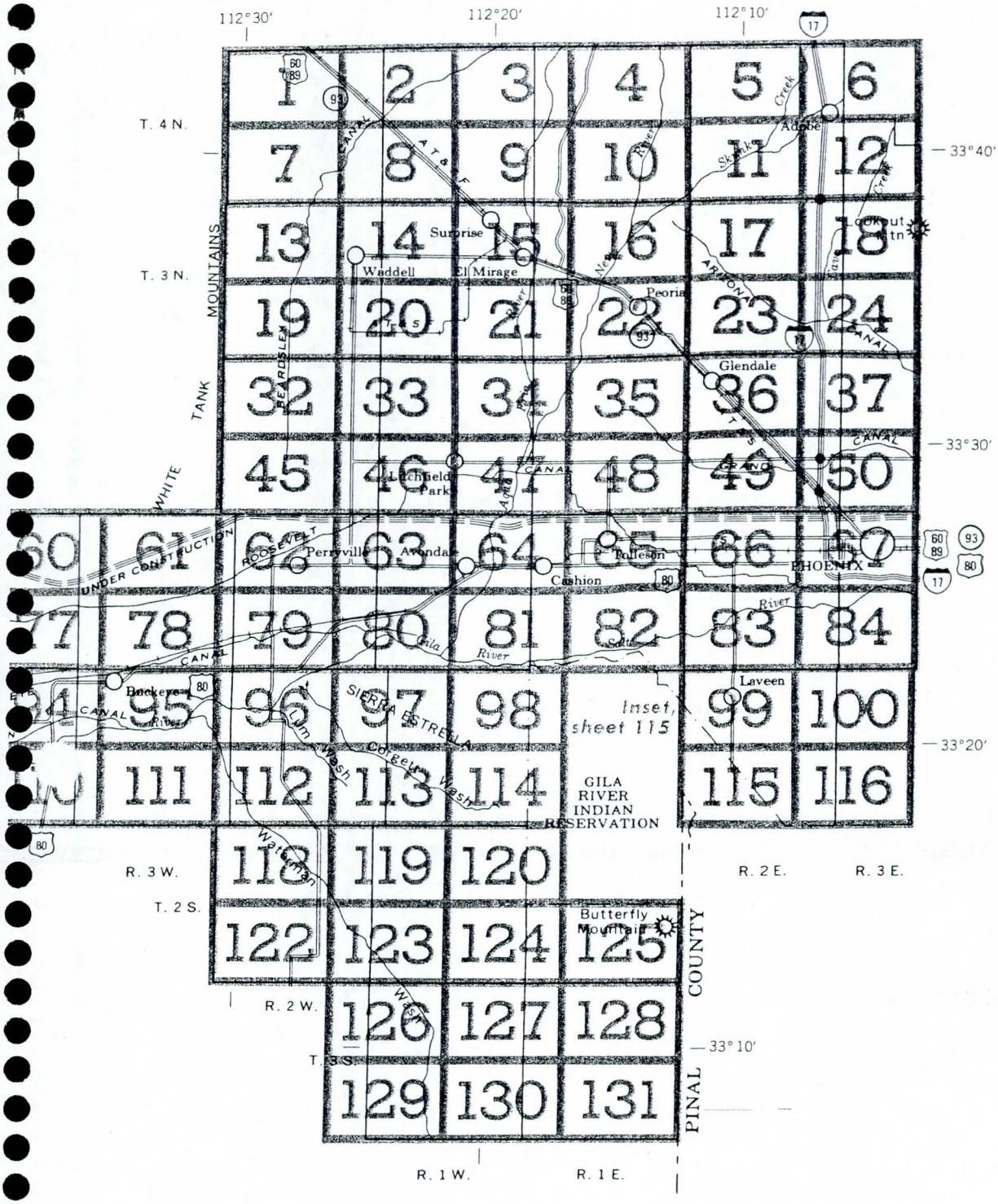
SOIL SURVEY OF

Maricopa County, Arizona

Central Part

United States Department of Agriculture
Soil Conservation Service
in cooperation with
University of Arizona
Agricultural Experiment Station

REF-77-2001b

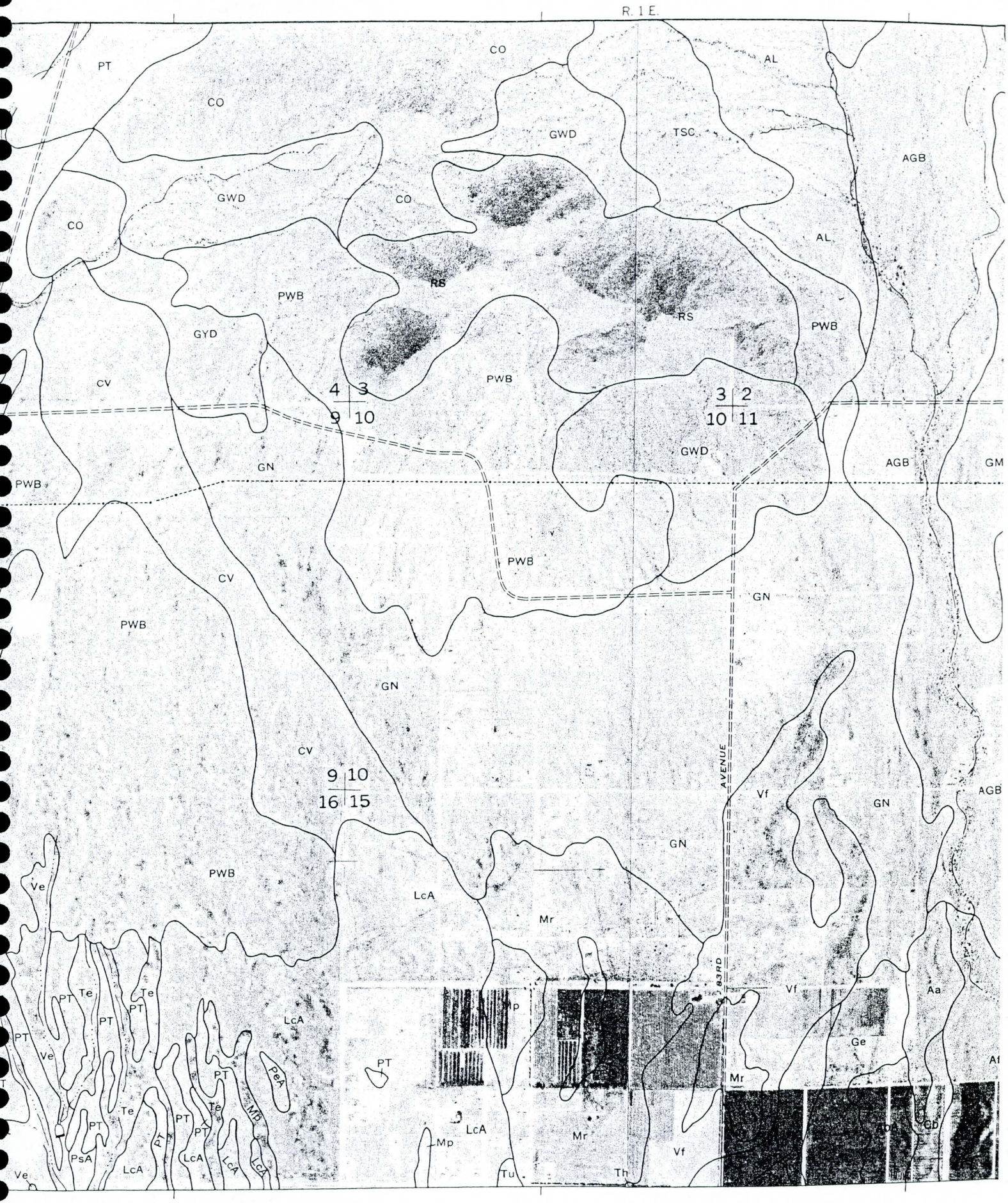


MAP SHEETS

ARIZONA, CENTRAL PART

Scale 1:380,160

2 3 4 5 6 Miles


R. 1 E.
PT
CO
GWD
TSC
AL
AGB
RS
PWB
GYD
CV
GN
GM
4 3
9 10
3 2
10 11
9 10
16 15
AVENUE
83RD
Vf
Ve
LcA
Mr
Te
PeA
Mp
PsA
Tu
Th
Aa
Ge
Af
GB

SOIL LEGEND

The first letter, always a capital, is the initial letter of the soil name. The second letter is a capital if the mapping unit is broadly defined; otherwise, it is a small letter. The third letter, always a capital, A, B, C, D, or E, shows the slope. Most symbols without slope letters are those of nearly level soils but some are for miscellaneous land types, soil associations or undifferentiated groups with a fair to considerable range of slope. A final number, 2 or 3 in the symbol shows that the soil has been eroded.

SYMBOL	NAME
Aa	Agualt loam
AbA	Antho sandy loam, 0 to 1 percent slopes
AbB	Antho sandy loam, 1 to 3 percent slopes
Ac	Antho sandy loam, saline-alkali
AdA	Antho gravelly sandy loam, 0 to 1 percent slopes
AdB	Antho gravelly sandy loam, 1 to 3 percent slopes
Ae	Antho-Brios sandy loams
AfA	Antho-Carrizo complex, 0 to 1 percent slopes
AfB	Antho-Carrizo complex, 1 to 3 percent slopes
AGB	Antho-Carrizo complex, 0 to 3 percent slopes
AHC	Antho-Tremant complex, 1 to 5 percent slopes
AkB	Antho-Tremant-Mohall complex, 1 to 5 percent slopes
AL	Antho association
AM	Antho-Valencia association
An	Avonda clay loam
Ao	Avondale clay loam
Ap	Avondale clay loam, saline-alkali
BE	Beardsley loam
Br	Brios loamy sand
Bs	Brios sandy loam
Bt	Brios loam
CA2	Calciorthids and Torriorthents, eroded
Cb	Carrizo gravelly sandy loam
CeD	Carrizo-Ebon complex, 3 to 12 percent slopes
CF	Carrizo and Brios soils
Cg	Casa Grande sandy loam
Ch	Casa Grande loam
Ck	Casa Grande complex
Cm	Casa Grande-Laveen complex, alkali
Cn	Cashion clay, saline-alkali
CO	Cherioni-Rock outcrop complex
Cp	Coolidge sandy loam
CrB	Coolidge gravelly sandy loam, 1 to 3 percent slopes
Cs	Coolidge-Tremant complex
CV	Coolidge-Laveen association
Dn	Dune land
EbD	Ebon gravelly loam, 0 to 8 percent slopes
EPD	Ebon-Pinamt complex, 0 to 10 percent slopes
Es	Estrella loam
Et	Estrella loam, saline-alkali
GA	Gachado-Rock outcrop complex
Gb	Gadsden clay loam
Gc	Gadsden clay
Gd	Gadsden clay, saline-alkali
Ge	Gilman fine sandy loam
Gf	Gilman fine sandy loam, saline-alkali
GgA	Gilman loam, 0 to 1 percent slopes
GgB	Gilman loam, 1 to 3 percent slopes
Gh	Gilman loam, saline-alkali
GL	Gilman complex, saline-alkali
GM	Gilman-Antho association
GN	Gilman-Laveen association
Go3	Gilman, Antho and Glenbar soils, severely eroded
Gp	Gilman loam, clayey subsoil variant, moderately saline
Gr	Glenbar loam
Gs	Glenbar loam, saline-alkali
Gt	Glenbar clay loam
Gu	Glenbar clay loam, saline-alkali
Gv	Glenbar clay
GWD	Gunsight-Pinal complex, 1 to 10 percent slopes
GxA	Gunsight-Rillito complex, 0 to 1 percent slopes
GxB	Gunsight-Rillito complex, 1 to 3 percent slopes
GYD	Gunsight-Rillito complex, 0 to 10 percent slopes
HAB	Harqua complex, 0 to 3 percent slopes
HAC	Harqua complex, 3 to 8 percent slopes
HLC	Harqua-Gunsight complex, 0 to 5 percent slopes
HM	Harqua-Laveen complex
HrB	Harqua-Rillito complex, 1 to 3 percent slopes
La	La Palma very fine sandy loam
Lb	Laveen sandy loam
LcA	Laveen loam, 0 to 1 percent slopes
LcB	Laveen loam, 1 to 3 percent slopes
Ld	Laveen loam, saline-alkali
Le	Laveen clay loam
Lf	Laveen-Antho complex, saline-alkali
Ma	Maripo sandy loam
Mo	Mohall sandy loam
Mp	Mohall loam
Mr	Mohall clay loam
Ms	Mohall clay
MTB	Mohall-Tremant complex, 0 to 3 percent slopes
MV	Mohall-Laveen association
Pa	Perryville sandy loam
Pb	Perryville loam, saline-alkali
PeA	Perryville gravelly loam, 0 to 1 percent slopes
PeB	Perryville gravelly loam, 1 to 3 percent slopes
PRB	Perryville-Rillito complex, 0 to 3 percent slopes
PsA	Pinal loam, 0 to 1 percent slopes
PsB	Pinal loam, 1 to 3 percent slopes
PT	Pinal gravelly loam
PvB	Pinal-La Palma loams, 1 to 3 percent slopes
PWB	Pinal-Suncity complex, 0 to 3 percent slopes
PYD	Pinamt-Tremant complex, 1 to 10 percent slopes
RaA	Rillito sandy loam, 0 to 1 percent slopes
RaB	Rillito sandy loam, 1 to 3 percent slopes
RbA	Rillito loam, 0 to 1 percent slopes
RbB	Rillito loam, 1 to 3 percent slopes
RhB	Rillito-Harqua complex, 1 to 3 percent slopes
RpE	Rillito-Perryville complex, 5 to 20 percent slopes
RS	Rock outcrop-Cherioni complex
Ta	Toltec loam
TB	Torrifluvents
Tc	Torriorthents
TD	Torripsamments and Torrifluvents, frequently flooded
Te	Tremant loam
TfA	Tremant gravelly loam, 0 to 1 percent slopes
TfB	Tremant gravelly loam, 1 to 3 percent slopes
Tg	Tremant clay loam
Th	Tremant gravelly clay loam
TPB	Tremant complex, 0 to 3 percent slopes
TrA	Tremant-Rillito complex, 0 to 1 percent slopes
TrB	Tremant-Rillito complex, 1 to 3 percent slopes
TSC	Tremant-Rillito complex, 0 to 5 percent slopes
Tt	Trix clay loam
Tu	Tucson loam
Tw	Tucson clay loam
Va	Valencia sandy loam
Vb	Valencia sandy loam, saline-alkali
Vc	Valencia gravelly sandy loam
Ve	Vecont loam
Vf	Vecont clay
Vg	Vint loamy fine sand
Vh	Vint fine sandy loam
Vk	Vint loam
Vn	Vint clay loam
Vr	Vint-Carrizo complex
Wg	Wintersburg complex

Specializing in Soil Surveys, Soil Interpretations, Land Use Planning and Soil Conservation

Pease Environmental Consultants, Inc.
1323 East Fremont Dr.
Tempe, Arizona 85282-7263
(~~602~~ 480) 839-4803

February 26, 2003

Joe Groetsch
SKG Enterprises, Inc.
9260 East Raintree Drive
Suite 140
Scottsdale, AZ 85260

Dear Mr. Groetsch:

Today, I delivered to you the Hydrologic Soil Group Investigation for the Peoria-60 acre site. We met briefly to discuss the report. Please let me know if this is adequate for your needs.

Sincerely yours,

Douglas S. Pease

Douglas S. Pease, CPSS

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Issued September 1977

Text

HYDROLOGIC SOIL GROUP INVESTIGATION STUDY

of

PEORIA - 60 ACRE SITE

for

SKG Enterprises, INC.

And

Marsto-Keith Company

by

Pease Environmental Consultants, Inc.

February 24, 2003

HYDROLOGIC SOIL GROUP INVESTIGATION STUDY
of PEORIA - 60 ACRE SITE

February 24, 2003

Investigations Conducted By:
Pease Environmental Consultants, Inc.
Douglas S. Pease. CPSS
1323 East Fremont Drive
Tempe, AZ 85282-7263
(480) 839-4803
e-mail: dougpease@juno.com

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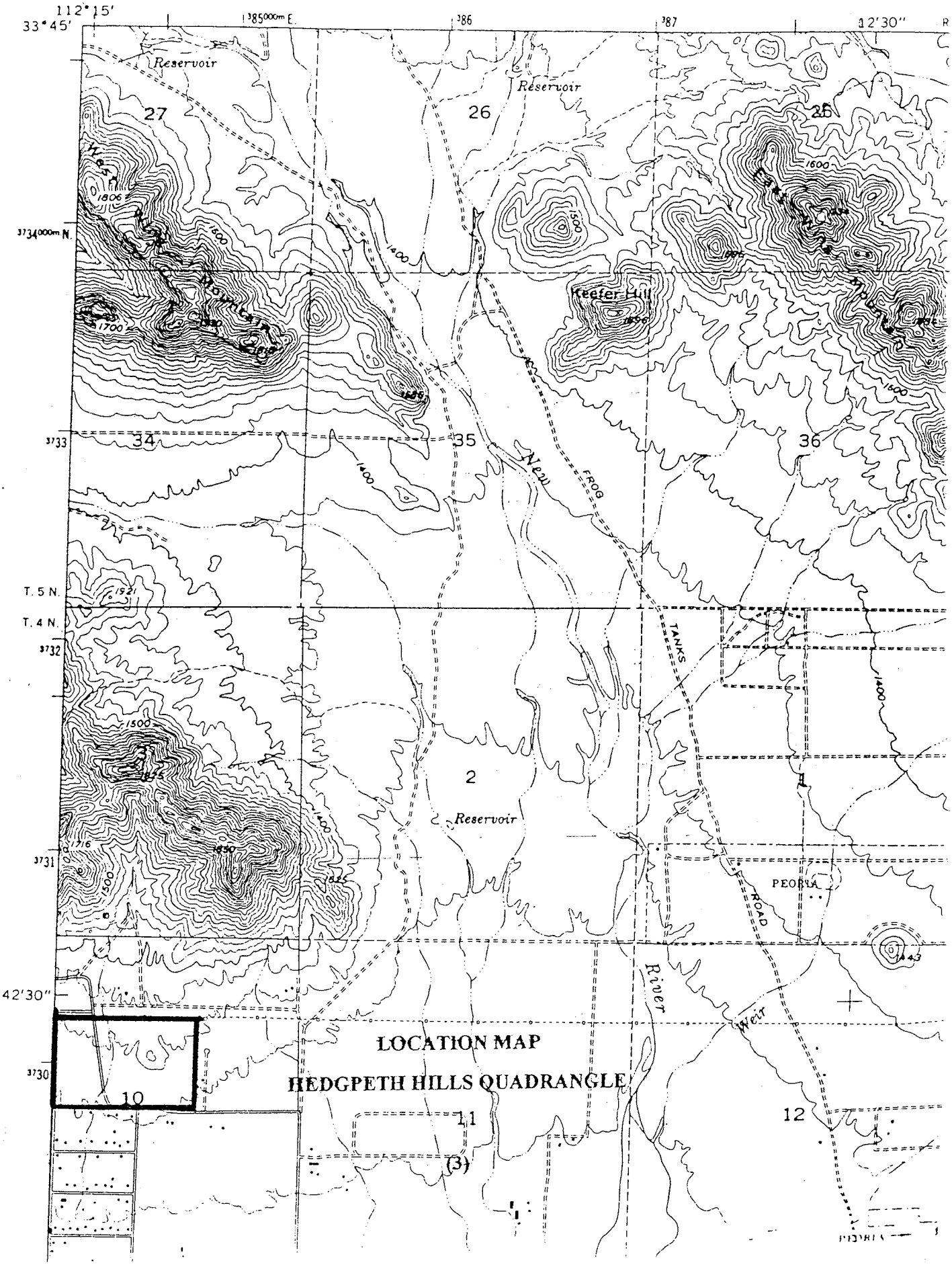
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



HOW THIS INVESTIGATION WAS MADE

This investigation was made to provide information about the Hydrologic Soil Groups (HSG) for the Peoria - 60 acre site. This information includes a description of each observation, the location, and a discussion of the HSGs. The soil scientist observed the steepness, length and shape of the slopes; the general pattern of drainage; the kinds of native plants; and the kinds of rocks. He dug many holes to study the soil profile, which is the sequence of natural layers in the soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or down to a consolidated layer (pan) or to a relatively unweathered bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the area are in an orderly pattern that is related to the geology, land form, relief, climate and natural vegetation. Each soil (and HSG) is associated with a particular kind or segment of the landscape. By observing the soils in the area and relating their position to the specific segments of the landscape, a soil scientist develops a concept or model as to how they were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil (HSG) at a specific location on the landscape.

Individual soils on the landscape commonly merge gradually into one another as their characteristics gradually change. To construct an accurate map, the soil scientist must determine the boundaries between the soils (and HSGs). The soil scientist can observe only a limited number of profiles. These observations, supplemented by an understanding of the soil-vegetation-landscape relationships are sufficient to verify predictions of the kinds of soils in the area and to determine the boundaries.

To begin the investigation, the soil scientist made a reconnaissance of the are to observe the landscapes, vegetation, rock outcrops, exposures of pans, drainage patterns, streets and trails, and any construction sites. The soil scientist stopped to look at road cuts and utility line excavations. These general observations gave the soil scientist an idea of the area and the general pattern of soils.

The next step was to observe the soils in more detail. At each observation point, the soil scientist dug to the depth of three feet or more; or to hard bedrock or an indurated pan. He observed such features as texture (composition of clay, silt, sand and rock fragments), structure, root penetration, lime segregation, weathering of bedrock (if present), and an estimate of permeability. The soils were then placed within a soil series (such as the Laveen series) used by the National Cooperative Soil Survey (NCSS).

The soil scientist predicted the soils on each segment of the landscape. The observations either verified the prediction or adjusted the model he had developed for the investigation. The soil-vegetation-landscape relationships helped the soil scientist in separating each of the hydrologic soil groups based on soil characteristics.

The soil scientist used the methods prepared by the National Cooperative Soil Survey. NCSS procedures are defined in the National Soil Handbook (2). The NCSS places soils within the concept of soil series. Each soil series is placed in a Hydrologic Soil Group.

The HSG boundaries were drawn on the maps as accurately as possible based on the soil characteristics and the use of aerial photo interpretation. Each area of an HSG drawn on the map may have

small inclusions of contrasting types of soils. These inclusions of soils (and HSGs) were too small to separate for the purposes of this investigation. The minimum size delineation used for this investigation was 5 acres.

EQUIPMENT USED FOR THIS HSG INVESTIGATION

Transportation for the survey was provided by a 1986 2WD Toyota pickup. Sampling equipment included a five foot regular bucket auger, a Montana sharpshooter (tile spade), a round pointed shovel, and an Eastwing geology pick for the examination of the soils to depths of 36 inches (or more) or to bedrock or a pan. Dilute hydrochloric acid was used to determine the presence of calcium carbonate (lime). Texture was determined through experience with moistened soil samples. Colors were made using a Munsell Soil Color Book (1). Extensive observations were made on foot where stops areas were not accessible by pickup.

HYDROLOGIC SOIL GROUPS

Hydrologic soil groups (2) are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist of mainly deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist of deep, well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water. It includes shallow soils that have deeply weathered granite. These soils have a slow rate of water transmission. This includes soils in Lithic subgroups that have rock that is pervious or cracked enough to allow water to penetrate.

Group D. Soils having a very slow infiltration rate when thoroughly wet. These consist chiefly of soils that are shallow to a pan or bedrock. These soils have a very slow rate of water transmission.

OBSERVATIONS

This section of the report will consist of stop number, location, landscape position, soil characteristics, soil series and HSG. The observations were made on February 21, 2003. This area is on map sheet 4 of the Soil Survey of Maricopa County, Arizona, Central Part (3). The soil mapping units from this soil survey that occur within the area are:

GN Gilman-Laveen association

GWD Gunsight-Pinal complex, 1 to 10 percent slopes

PWB Pinal-Suncity complex, 0 to 3 percent slopes

The vegetation observed in this are was primarily creosotebush, teddybear cholla, staghorn cholla, b. .el cactus, triangle bursage, paloverde trees, and saguaro cactus.

There is a layer of pebbles and cobbles throughout the area. The layer of pebbles and cobbles in greater for the soils with an indurated duripan. Also, there is desert varnish on the rock fragments associated with rock outcrop.

This area had nearly two inches of precipitation in early February. The soils were damp to a depth of about 16-20 inches or to bedrock or a duripan.

Stop#1 - At the southwest corner of the study site near the intersection of 89th Avenue and Calle Lejos. Fan terrace.

0-19"	Sandy loam, strongly effervescent.	
19-26"	Sandy loam, violently effervescent, high lime layer.	
26-50+"	Fine sandy loam, strongly effervescent.	
Laveen series.		HSG-B.

Stop #2 - 0.1 mile north of stop #1, southeast of intersection of 89th Avenue and Villa Lindo. Fan terrace.

0-18"	Sandy loam, strongly effervescent.	
18-24"	Sandy loam, violently effervescent, high lime layer.	
24-50+"	Sandy loam, strongly effervescent.	
Laveen series.		HSG-B.

Stop #3 - 250 feet north of stop #2, northeast of intersection of 89th Avenue and Villa Lindo. Fan terrace.

0-16"	Sandy loam, strongly effervescent.	
16-28"	Sandy loam, violently effervescent, high lime layer.	
28-36+"	Sandy loam, strongly effervescent.	
Laveen series.		HSG-B.

Stop #4 - 400 feet north of stop #3, southeast of intersection of 89th Avenue and Hatfield Road. Fan terrace.

0-2"	Gravelly sandy loam, strongly effervescent.	
2-14"	Gravelly sandy loam, violently effervescent.	
14+"	Indurated duripan.	
Pinal series.		HSG-D.

Walked up and down the gully east of stop #4. Observed exposures of the indurated duripan. This helped to separate the HSG-B unit from the HSG-D unit.

Stop #5 - west of 88th Avenue and south of Hatfield Road, south of the electric power line. Fan terrace.

0-8"	Sandy loam, strongly effervescent.	
8-10"	Gravelly sandy loam, violently effervescent.	
10+"	Indurated duripan.	
Pinal series.		HSG-D.

Stop #6 - 300 feet south of stop #5 on the west side of 88th Avenue. Fan terrace.

0-6"	Sandy loam, strongly effervescent.
6-8"	Sandy loam, strongly effervescent, thin argillic layer.
8-10"	Gravelly sandy loam, violently effervescent.
10+"	Indurated duripan.

Suncity series. HSG-D.

Between stops 6 and 7 there are exposures of the indurated duripan in the road cut.

Stop #7 - 300 feet south of stop #6 on the west side of 88th Avenue. Fan terrace.

0-14"	Sandy loam, strongly effervescent.
14-22"	Sandy loam, violently effervescent, high lime layer.
22-30+"	Sandy loam, violently effervescent.

Laveen series. HSG-B.

Stop #8 - west side of 88th Avenue at the curve just north of Calle Lejos. Fan terrace.

0-18"	Sandy loam, strongly effervescent.
18-26"	Sandy loam, violently effervescent, high lime layer.
26-30+"	Sandy loam, violently effervescent.

Laveen series. HSG-B.

Stop #9 - Halfway between 88th Avenue and southeast corner of the project area along the north side of Calle Lejos. Fan Terrace.

0-24"	Sandy loam, strongly effervescent.
24-32"	Gravelly sandy loam, violently effervescent, high lime layer.
32+"	Gravelly sandy loam, violently effervescent, less lime than the layer above.

Laveen series. HSG-B.

Stop #10 - Southeast corner of project area, north side of Calle Lejos. Alluvial fan.

0-24"	Sandy loam, slightly effervescent.
24-36+"	Sandy loam, strongly effervescent.

Gilman series. HSG-B.

Stop #11 - Drove east of 88th Avenue on the power line trail along the north boundary of project area. Observed outcrops of an indurated duripan in the road cut and in the gullies. Fan terrace.

Pinal series. HSG-D.

Stop #12 - High point of the property, southwest of the northeast corner of the project area. Traveled on a dim trail leading out to this high point. Observed outcrops of gneiss bedrock. Also, saw some granite

outcrops. Very shallow soils to bedrock. The gneiss has a thick coating of desert varnish. Some soils have a thin indurated duripan over the bedrock and other soils lack a duripan.

Cherioni series. HSG-D.

Stop #13 - Walked a circuitous route around stop #12. Observed Cherioni and Pinal series.

HSG-D.

Stop #14 - Northeast corner of the project area along the power line. Observed soils that are shallow to a duripan.

Pinal series. HSG-D.

Stop #15 - North of Calle Lejos where it intersects with 87th Avenue. Alluvial fan.

0-36+" Sandy loam, strongly effervescent.

Gilman series. HSG-B.

REPRESENTATIVE SOIL PROFILES

The Cherioni series consists of well-drained soils that have an indurated duripan about 6 to 18 inches deep over granite-gneiss bedrock. The soils formed on low desert hills. Slopes range from 3 to 25 percent. In a representative profile the surface layer is light yellowish brown very gravelly sandy loam about one inch thick. The underlying material is light yellowish brown very gravelly loam about seven inches thick. It rests on a white silica and lime cemented duripan about four inches thick. Fractured gneiss bedrock is just below the pan. The soil is strongly alkaline and strongly to violently effervescent. Permeability is moderate above the pan. Runoff is medium. The hazard of erosion is slight to moderate. The available water capacity is less than two inches. Roots penetrate to a depth of less than 20 inches.

The Gilman series consists of deep, well-drained soils on alluvial fans. These soils formed in recent alluvium. Slopes are 0 to 3 percent. In a representative profile the surface layer is yellowish brown sandy loam about five inches thick. The underlying material is light yellowish brown stratified fine sandy loam and sandy loam to a depth of 50 inches or more. The soil is moderately alkaline and strongly effervescent. Permeability is moderate. Runoff is slow. The hazard of erosion is moderate. The available water capacity is about 10 inches. Roots penetrate to a depth of 50 inches or more.

The Laveen series consists of deep, well-drained soils that have a layer of high lime concentration. These soils formed in alluvium on fan terraces. Slopes are 0 to 5 percent. Commonly there is a thin layer of pebbles on the surface. In a representative profile the surface layer is light brown sandy loam about rive inches thick. The underlying layer is pale brown to pink sandy loam and fine sandy loam with a high lime layer at about 18 to 30 inches.. The underlying layer extends to a depth of 50 inches or more. The soil is moderately to strongly alkaline. It is strongly to violently effervescent. Permeability is moderate. Runoff is slow to medium. The erosion hazard is slight to moderate. The available water capacity is about 10 inches. Roots penetrate to a depth of 50 inches or more.

The Pinal series consists of shallow, well-drained soils that are less than 20 inches deep over a silica-

lime cemented duripan. These soils formed in old alluvium on fan terraces. Slopes are 1 to 5 percent. Commonly there is a thin layer of pebbles and cobblestones on the surface. In a representative profile the surface layer is a light yellowish brown about two inches thick. The underlying material is a light yellowish brown gravelly sandy loam to a depth of 12 to 14 inches. It is underlain by a white indurated silica-lime cemented duripan. The soil is strongly alkaline and violently effervescent. Permeability is moderate above the pan. Runoff is slow to medium. The hazard of erosion is slight to moderate. The available water capacity is one to two inches. Roots can penetrate to the indurated duripan.

The Suncity series consists of shallow well-drained soils that are less than 20 inches deep over a silica-lime cemented duripan. These soil formed in old alluvium on fan terraces. Slopes are 1 to 5 percent. Commonly there is a thin layer of pebbles and cobblestones on the surface. In a representative profile the surface layer is light yellowish brown gravelly sandy loam about six inches thick. The subsoil is a reddish brown gravelly sandy loam about two inches thick. It is underlain by a white indurated silica-lime cemented duripan. It is strongly alkaline and violently effervescent. Permeability is moderate above the pan. Runoff is slow to medium. The hazard of erosion is slight to moderate. The available water capacity is one to two inches. Roots can penetrate only to the duripan.

IMPLICATIONS OF SOIL FORMATION

The primary factors in soil formation are the topography (relief), climate, biota, parent material and time. In this study area the soils are progressively older starting from the Gilman series- Laveen series-Pinal series-Suncity series. These soils all formed in mixed alluvium. The lime in the alluvium was moved to a moderate depth in the Laveen soils. The lime and silica in the alluvium were transported to shallow depths (depth of wetting from precipitation) in the Pinal and Suncity soils. In addition the Suncity soils had a small amount of clay moved into the subsoil. The Cherioni soils are controlled by the underlying bedrock. A small amount of lime and silica were moved to a layer above the bedrock.

The climate, biota (native vegetation and organisms) and parent material seem uniform for all of the soils except for the Cherioni series. The topography is uniform except the Gilman soils formed alluvial fans and the Cherioni soils on desert hills.

It appears that time is the most significant factor in the formations of the soils in this study area. As soils are progressively older there is a greater concentration of lime and silica.

GLOSSARY

Alluvial Fan - A fan shaped deposit of sand, fine material, and gravel dropped by an intermittent stream where its gradient lessens abruptly.

Alluvium - Soil material, such as sand, silt and clay that has been deposited on land by streams.

Available water capacity - The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point.

Cobblestone - A rounded or partially rounded fragment of rock, 3 to 10 inches in diameter.

Depth, soil - shallow is 0 to 20 inches over bedrock or a pan. Deep is over 40 inches to bedrock or

a pan.

Duripan - A cemented (indurated) layer. The cementing agents are a combination of lime (calcium carbonate) and silica.

Fan terrace - A relict alluvial fan, no longer a site of active deposition, incised by a younger and lower alluvial surfaces.

Pebble - A rounded or partially rounded fragment of rock that is less than three inches in diameter.

Permeability - The quality of the soil that enables water to move downward through the profile.

SOIL INTERPRETATIONS

The Natural Resources Conservation Service (formerly the Soil Conservation Service) has developed a variety of soil interpretations for each identified soil series. The soil interpretations are given in various sections of the Soil Survey of Maricopa County, Arizona, Central Part (3).

REFERENCES

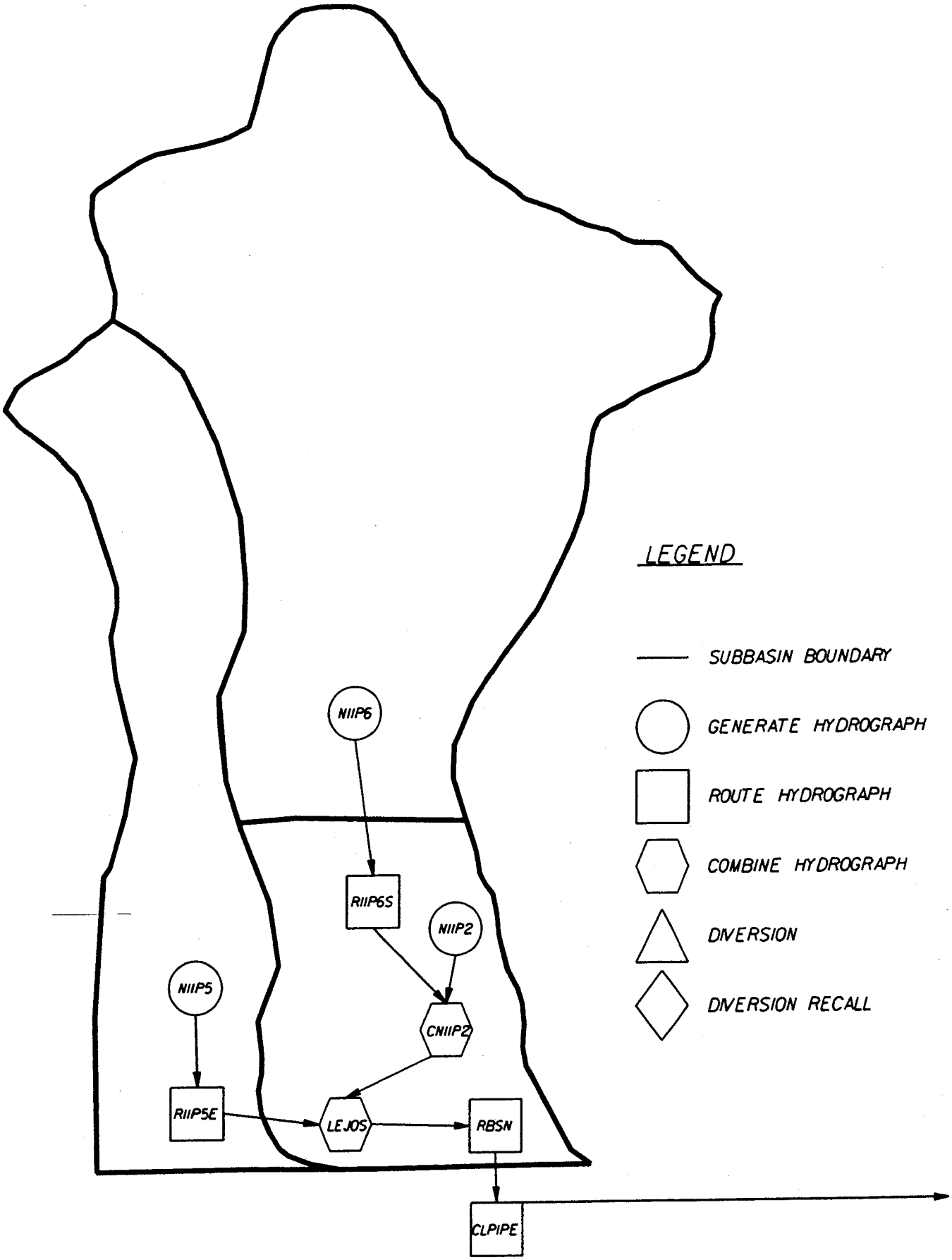
(1) Kollmorgen Corporation. 1975. Munsell Soil Color Charts.

(2) United States Department of Agriculture. 1993. National Soils Handbook. Pp. 618-16 & 17.

(3) Unites States Department of Agriculture. 1977. Soil Survey of Maricopa County, Arizona, Central Part. 117 pp., illus., maps.

Appendix C: HEC-1

Calle Lejos Road Detention Basin – ADMP Alternative


LEGEND
SUBBASIN BOUNDARY
GENERATE HYDROGRAPH
ROUTE HYDROGRAPH
COMBINE HYDROGRAPH
DIVERSION
DIVERSION RECALL
NIIP6
RIIP6S
NIIP2
NIIP5
CNIIP2
RIIP5E
LEJOS
RBSN
CLPIPE

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   27SEP04  TIME  12:50:13  *
*                                      *
****************************************
```

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

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

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

K/T 4PRINT

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

  1           ID
  2           ID   83RD AVENUE AND PINNACLE PEAK DRAINAGE IMPROVEMENTS
  3           ID   THIS FILE MODELS THE HYDRYOLOGY FOR THE PROPOSED
  4           ID   CALLE LEJOS DETENTION BASIN - ADMP ALTERNATIVE
  5           ID
  6           ID   J2 MODIFIED THE ENTELLUS GLENDALE/PEORIA ADMP UPDATE
  7           ID   LEVEL3.DAT
  8           ID   J2 UPDATED THE HYDROLOGY MODEL AND REDUCED THE LIMITS TO AREAS PERTINENT
  9           ID   TO THIS PROJECT.
 10           ID
 11           ID   PREPARED BY: KBD
 12           ID   DATE: SEPTEMBER 2004
 13           ID
 14           ID   MODEL ID: CLADMP.DAT
 15           ID
 16           ID   ***********************************************************************
 17           ID   ***********************************************************************
 18           ID
 19           ID   Project ID: GP - Major Basin: 01 - Return Period: 100 Years 6-HR
 20           ID
 21           ID   ***********************************************************************************
 22           ID   **                                                                               **
 23           ID   **                    Glendale/Peoria ADMP Update                                **
 24           ID   **                                                                               **
 25           ID   ***********************************************************************************
 26           ID   ***********************************************************************************
 27           ID   PROJECT:                Glendale Peoria ADMP Update
 28           ID   CLIENT:                 Flood Control District of Maricopa County
 29           ID   PREPARED BY:            Entellus, Inc.
 30           ID   PROJECT No:             FCD 99-44              Entellus 310.017
 31           ID   FILE NAME: LEVEL3.DAT             CREATED DATE: JUNE 6, 2001
 32           ID   MODIFIED:
 33           ID   STORM:                  100-year 6-hour Storm
 34           ID   DEVELOPMENT CONDITIONS: LEVEL 3 HYDROLOGY
 35           ID
 36           ID   ***********************************************************************
 37           ID   ***********************************************************************
 38           ID
 39           ID   DDM MCUHP1
              *
              * ***********************************************************************************
 40           IT       2                    1000
 41           IO       5
              *
              *DIAGRAM
 42           IN      15
              *
              * ***********************************************************************************
              * ***********************************************************************************
              * ***********************************      83RD AVENUE     ***********************************
              * ***********************************************************************************
              *
```


K/L4PRINT

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

  43          KK   N11P5   BASIN
  44          KM   THE ADMP UPDATE SHOWED N11P5 BASIN ENDING AT HATFIELD ROAD.
  45          KM   J2 MODIFIED THE DRAINAGE AREA DELINEATION AND EXTENDED TO
  46          KM   CALLE LEJOS ROAD
  47          BA    .088
  48          PB   3.200
  49          PC    .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
  50          PC    .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
  51          PC    .962    .972    .983    .991   1.000
  52          LG    .350    .350   2.650   1.200    .000
  53          UC    .371    .399
  54          UA       0       3       5       8      12      20      43      75      90      96
  55          UA     100
              *

  56          KK  R11P5E
  57          KM   ROUTE N11P5 FLOWS EAST IN PROPOSED CHANNEL (THEN THRU BOX AT 88TH AVE)
  58          RK    1430    .002    .018            TRAP      10       4
              *

  59          KK   N11P6   BASIN
  60          BA    .203
  61          LG    0.35    0.35    2.65    1.20       0
  62          UC   0.213   0.128
  63          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  64          UA     100
              *

  65          KK  R11P6S
  66          KM   ROUTE THRU N11P2 TO JUST NORTH OF THE PROPOSED CALLE LEJOS BASIN
  67          KM   ROUTE R11P6S IS 1620 FT WITH A SLOPE OF 0.0222
  68          KM   CROSS SECTION IS A MEDIUM WASH
  69          RS       3    FLOW       0
  70          RC     .05     .05     .05    1620  0.0222
  71          RX       0     100     300     360     380     420     620     720
  72          RY      10       8       6       2       0       6       8      10
              *

  73          KK   N11P2   BASIN
  74          BA    .063
  75          LG    0.35    0.35    2.65    1.20       0
  76          UC   0.338   0.327
  77          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  78          UA     100
              *

  79          KK  CN11P2
  80          KM   COMBINE N11P6 AND BASIN N11P2
  81          KM   THE NORTH SIDE OF THE PROPOSED CALLE LEJOS BASIN
  82          HC       2
              *
```

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

  83          KK   LEJOS
  84          KM   COMBINE INFLOWS FROM N11P5 AND COMBINED FLOWS FROM N11P6 AND N11P2
  85          KO       3                                22,
  86          HC       2
              *

  87          KK    RBSN
  88          KM   CALLE LEJOS DETENTION BASIN ROUTING
  89          KM   THE ADMP ALLOWS FOR 45 CFS METERED OUT
  90          KO       3                                22
  91          RS       1    STOR       0
  92          SV       0    1.58    3.36    5.33     7.5    9.87   12.45   15.26   18.27   18.27
  93          SE    1340    1341    1342    1343    1344    1345    1346    1347    1348    1350
  94          SQ       0       5      19      36      44      46      48      50      52      56
              *

  95          KK  CLPIPE
  96          KM   CALLE LEJOS DETETNION BASIN OUTLET PIPE
  97          KM   PIPE OUTFALL IS PROPOSED B3RD 2-8X4 RCBC
  98          RK    2000    .004    .013            CIRC       3
              *
  99          ZZ
```

```
                SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   43       N11P5
                V
                V
   56      R11P5E
                .
                .
   59           .       N11P6
                .           V
                .           V
   65           .      R11P6S
                .           .
                .           .
   73           .           .       N11P2
                .           .           .
                .           .           .
   79           .      CN11P2............
                .           .
                .           .
   83       LEJOS............
                V
                V
   87        RBSN
                V
                V
   95      CLPIPE

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


K&E 4PRINT

```
*****************************************
*                                       *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *
*              JUN   1998               *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   27SEP04  TIME  12:50:13   *
*                                       *
*****************************************
```

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

```
B3RD AVENUE AND PINNACLE PEAK DRAINAGE IMPROVEMENTS
THIS FILE MODELS THE HYDRYOLOGY FOR THE PROPOSED
CALLE LEJOS DETENTION BASIN - ADMP ALTERNATIVE

J2 MODIFIED THE ENTELLUS GLENDALE/PEORIA ADMP UPDATE
LEVEL3.DAT
J2 UPDATED THE HYDROLOGY MODEL AND REDUCED THE LIMITS TO AREAS PERTINENT
TO THIS PROJECT.

PREPARED BY: KBD
DATE: SEPTEMBER 2004

MODEL ID: CLADMP.DAT

==========================================================================
==========================================================================

Project ID: GP - Major Basin: 01 - Return Period: 100 Years 6-HR

**************************************************************************
**                                                                      **
**                    Glendale/Peoria ADMP Update                       **
**                                                                      **
**************************************************************************
**************************************************************************
PROJECT:                  Glendale Peoria ADMP Update
CLIENT:                   Flood Control District of Maricopa County
PREPARED BY:              Entellus, Inc.
PROJECT No:               FCD 99-44          Entellus 310.017
FILE NAME: LEVEL3.DAT               CREATED DATE: JUNE 6, 2001
MODIFIED:
STORM:                    100-year 6-hour Storm
DEVELOPMENT CONDITIONS: LEVEL 3 HYDROLOGY

=====================================================================
=====================================================================

DDM MCUHP1

41 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  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       1000  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     2    0  ENDING DATE
                    NDTIME       0918  ENDING TIME
```

```
                    ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL     .03 HOURS
                     TOTAL TIME BASE   33.30 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


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


            **************
            *            *
  83 KK     *     LEJOS  *
            *            *
            **************

  85 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


  86 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

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

                       HYDROGRAPH AT STATION    LEJOS

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                  6-HR       24-HR       72-HR     33.30-HR
    472.       4.20        (CFS)      34.          9.          6.          6.
                         (INCHES)    .904        .904        .904        .904
                          (AC-FT)     17.         17.         17.         17.

                       CUMULATIVE AREA =     .35 SQ MI


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


            **************
            *            *
  87 KK     *      RBSN  *
            *            *
            **************

  90 KO          OUTPUT CONTROL VARIABLES
```

```
                IPRNT          3  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2       1000  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


          HYDROGRAPH ROUTING DATA

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

92 SV         STORAGE        .0       1.6       3.4       5.3       7.5       9.9      12.4      15.3      18.3      18.3

93 SE       ELEVATION   1340.00   1341.00   1342.00   1343.00   1344.00   1345.00   1346.00   1347.00   1348.00   1350.00

94 SQ       DISCHARGE        0.        5.       19.       36.       44.       46.       48.       50.       52.       56.

                                                          ***

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

                    HYDROGRAPH AT STATION     RBSN

PEAK FLOW    TIME                        MAXIMUM AVERAGE FLOW
  (CFS)      (HR)              6-HR       24-HR       72-HR     33.30-HR
   48.       4.80     (CFS)     31.          9.          6.          6.
                     (INCHES)   .815        .903        .904        .904
                     (AC-FT)    15.         17.         17.         17.

PEAK STORAGE TIME                        MAXIMUM AVERAGE STORAGE
  (AC-FT)    (HR)              6-HR       24-HR       72-HR     33.30-HR
   13.       4.80               7.          2.          1.          1.

PEAK STAGE   TIME                        MAXIMUM AVERAGE STAGE
  (FEET)     (HR)              6-HR       24-HR       72-HR     33.30-HR
 1346.23     4.80           1343.40     1341.01     1340.73     1340.73

                    CUMULATIVE AREA =     .35 SQ MI
```

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	N11P5	83.	4.23	9.	2.	2.	.09		
ROUTED TO	R11P5E	83.	4.30	9.	2.	2.	.09		
HYDROGRAPH AT	N11P6	370.	4.10	20.	5.	4.	.20		
ROUTED TO	R11P6S	354.	4.17	20.	5.	4.	.20	2.77	4.17
HYDROGRAPH AT	N11P2	69.	4.20	6.	2.	1.	.06		
2 COMBINED AT	CN11P2	418.	4.17	26.	6.	5.	.27		
2 COMBINED AT	LEJOS	472.	4.20	34.	9.	6.	.35		
ROUTED TO	RBSN	48.	4.80	31.	9.	6.	.35	1346.23	4.80
ROUTED TO	CLPIPE	48.	4.83	31.	9.	6.	.35		

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

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
R11PSE	MANE	1.58	83.40	257.22	.90	2.00	83.17	258.00	.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4239E+01 EXCESS= .0000E+00 OUTFLOW= .4244E+01 BASIN STORAGE= .3723E-06 PERCENT ERROR= -.1

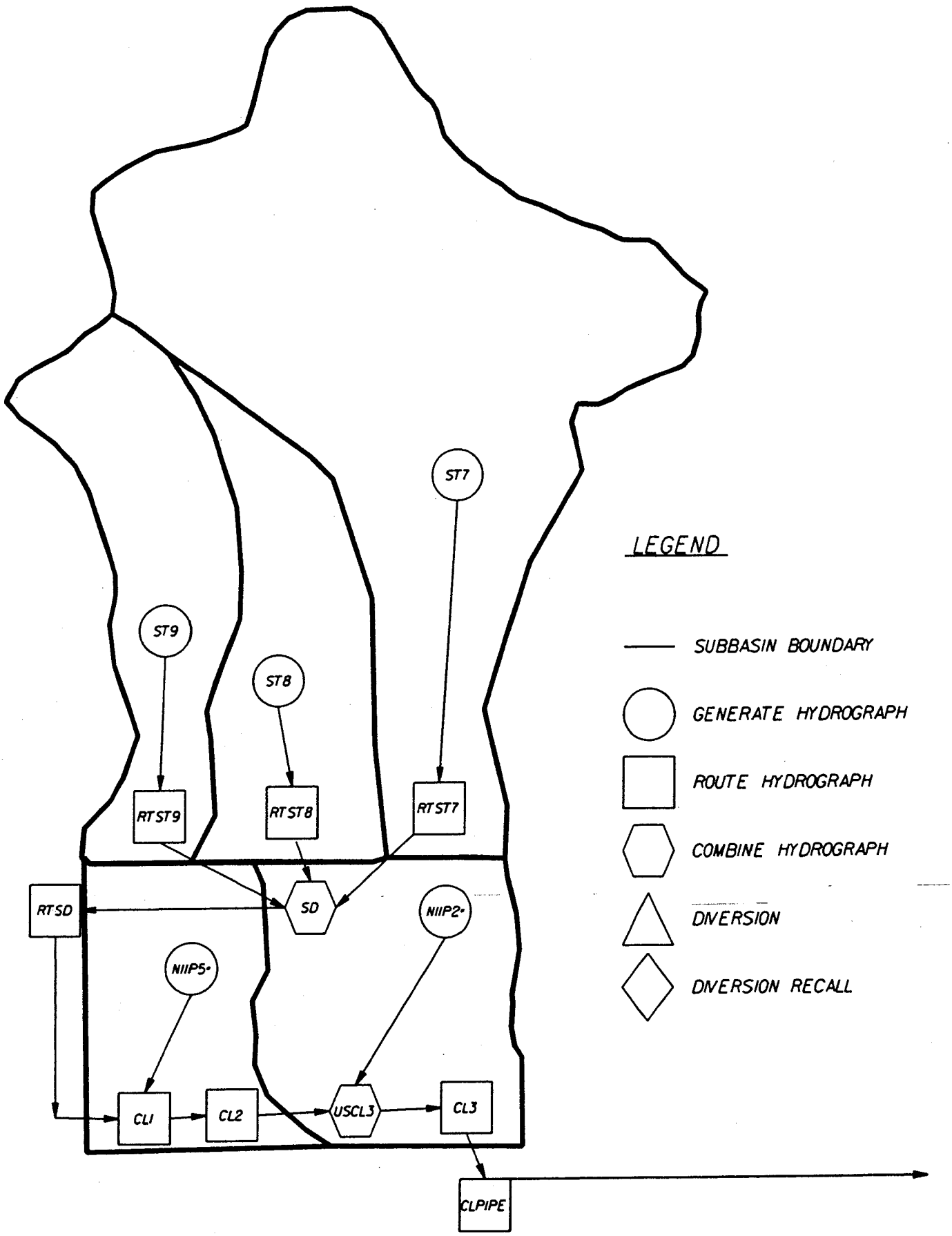
CLPIPE	MANE	1.21	48.45	290.26	.90	2.00	48.45	290.00	.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1706E+02 EXCESS= .0000E+00 OUTFLOW= .1706E+02 BASIN STORAGE= .2232E-03 PERCENT ERROR= .0

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

K/14PRINT

Calle Lejos Road Detention Basin – State Lands Alternative


ST7
ST9
ST8
RTST9
RTST8
RTST7
RTSD
SD
NIIP2*
NIIP5*
CL1
CL2
USCL3
CL3
CLPIPE
LEGEND
SUBBASIN BOUNDARY
GENERATE HYDROGRAPH
ROUTE HYDROGRAPH
COMBINE HYDROGRAPH
DIVERSION
DIVERSION RECALL

```
**********************************
*                                *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            JUN   1998          *
*         VERSION 4.1            *
*                                *
* RUN DATE   27SEP04  TIME  13:02:07  *
*                                *
**********************************
```

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

```
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

K/74PRINT

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

  1           ID   J2 MODEL FOR 83RD AVENUE DETENTION BASIN PROJECT
  2           ID   J2 MODIFIED THE ENTELLUS GLENDALE/PEORIA ADMP UPDATE
  3           ID   LEVEL3.DAT
  4           ID   THIS MODEL SIMULATES THE PEORIA 60 PROPOSAL FOR LOCATING THE CALLE LEJOS
  5           ID   DETENTION BAISN ALONG THE SRP PEROLINE EASEMENT AT HATFIELD ROAD.
  6           ID
  7           ID   PREPARED BY: KBD
  8           ID   DATE: SEPTEMBER 2004
  9           ID
 10           ID   MODEL ID: NBASIN.DAT
 11           ID   ORIGINAL ADMP UPDATE ID FOLLOWS:
 12           ID
 13           ID   ==================================================================
 14           ID   ==================================================================
 15           ID
 16           ID   Project ID: GP - Major Basin: 01 - Return Period: 100 Years 6-HR
 17           ID
 18           ID   ******************************************************************
 19           ID   **                                                              **
 20           ID   **                  Glendale/Peoria ADMP Update                 **
 21           ID   **                                                              **
 22           ID   ******************************************************************
 23           ID   ******************************************************************
 24           ID   PROJECT:                Glendale Peoria ADMP Update
 25           ID   CLIENT:                 Flood Control District of Maricopa County
 26           ID   PREPARED BY:            Entellus, Inc.
 27           ID   PROJECT No:             FCD 99-44              Entellus 310.017
 28           ID   FILE NAME: LEVEL3.DAT             CREATED DATE: JUNE 6, 2001
 29           ID   MODIFIED:
 30           ID   STORM:                  100-year 6-hour Storm
 31           ID   DEVELOPMENT CONDITIONS: LEVEL 3 HYDROLOGY
 32           ID
 33           ID   ================================================================
 34           ID   ================================================================
 35           ID
 36           ID   THIS MODEL MODIFIED BY J2 FROM GLENDALE ADMP UPDATE MODEL LEVEL3.DAT
 37           ID   ADMP UPDATE PREPARED BY ENTELLUS
 38           ID   BY: PAW
 39           ID   PREPARED BY: J2 ENGINEERING AND ENVIRONMENTAL DESIGN
 40           ID   BY: KBD
 41           ID   DATE: 9-2004
 42           ID
 43           ID   ================================================================
 44           ID   ================================================================
 45           ID
 46           ID   DDM MCUHP1
              *
              * ******************************************************************
 47           IT       2                    1000
 48           IO       5
              *
              *DIAGRAM
 49           IN      15
              *
              * ******************************************************************
              * ******************************************************************
              * ***********************      83RD AVENUE    ***********************
              * ******************************************************************
              *
```

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

  50          KK     ST7
  51          KO       3                                22
  52          KM   EAST BASIN
  53          KM   SUB-BASIN ST7
  54          BA    .172
  55          IN      15
  56          PB   3.200
  57          KM     L =  .75  Kb = .099  Adj. Slope =  315.0
  58          PC    .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
  59          PC    .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
  60          PC    .962    .972    .983    .991   1.000
  61          LG    .350    .350   2.650   1.200    .000
  62          UC    .342    .243
  63          UA       0       3       5       8      12      20      43      75      90      96
  64          UA     100
              *

  65          KK   RTST7
  66          KO       3                                22
  67          RS       1    STOR       0
  68          SV       0      .7    1.55    2.58    3.79
  69          SE    1372    1373    1374    1375    1376
  70          SQ       0       0       0      11    15.5
              *

  71          KK     ST8
  72          KO       3                                22
  73          KM   MIDDLE BASIN
  74          KM     L =  .46  Kb = .113  Adj. Slope =  315.0
  75          BA    .048
  76          LG    .350    .350   2.650   1.200    .000
  77          UC    .258    .250
  78          UA       0       3       5       8      12      20      43      75      90      96
  79          UA     100
              *

  80          KK   RTST8
  81          KO       3                                22
  82          RS       1    STOR       0
  83          SV       0     .99    2.21    3.66    5.36    7.33
  84          SE    1369    1370    1371    1372    1373    1374
  85          SQ       0       0       0      11    15.5      19
              *

  86          KK     ST9
  87          KO       3                                22
  88          KM   SUB-BASIN ST9
  89          KM   WEST MOST BASIN
  90          KM     L =  .47  Kb = .112  Adj. Slope =  315.0
  91          BA    .050
  92          LG    .350    .350   2.650   1.200  14.000
  93          UC    .250    .239
  94          UA       0       3       5       8      12      20      43      75      90      96
  95          UA     100
              *
```


K/T 4PRINT

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

 96           KK   RTST9
 97           KO       3                                22
 98           RS       1    STOR       0
 99           SV     0.0    0.58    1.29    2.13    3.09    4.20    5.47
100           SE    1360    1361    1362    1363    1364    1365    1366
101           SQ       0       0       0      11    15.5      19      22
              *

102           KK      SD
103           HC       3
              *

104           KK    RTSD
105           KM
106           KO       3                                22
107           RK    3190    .005    .013            CIRC       3
              *

108           KK  N11P5*
109           KM   WESTERN AREA OF PROPOSED PEORIA 60 DEVELOPMENT - UNDEVLOPED CONDITION
110           KM     L =  .26  Kb = .061  Adj. Slope =   88.0
111           BA    .040
112           LG    .350    .350   2.650   1.200    .000
113           UC    .204    .135
114           UA       0       3       5       8      12      20      43      75      90      96
115           UA     100
              *

116           KK   USBSN
117           HC       2
              *

118           KK     CL1
119           KM   WEST LINEAR BASIN ALONG CALLE LEJOS ROAD
120           KO       3                                22
121           RS       1    STOR       0
122           SV       0     .20     .69    1.32    2.08    2.94
123           SE    1340    1341    1342    1343    1344    1345
124           SQ       0       2       2       3       3       3
              *

125           KK     CL2
126           KM   MIDDLE LINEAR BASIN ALONG CALLE LEJOS ROAD
127           KO       3                                22
128           RS       1    STOR       0
129           SV       0     .22     .52     .89
130           SE    1342    1343    1344    1345
131           SQ       0       2       2       3
              *
```


1C/14PRINT

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

 132          KK  N11P2*
 133          KM   SUB-BASIN N11P2*
 134          KM   EASTERN AREA OF PROPOSED PEORIA 60 DEVELOPMENT - UNDEVLOPED CONDITION
 135          KM     L =  .43  Kb = .059  Adj. Slope =   69.0
 136          BA    .055
 137          LG    .350    .350   2.650   1.200    .000
 138          UC    .300    .259
 139          UA       0       3       5       8      12      20      43      75      90      96
 140          UA     100
              *

 141          KK   USCL3
 142          HC       2
              *

 143          KK     CL3
 144          KM   EAST LINEAR BASIN ALONG CALLE LEJOS ROAD
 145          KO       3                                22
 146          RS       1    STOR       0
 147          SV       0     .01     .05     .20     .44     .76
 148          SE    1340    1341    1342    1343    1344    1345
 149          SQ       0       5      19      36      44      46
              *

 150          KK  CLPIPE
 151          RK    2000    .004    .013            CIRC       3
              *
 152          ZZ
```


1C714PRINT

```
                SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  50         ST7
              V
              V
  65       RTST7
              .
              .
  71          .         ST8
              .          V
              .          V
  80          .       RTST8
              .          .
              .          .
  86          .          .         ST9
              .          .          V
              .          .          V
  96          .          .       RTST9
              .          .          .
              .          .          .
 102          SD.......................
              V
              V
 104        RTSD
              .
              .
 108          .      N11P5*
              .          .
              .          .
 116       USBSN............
              V
              V
 118         CL1
              V
              V
 125         CL2
              .
              .
 132          .      N11P2*
              .          .
              .          .
 141       USCL3............
              V
              V
 143         CL3
              V
              V
 150      CLPIPE

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


K&E 4-PRINT

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   27SEP04  TIME  13:02:07  *
*                                      *
****************************************
```

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

```
J2 MODEL FOR 83RD AVENUE DETENTION BASIN PROJECT
J2 MODIFIED THE ENTELLUS GLENDALE/PEORIA ADMP UPDATE
LEVEL3.DAT
THIS MODEL SIMULATES THE PEORIA 60 PROPOSAL FOR LOCATING THE CALLE LEJOS
DETENTION BAISN ALONG THE SRP PEROLINE EASEMENT AT HATFIELD ROAD.

PREPARED BY: KBD
DATE: SEPTEMBER 2004

MODEL ID: NBASIN.DAT
ORIGINAL ADMP UPDATE ID FOLLOWS:

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

Project ID: GP - Major Basin: 01 - Return Period: 100 Years 6-HR

*****************************************************************************
**                                                                         **
**                    Glendale/Peoria ADMP Update                          **
**                                                                         **
*****************************************************************************
*****************************************************************************
PROJECT:                 Glendale Peoria ADMP Update
CLIENT:                  Flood Control District of Maricopa County
PREPARED BY:             Entellus, Inc.
PROJECT No:              FCD 99-44              Entellus 310.017
FILE NAME: LEVEL3.DAT              CREATED DATE: JUNE 6, 2001
MODIFIED:
STORM:                   100-year 6-hour Storm
DEVELOPMENT CONDITIONS: LEVEL 3 HYDROLOGY

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

THIS MODEL MODIFIED BY J2 FROM GLENDALE ADMP UPDATE MODEL LEVEL3.DAT
ADMP UPDATE PREPARED BY ENTELLUS
BY: PAW
PREPARED BY: J2 ENGINEERING AND ENVIRONMENTAL DESIGN
BY: KBD
DATE: 9-2004

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

DDM MCUHP1

48 IO        OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
```


K/L4PRINT

```
  IT          HYDROGRAPH TIME DATA
                    NMIN          2  MINUTES IN COMPUTATION INTERVAL
                   IDATE      1    0  STARTING DATE
                   ITIME       0000  STARTING TIME
                      NQ       1000  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE      2    0  ENDING DATE
                  NDTIME       0918  ENDING TIME
                   ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .03 HOURS
                   TOTAL TIME BASE   33.30 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

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

          ***************
          *             *
 50 KK    *       ST7   *
          *             *
          ***************

 51 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2       1000  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       .033  TIME INTERVAL IN HOURS

                        EAST BASIN
                        SUB-BASIN ST7
                          L =  .75  Kb = .099  Adj. Slope =  315.0

 55 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

 54 BA          SUBBASIN CHARACTERISTICS
                     TAREA        .17  SUBBASIN AREA

                PRECIPITATION DATA

 57 PB               STORM       3.20  BASIN TOTAL PRECIPITATION

 57 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```


K/14PRINT

```
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .01     .01     .01
.01     .01     .01     .01     .01     .02     .02     .02     .02     .02
.02     .02     .04     .06     .06     .06     .06     .06     .06     .06
.01     .01     .01     .01     .01     .01     .01     .01     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00

61 LG        GREEN AND AMPT LOSS RATE
                STRTL        .35  STARTING LOSS
                  DTH        .35  MOISTURE DEFICIT
                 PSIF       2.65  WETTING FRONT SUCTION
                XKSAT       1.20  HYDRAULIC CONDUCTIVITY
                RTIMP        .00  PERCENT IMPERVIOUS AREA

62 UC        CLARK UNITGRAPH
                   TC        .34  TIME OF CONCENTRATION
                    R        .24  STORAGE COEFFICIENT

63 UA        ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                  .0      3.0      5.0      8.0     12.0     20.0     43.0     75.0     90.0     96.0
               100.0

                                                  ***

                                          UNIT HYDROGRAPH PARAMETERS
                                     CLARK   TC=   .34 HR,       R=   .24 HR
                                    SNYDER   TP=   .29 HR,      CP=   .77

                                          UNIT HYDROGRAPH
                                     45 END-OF-PERIOD ORDINATES
          6.      16.      24.      35.      55.     107.     201.     277.     295.     283.
        258.     227.     198.     173.     151.     131.     114.     100.      87.      76.
         66.      58.      50.      44.      38.      33.      29.      25.      22.      19.
         17.      15.      13.      11.      10.       8.       7.       6.       6.       5.
          4.       4.       3.       3.       2.

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

                HYDROGRAPH AT STATION      ST7

  TOTAL RAINFALL =    3.20, TOTAL LOSS =    2.29, TOTAL EXCESS =     .91

PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
  (CFS)       (HR)                 6-HR       24-HR       72-HR     33.30-HR
   222.       4.20       (CFS)      17.          4.          3.           3.
                       (INCHES)    .903        .903        .903         .903
                        (AC-FT)      8.          8.          8.           8.

                       CUMULATIVE AREA =     .17 SQ MI

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

          ***************
          *             *
65 KK     *     RTST7   *
```

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

 66 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2       1000  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       .033  TIME INTERVAL IN HOURS


             HYDROGRAPH ROUTING DATA

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

 68 SV            STORAGE         .0        .7       1.5       2.6       3.8

 69 SE          ELEVATION    1372.00   1373.00   1374.00   1375.00   1376.00

 70 SQ          DISCHARGE         0.        0.        0.       11.       16.

                                                          ***

WARNING --- ROUTED OUTFLOW (     16.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     18.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     20.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     21.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     22.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     23.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     24.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     24.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     25.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     25.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
```

```
WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     26.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     25.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     25.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     25.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     25.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     25.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     25.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     24.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     24.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (     24.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     23.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     23.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     23.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (     23.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     22.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     22.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     22.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     22.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     21.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     21.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     21.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     21.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     21.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     20.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     20.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     20.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     20.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE
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K/71 4-PRINT

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WARNING --- ROUTED OUTFLOW (     20.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     19.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     19.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     19.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

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WARNING --- ROUTED OUTFLOW (     19.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     18.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     18.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

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WARNING --- ROUTED OUTFLOW (     18.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     17.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     17.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

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WARNING --- ROUTED OUTFLOW (     16.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     16.) IS GREATER THAN MAXIMUM OUTFLOW (     16.) IN STORAGE-OUTFLOW TABLE

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                    HYDROGRAPH AT STATION    RTST7

 PEAK FLOW    TIME                        MAXIMUM AVERAGE FLOW
   (CFS)      (HR)                 6-HR       24-HR       72-HR     33.30-HR
    26.       4.77      (CFS)      13.         3.          2.          2.
                      (INCHES)    .719        .734        .734        .734
                       (AC-FT)     7.          7.          7.          7.

PEAK STORAGE  TIME                        MAXIMUM AVERAGE STORAGE
  (AC-FT)     (HR)                 6-HR       24-HR       72-HR     33.30-HR
     7.       4.77                  4.         2.          2.          2.

 PEAK STAGE   TIME                        MAXIMUM AVERAGE STAGE
   (FEET)     (HR)                 6-HR       24-HR       72-HR     33.30-HR
  1378.40     4.77              1375.83    1374.46     1374.09     1374.09

                    CUMULATIVE AREA =     .17 SQ MI
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          *             *
 71 KK    *     ST8     *
          *             *
          ***************

 72 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          3  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE
                    IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                     IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2       1000  LAST ORDINATE PUNCHED OR SAVED
                   TIMINT       .033  TIME INTERVAL IN HOURS

                       MIDDLE BASIN
                         L =  .46  Kb = .113  Adj. Slope =  315.0

            SUBBASIN RUNOFF DATA

 75 BA        SUBBASIN CHARACTERISTICS
                    TAREA        .05  SUBBASIN AREA

              PRECIPITATION DATA

 57 PB              STORM       3.20  BASIN TOTAL PRECIPITATION

 57 PI          INCREMENTAL PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                    .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                    .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                    .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

 76 LG        GREEN AND AMPT LOSS RATE
                    STRTL        .35  STARTING LOSS
                      DTH        .35  MOISTURE DEFICIT
                     PSIF       2.65  WETTING FRONT SUCTION
                    XKSAT       1.20  HYDRAULIC CONDUCTIVITY
                    RTIMP        .00  PERCENT IMPERVIOUS AREA

 77 UC        CLARK UNITGRAPH
                       TC        .26  TIME OF CONCENTRATION
                        R        .25  STORAGE COEFFICIENT

 78 UA        ACCUMULATED-AREA VS. TIME,  11 ORDINATES
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                .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
              100.0

                                                  ***

                                          UNIT HYDROGRAPH PARAMETERS
                                   CLARK   TC=   .26 HR,       R=   .25 HR
                                  SNYDER   TP=   .23 HR,      CP=   .64

                                          UNIT HYDROGRAPH
                                   45 END-OF-PERIOD ORDINATES
            2.        6.       10.       18.       43.       74.       87.       84.       76.       66.
           58.       51.       44.       39.       34.       30.       26.       23.       20.       17.
           15.       13.       12.       10.        9.        8.        7.        6.        5.        5.
            4.        4.        3.        3.        2.        2.        2.        2.        1.        1.
            1.        1.        1.        1.        1.

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

                 HYDROGRAPH AT STATION      ST8

  TOTAL RAINFALL =    3.20, TOTAL LOSS =    2.29, TOTAL EXCESS =     .91

PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
  (CFS)       (HR)                  6-HR       24-HR       72-HR     33.30-HR
    63.       4.17        (CFS)       5.          1.          1.          1.
                        (INCHES)    .903        .903        .903        .903
                         (AC-FT)      2.          2.          2.          2.

                       CUMULATIVE AREA =     .05 SQ MI


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          *             *
 80 KK    *     RTSTB   *
          *             *
          ***************

 81 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2       1000  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS


            HYDROGRAPH ROUTING DATA

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

 83 SV            STORAGE          .0       1.0       2.2       3.7       5.4       7.3

 84 SE          ELEVATION     1369.00   1370.00   1371.00   1372.00   1373.00   1374.00
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 85 SQ          DISCHARGE          0.        0.        0.       11.       16.       19.

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                        HYDROGRAPH AT STATION    RTST8

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                   6-HR       24-HR       72-HR     33.30-HR
     1.        5.30        (CFS)       0.          0.          0.          0.
                         (INCHES)     .039        .040        .040        .040
                         (AC-FT)       0.          0.          0.          0.

PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
  (AC-FT)      (HR)                   6-HR       24-HR       72-HR     33.30-HR
     2.        5.30                    2.          2.          2.          2.

 PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
   (FEET)      (HR)                   6-HR       24-HR       72-HR     33.30-HR
 1371.06       5.30               1371.02     1371.00     1370.75     1370.75

                         CUMULATIVE AREA =     .05 SQ MI


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            *             *
 86 KK      *        ST9  *
            *             *
            ***************

 87 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

                         SUB-BASIN ST9
                         WEST MOST BASIN
                           L =  .47  Kb = .112  Adj. Slope =  315.0

              SUBBASIN RUNOFF DATA

 91 BA          SUBBASIN CHARACTERISTICS
                      TAREA         .05  SUBBASIN AREA

                PRECIPITATION DATA

 57 PB                STORM        3.20  BASIN TOTAL PRECIPITATION

 57 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

92 LG         GREEN AND AMPT LOSS RATE
                    STRTL        .35  STARTING LOSS
                      DTH        .35  MOISTURE DEFICIT
                     PSIF       2.65  WETTING FRONT SUCTION
                    XKSAT       1.20  HYDRAULIC CONDUCTIVITY
                    RTIMP      14.00  PERCENT IMPERVIOUS AREA

93 UC         CLARK UNITGRAPH
                       TC        .25  TIME OF CONCENTRATION
                        R        .24  STORAGE COEFFICIENT

94 UA         ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                      .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                   100.0

                                                   ***

                                          UNIT HYDROGRAPH PARAMETERS
                                     CLARK   TC=   .25 HR,       R=   .24 HR
                                    SNYDER   TP=   .22 HR,      CP=   .66

                                              UNIT HYDROGRAPH
                                          43 END-OF-PERIOD ORDINATES
              2.        6.       11.       22.       53.       85.       95.       89.       79.       69.
             60.       52.       45.       39.       34.       30.       26.       22.       20.       17.
             15.       13.       11.       10.        8.        7.        6.        6.        5.        4.
              4.        3.        3.        2.        2.        2.        2.        1.        1.        1.
              1.        1.        1.

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                     HYDROGRAPH AT STATION      ST9

   TOTAL RAINFALL =    3.20, TOTAL LOSS =    1.97, TOTAL EXCESS =    1.23

PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
  (CFS)       (HR)                  6-HR       24-HR       72-HR     33.30-HR
    76.       4.13        (CFS)       7.          2.          1.          1.
                         (INCHES)   1.220       1.223       1.223       1.223
                         (AC-FT)      3.          3.          3.          3.

                         CUMULATIVE AREA =     .05 SQ MI


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 96 KK      *     RTST9   *
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14PRINT

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 97 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


            HYDROGRAPH ROUTING DATA

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

 99 SV            STORAGE          .0        .6       1.3       2.1       3.1       4.2       5.5

100 SE          ELEVATION     1360.00   1361.00   1362.00   1363.00   1364.00   1365.00   1366.00

101 SQ          DISCHARGE          0.        0.        0.       11.       16.       19.       22.

                                                                 ***

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

                        HYDROGRAPH AT STATION    RTST9

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                  6-HR       24-HR       72-HR     33.30-HR
     13.       4.63        (CFS)       4.          1.          1.          1.
                         (INCHES)    .737        .739        .739        .739
                          (AC-FT)      2.          2.          2.          2.

PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
  (AC-FT)      (HR)                  6-HR       24-HR       72-HR     33.30-HR
      3.       4.63                    2.          1.          1.          1.

 PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
   (FEET)      (HR)                  6-HR       24-HR       72-HR     33.30-HR
  1363.40      4.63               1362.38     1362.10     1361.84     1361.84

                        CUMULATIVE AREA =     .05 SQ MI


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          *             *
104 KK    *     RTSD    *
          *             *
          ***************

106 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
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                IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
               ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
               ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
              TIMINT        .033  TIME INTERVAL IN HOURS


        HYDROGRAPH ROUTING DATA

107 RK     KINEMATIC WAVE STREAM ROUTING
                   L       3190.  CHANNEL LENGTH
                   S       .0050  SLOPE
                   N        .013  CHANNEL ROUGHNESS COEFFICIENT
                  CA         .00  CONTRIBUTING AREA
               SHAPE        CIRC  CHANNEL SHAPE
                  WD        3.00  BOTTOM WIDTH OR DIAMETER
                   Z         .00  SIDE SLOPE
              NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS

                                          ***
                        COMPUTED KINEMATIC PARAMETERS
                             VARIABLE TIME STEP
                           (DT SHOWN IS A MINIMUM)

          ELEMENT    ALPHA       M        DT        DX       PEAK    TIME TO     VOLUME    MAXIMUM
                                                                       PEAK                  CELERITY
                                          (MIN)      (FT)     (CFS)     (MIN)       (IN)      (FPS)

          MAIN        5.25      1.25      1.83   1063.33     38.98    287.33       .61       9.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8807E+01  EXCESS= .0000E+00 OUTFLOW= .8808E+01 BASIN STORAGE= .5894E-05 PERCENT ERROR=    .0


                          INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


          MAIN        5.25      1.25      2.00              38.98    288.00       .61

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

                 HYDROGRAPH AT STATION     RT50

 PEAK FLOW    TIME                        MAXIMUM AVERAGE FLOW
   (CFS)      (HR)                 6-HR      24-HR      72-HR    33.30-HR
     39.      4.80       (CFS)      17.         4.         3.          3.
                      (INCHES)     .601       .612       .612        .612
                       (AC-FT)       9.         9.         9.          9.

                      CUMULATIVE AREA =     .27 SQ MI


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          *             *
118 KK    *       CL1   *
          *             *
          ***************

120 KO     OUTPUT CONTROL VARIABLES
                 IPRNT           3  PRINT CONTROL
                 IPLOT           0  PLOT CONTROL
                 OSCAL          0.  HYDROGRAPH PLOT SCALE
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K&E 4PRINT

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                    IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                     IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2       1000  LAST ORDINATE PUNCHED OR SAVED
                   TIMINT       .033  TIME INTERVAL IN HOURS


            HYDROGRAPH ROUTING DATA

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

122 SV          STORAGE          .0        .2        .7       1.3       2.1       2.9

123 SE        ELEVATION     1340.00   1341.00   1342.00   1343.00   1344.00   1345.00

124 SQ        DISCHARGE          0.        2.        2.        3.        3.        3.

                                                                 ***

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

                     HYDROGRAPH AT STATION      CL1

 PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                 6-HR       24-HR       72-HR     33.30-HR
     3.        4.20       (CFS)       3.          3.          3.          3.
                        (INCHES)    .090        .360        .440        .440
                         (AC-FT)      1.          6.          7.          7.

PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
  (AC-FT)      (HR)                 6-HR       24-HR       72-HR     33.30-HR
     9.        9.43                  9.          7.          6.          6.

 PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
   (FEET)      (HR)                 6-HR       24-HR       72-HR     33.30-HR
  1352.15      9.47              1351.83     1349.79     1347.98     1347.98

                       CUMULATIVE AREA =     .31 SQ MI


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


          ***************
          *             *
125 KK    *      CL2    *
          *             *
          ***************

127 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          3  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE
                    IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                     IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2       1000  LAST ORDINATE PUNCHED OR SAVED
                   TIMINT       .033  TIME INTERVAL IN HOURS
```

```
            HYDROGRAPH ROUTING DATA

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

129 SV            STORAGE          .0        .2        .5        .9

130 SE          ELEVATION     1342.00   1343.00   1344.00   1345.00

131 SQ          DISCHARGE          0.        2.        2.        3.

                                                                 ***

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

                       HYDROGRAPH AT STATION      CL2

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                   6-HR       24-HR       72-HR     33.30-HR
      3.      32.57       (CFS)        3.          3.          2.          2.
                        (INCHES)     .090        .339        .386        .386
                         (AC-FT)       1.          6.          6.          6.

PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
  (AC-FT)      (HR)                   6-HR       24-HR       72-HR     33.30-HR
      1.      31.40                     1.          1.          1.          1.

 PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
   (FEET)      (HR)                   6-HR       24-HR       72-HR     33.30-HR
  1345.00      33.20               1344.99     1344.83     1344.24     1344.24

                        CUMULATIVE AREA =     .31 SQ MI


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


            ***************
            *             *
143 KK      *       CL3   *
            *             *
            ***************

145 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


            HYDROGRAPH ROUTING DATA

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


1<7 4PRINT

147 SV	STORAGE	.0	.0	.1	.2	.4	.8
148 SE	ELEVATION	1340.00	1341.00	1342.00	1343.00	1344.00	1345.00
149 SQ	DISCHARGE	0.	5.	19.	36.	44.	46.

***

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

HYDROGRAPH AT STATION CL3

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	33.30-HR
45.	4.33	(CFS)	7.	4.	3.	3.
		(INCHES)	.181	.394	.463	.463
		(AC-FT)	4.	8.	9.	9.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	33.30-HR
1.	4.33	0.	0.	0.	0.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	33.30-HR
1344.42	4.33	1340.87	1340.64	1340.56	1340.56

CUMULATIVE AREA = .37 SQ MI

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	ST7	222.	4.20	17.	4.	3.	.17		
ROUTED TO	RTST7	26.	4.77	13.	3.	2.	.17	1378.40	4.77
HYDROGRAPH AT	ST8	63.	4.17	5.	1.	1.	.05		
ROUTED TO	RTST8	1.	5.30	0.	0.	0.	.05	1371.06	5.30
HYDROGRAPH AT	ST9	76.	4.13	7.	2.	1.	.05		
ROUTED TO	RTST9	13.	4.63	4.	1.	1.	.05	1363.40	4.63
3 COMBINED AT	SD	39.	4.73	17.	4.	3.	.27		
ROUTED TO	RTSD	39.	4.80	17.	4.	3.	.27		
HYDROGRAPH AT	N11P5*	72.	4.10	4.	1.	1.	.04		
2 COMBINED AT	USBSN	72.	4.10	21.	5.	4.	.31		
ROUTED TO	CL1	3.	4.20	3.	3.	3.	.31	1352.15	9.47
ROUTED TO	CL2	3.	32.57	3.	3.	2.	.31	1345.00	33.20
HYDROGRAPH AT	N11P2*	69.	4.20	5.	1.	1.	.05		
2 COMBINED AT	USCL3	70.	4.20	7.	4.	3.	.37		
ROUTED TO	CL3	45.	4.33	7.	4.	3.	.37	1344.42	4.33
ROUTED TO	CLPIPE	45.	4.40	7.	4.	3.	.37		

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

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
RTSD	MANE	1.83	38.98	287.33	.61	2.00	38.98	288.00	.61

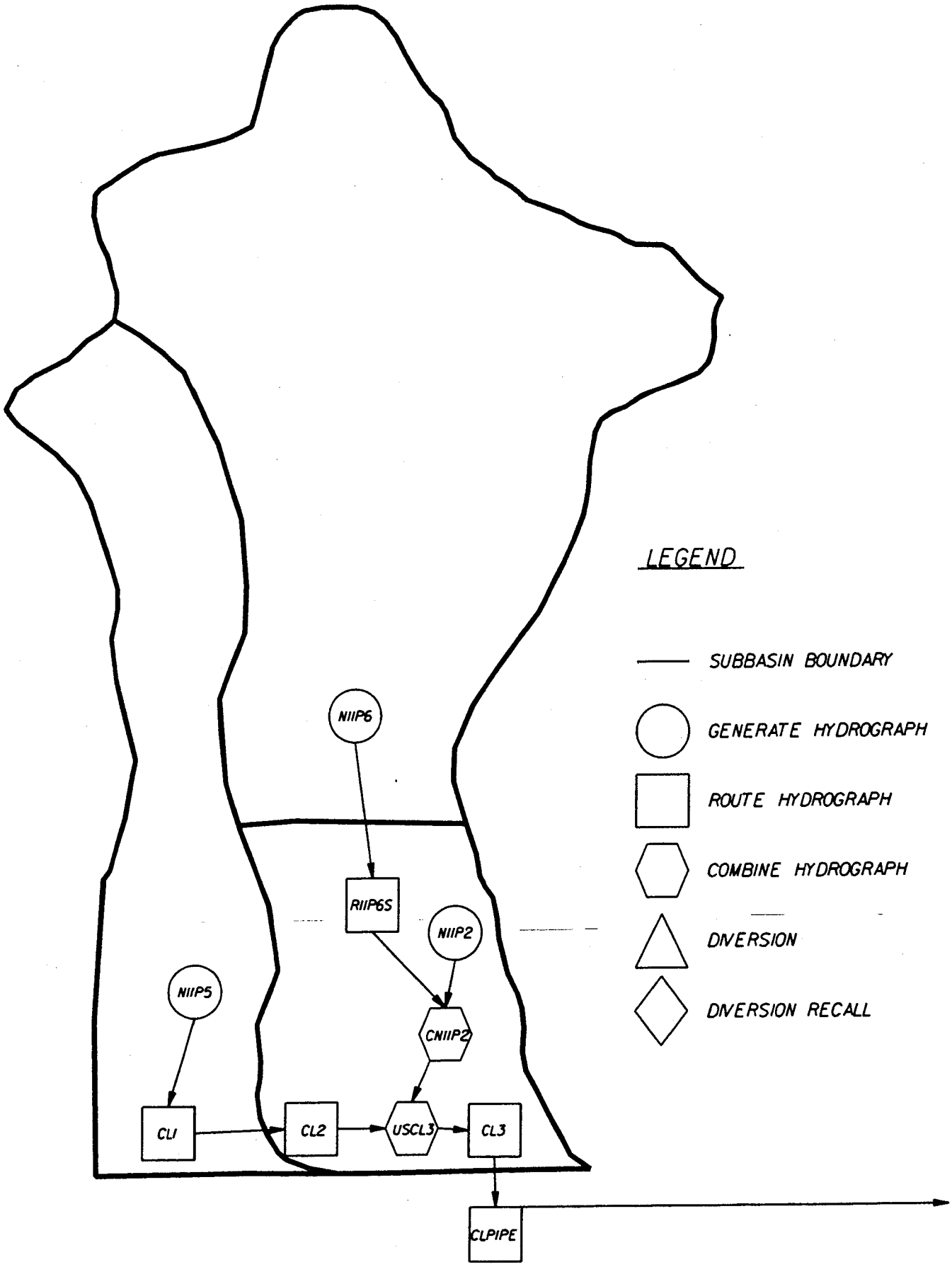
CONTINUITY SUMMARY (AC-FT) - INFLOW= .8807E+01 EXCESS= .0000E+00 OUTFLOW= .8808E+01 BASIN STORAGE= .5894E-05 PERCENT ERROR= .0

CLPIPE	MANE	1.24	44.84	262.77	.46	2.00	44.83	264.00	.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9022E+01 EXCESS= .0000E+00 OUTFLOW= .9003E+01 BASIN STORAGE= .1924E-01 PERCENT ERROR= .0

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

Calle Lejos Road Detention Basin – Peoria 60 Southern Basin


LEGEND
SUBBASIN BOUNDARY
GENERATE HYDROGRAPH
ROUTE HYDROGRAPH
COMBINE HYDROGRAPH
DIVERSION
DIVERSION RECALL
NIIP6
RIIP6S
NIIP2
NIIP5
CNIIP2
CL1
CL2
USCL3
CL3
CLPIPE

```
**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)*
*              JUN   1998            *
*           VERSION 4.1              *
*                                    *
*  RUN DATE   27SEP04  TIME  12:58:20*
*                                    *
**************************************
```

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

```
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

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

  1           ID
  2           ID   83RD AVENUE AND PINNACLE PEAK DRAINAGE IMPROVEMENTS
  3           ID   THIS FILE MODELS THE HYDRYOLOGY FOR THE PROPOSED
  4           ID   CALLE LEJOS DETETNION BASIN - PEORIA 60 SOUTHERN BASIN ALTERNATIVE
  5           ID
  6           ID   J2 MODIFIED THE ENTELLUS GLENDALE/PEORIA ADMP UPDATE
  7           ID   LEVEL3.DAT
  8           ID   J2 UPDATED THE HYDROLOGY MODEL AND REDUCED THE LIMITS TO AREAS PERTINENT
  9           ID   TO THIS PROJECT.
 10           ID
 11           ID   PREPARED BY: KBD
 12           ID   DATE: SEPTEMBER 2004
 13           ID
 14           ID   MODEL ID: PEOR60.DAT
 15           ID
 16           ID   ==========================================================================
 17           ID   ==========================================================================
 18           ID
 19           ID   Project ID: GP - Major Basin: 01 - Return Period: 100 Years 6-HR
 20           ID
 21           ID   ******************************************************************************
 22           ID   **                                                                          **
 23           ID   **                    Glendale/Peoria ADMP Update                           **
 24           ID   **                                                                          **
 25           ID   ******************************************************************************
 26           ID   ******************************************************************************
 27           ID   PROJECT:                 Glendale Peoria ADMP Update
 28           ID   CLIENT:                  Flood Control District of Maricopa County
 29           ID   PREPARED BY:             Entellus, Inc.
 30           ID   PROJECT No:              FCD 99-44              Entellus 310.017
 31           ID   FILE NAME: LEVEL3.DAT              CREATED DATE: JUNE 6, 2001
 32           ID   MODIFIED:
 33           ID   STORM:                   100-year 6-hour Storm
 34           ID   DEVELOPMENT CONDITIONS: LEVEL 3 HYDROLOGY
 35           ID
 36           ID   ========================================================================
 37           ID   ========================================================================
 38           ID
 39           ID   DDM MCUHP1
              *
              * ****************************************************************************
 40           IT       2                    1000
 41           IO       5
              *
              *DIAGRAM
 42           IN      15
              *
              * ****************************************************************************
              * ****************************************************************************
              * ***********************       83RD AVENUE    ***************************
              * ****************************************************************************
              *
```

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

  43          KK   N11P5   BASIN
  44          KM   THE ADMP UPDATE SHOWED N11P5 BASIN ENDING AT HATFIELD ROAD.
  45          KM   J2 MODIFIED THE DRAINAGE AREA DELINEATION AND EXTENDED TO
  46          KM   CALLE LEJOS ROAD
  47          BA    .088
  48          PB   3.200
  49          PC    .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
  50          PC    .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
  51          PC    .962    .972    .983    .991   1.000
  52          LG    .350    .350   2.650   1.200    .000
  53          UC    .371    .399
  54          UA       0       3       5       8      12      20      43      75      90      96
  55          UA     100
              *

  56          KK    CL1
  57          KM   WEST LINEAR BASIN ALONG CALLE LEJOS ROAD
  58          KO       3                                22
  59          RS       1    STOR       0
  60          SV       0     .20     .69    1.32    2.08    2.94
  61          SE    1340    1341    1342    1343    1344    1345
  62          SQ       0       2       2       3       3       3
              *

  63          KK    CL2
  64          KM   MIDDLE LINEAR BASIN ALONG CALLE LEJOS ROAD
  65          KO       3                                22
  66          RS       1    STOR       0
  67          SV       0     .22     .52     .89
  68          SE    1342    1343    1344    1345
  69          SQ       0       2       2       3
              *

  70          KK   N11P6   BASIN
  71          BA    .203
  72          LG   0.35    0.35    2.65    1.20       0
  73          UC  0.213   0.128
  74          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  75          UA     100
              *

  76          KK  R11P6S
  77          KM   ROUTE THRU N11P2 TO JUST NORTH OF THE PROPOSED CALLE LEJOS BASIN
  78          KM   ROUTE R11P6S IS 1620 FT WITH A SLOPE OF 0.0222
  79          KM   CROSS SECTION IS A MEDIUM WASH
  80          RS       3    FLOW       0
  81          RC     .05     .05     .05    1620  0.0222
  82          RX       0     100     300     360     380     420     620     720
  83          RY      10       8       6       2       0       6       8      10
              *
```

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

  84          KK   N11P2   BASIN
  85          BA    .063
  86          LG    0.35    0.35    2.65    1.20       0
  87          UC   0.338   0.327
  88          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  89          UA     100
              *

  90          KK  CN11P2
  91          KM   COMBINE N11P6 AND BASIN N11P2
  92          HC       2
              *

  93          KK   USCL3
  94          KM   UPSTREAM OF LINEAR BASIN CL3
  95          HC       2
              *

  96          KK     CL3
  97          KM   EAST LINEAR BASIN ALONG CALLE LEJOS ROAD
  98          KO       3                                22
  99          RS       1    STOR       0
 100          SV       0     .01     .05     .20     .44     .76
 101          SE    1340    1341    1342    1343    1344    1345
 102          SQ       0       5      19      36      44      46
              *

 103          KK  CLPIPE
 104          KM   LINEAR BASIN OUTLET PIPE
 105          RK    2000    .004    .013            CIRC       3
              *
 106          ZZ
```


1C/14PRINT

```
                SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   43       N11P5
                V
                V
   56         CL1
                V
                V
   63         CL2
                .
                .
   70           .       N11P6
                .           V
                .           V
   76           .      R11P6S
                .           .
                .           .
   84           .           .       N11P2
                .           .           .
                .           .           .
   90           .      CN11P2............
                .           .
                .           .
   93       USCL3............
                V
                V
   96         CL3
                V
                V
  103      CLPIPE

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


1C/14PRINT

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   27SEP04  TIME  12:58:20   *
*                                       *
*****************************************
```

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

```
                    83RD AVENUE AND PINNACLE PEAK DRAINAGE IMPROVEMENTS
                    THIS FILE MODELS THE HYDRYOLOGY FOR THE PROPOSED
                    CALLE LEJOS DETETNION BASIN - PEORIA 60 SOUTHERN BASIN ALTERNATIVE

                    J2 MODIFIED THE ENTELLUS GLENDALE/PEORIA ADMP UPDATE
                    LEVEL3.DAT
                    J2 UPDATED THE HYDROLOGY MODEL AND REDUCED THE LIMITS TO AREAS PERTINENT
                    TO THIS PROJECT.

                    PREPARED BY: KBD
                    DATE: SEPTEMBER 2004

                    MODEL ID: PEOR60.DAT

                    ==========================================================================
                    ==========================================================================

                    Project ID: GP - Major Basin: 01 - Return Period: 100 Years 6-HR

                    ******************************************************************************
                    **                                                                          **
                    **                    Glendale/Peoria ADMP Update                           **
                    **                                                                          **
                    ******************************************************************************
                    ******************************************************************************
                    PROJECT:                Glendale Peoria ADMP Update
                    CLIENT:                 Flood Control District of Maricopa County
                    PREPARED BY:            Entellus, Inc.
                    PROJECT No:             FCD 99-44              Entellus 310.017
                    FILE NAME: LEVEL3.DAT             CREATED DATE: JUNE 6, 2001
                    MODIFIED:
                    STORM:                  100-year 6-hour Storm
                    DEVELOPMENT CONDITIONS: LEVEL 3 HYDROLOGY

                    ==================================================================
                    ==================================================================

                    DDM MCUHP1

 41 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  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       1000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2   0  ENDING DATE
                     NDTIME       0918  ENDING TIME
```

```
                    ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL     .03 HOURS
                     TOTAL TIME BASE   33.30 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


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


            ***************
            *             *
  56 KK     *       CL1   *
            *             *
            ***************

  58 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2       1000  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .033  TIME INTERVAL IN HOURS


              HYDROGRAPH ROUTING DATA

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

  60 SV            STORAGE         .0        .2        .7       1.3       2.1       2.9

  61 SE          ELEVATION     1340.00   1341.00   1342.00   1343.00   1344.00   1345.00

  62 SQ          DISCHARGE         0.        2.        2.        3.        3.        3.

                                                                 ***

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

                        HYDROGRAPH AT STATION      CL1

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                   6-HR       24-HR       72-HR     33.30-HR
     3.        4.27        (CFS)        3.          2.          2.          2.
                         (INCHES)     .317        .903        .903        .903
                          (AC-FT)       1.          4.          4.          4.

 PEAK STORAGE  TIME                          MAXIMUM AVERAGE STORAGE
   (AC-FT)     (HR)                   6-HR       24-HR       72-HR     33.30-HR
     4.        5.57                     3.          1.          1.          1.
```


K/14PRINT

```
 PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
   (FEET)      (HR)                  6-HR       24-HR       72-HR     33.30-HR
  1345.97      5.60                1345.41     1342.82     1342.03      1342.03

                        CUMULATIVE AREA =     .09 SQ MI

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

            ***************
            *             *
 63 KK      *       CL2   *
            *             *
            ***************

 65 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

              HYDROGRAPH ROUTING DATA

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

 67 SV            STORAGE          .0        .2        .5        .9

 68 SE          ELEVATION     1342.00   1343.00   1344.00   1345.00

 69 SQ          DISCHARGE          0.        2.        2.        3.

                                                                 ***

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

                       HYDROGRAPH AT STATION      CL2

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                  6-HR       24-HR       72-HR     33.30-HR
      3.      16.30        (CFS)       3.          2.          2.           2.
                        (INCHES)     .286        .896        .903         .903
                         (AC-FT)       1.          4.          4.           4.

PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
  (AC-FT)      (HR)                  6-HR       24-HR       72-HR     33.30-HR
      1.      16.20                    1.          1.          0.           0.

 PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
   (FEET)      (HR)                  6-HR       24-HR       72-HR     33.30-HR
  1344.79      16.40               1344.71     1343.92     1343.39      1343.39

                       CUMULATIVE AREA =     .09 SQ MI
```

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

          ***************
          *             *
 96 KK    *      CL3    *
          *             *
          ***************

 98 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2       1000  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       .033  TIME INTERVAL IN HOURS


             HYDROGRAPH ROUTING DATA

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

100 SV            STORAGE         .0        .0        .1        .2        .4        .8

101 SE          ELEVATION    1340.00   1341.00   1342.00   1343.00   1344.00   1345.00

102 SQ          DISCHARGE         0.        5.       19.       36.       44.       46.

                                                          ***

WARNING --- ROUTED OUTFLOW (     49.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     53.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     59.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

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WARNING --- ROUTED OUTFLOW (     76.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     81.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     84.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     87.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

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WARNING --- ROUTED OUTFLOW (     92.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (     59.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE
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K/14PRINT

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WARNING --- ROUTED OUTFLOW (     58.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     57.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

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WARNING --- ROUTED OUTFLOW (     51.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     50.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     49.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

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WARNING --- ROUTED OUTFLOW (     48.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     47.) IS GREATER THAN MAXIMUM OUTFLOW (     46.) IN STORAGE-OUTFLOW TABLE

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

                    HYDROGRAPH AT STATION      CL3

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                  6-HR       24-HR       72-HR     33.30-HR
     92.       4.50        (CFS)     28.          9.          6.          6.
                         (INCHES)   .724        .901        .904        .904
                          (AC-FT)    14.         17.         17.         17.

 PEAK STORAGE  TIME                          MAXIMUM AVERAGE STORAGE
   (AC-FT)     (HR)                  6-HR       24-HR       72-HR     33.30-HR
      8.       4.50                   2.          0.          0.          0.

 PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
   (FEET)      (HR)                  6-HR       24-HR       72-HR     33.30-HR
  1367.87      4.50               1346.36     1341.93     1341.39     1341.39

                        CUMULATIVE AREA =     .35 SQ MI
```

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	N11P5	83.	4.23	9.	2.	2.	.09		
ROUTED TO	CL1	3.	4.27	3.	2.	2.	.09	1345.97	5.60
ROUTED TO	CL2	3.	16.30	3.	2.	2.	.09	1344.79	16.40
HYDROGRAPH AT	N11P6	370.	4.10	20.	5.	4.	.20		
ROUTED TO	R11P6S	354.	4.17	20.	5.	4.	.20	2.77	4.17
HYDROGRAPH AT	N11P2	69.	4.20	6.	2.	1.	.06		
2 COMBINED AT	CN11P2	418.	4.17	26.	6.	5.	.27		
2 COMBINED AT	USCL3	418.	4.17	28.	9.	6.	.35		
ROUTED TO	CL3	92.	4.50	28.	9.	6.	.35	1367.87	4.50
ROUTED TO	CLPIPE	92.	4.53	28.	9.	6.	.35		

K/T 4PRINT

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

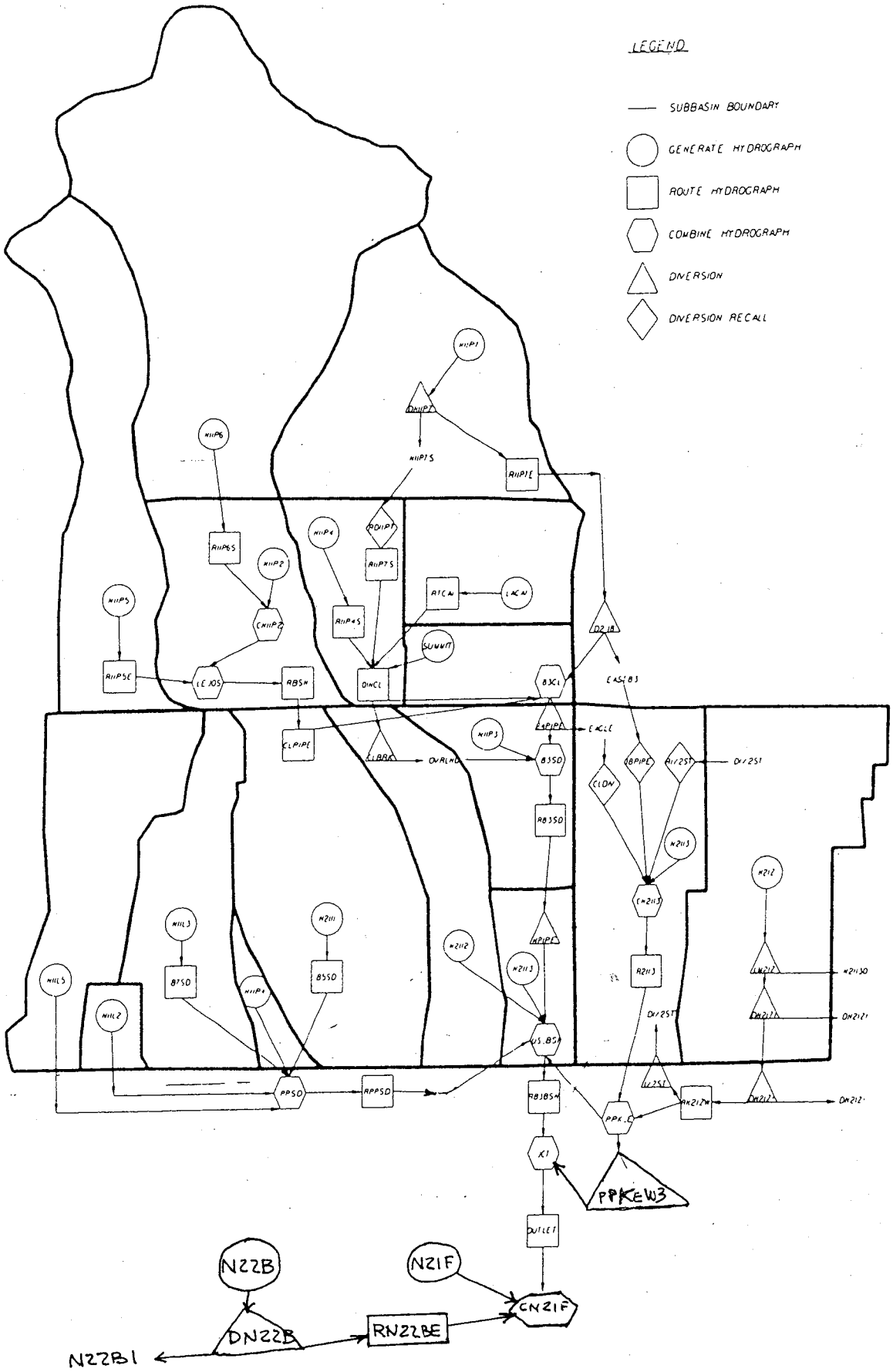
ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
CLPIPE	MANE	1.05	91.72	271.60	.90	2.00	91.71	272.00	.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1706E+02 EXCESS= .0000E+00 OUTFLOW= .1706E+02 BASIN STORAGE= .1482E-03 PERCENT ERROR= .0

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

K/14PRINT

Pinnacle Peak Road Detention Basin


LEGEND
SUBBASIN BOUNDARY
GENERATE HYDROGRAPH
ROUTE HYDROGRAPH
COMBINE HYDROGRAPH
DIVERSION
DIVERSION RECALL
N11P1
DN11P1
N11P1S
R11P1E
N11P6
R11P6S
N11P2
CN11P2
N11P4
RD11P1
R11P1S
R11P4S
N11P5
R11P5E
LCJOS
RBSN
DIVCL
ATCN
LACN
SUMWM
DZ1B
BXCL
EAS1B3
CLPIPE
EXPIPE
EACLC
N11P3
BSSD
OVRLND
CLOW
BPIPE
DV12ST
RBSSD
N2113
CN2113
N2112
N11L3
BTSD
N2111
BSSD
N11P4
N11L5
N11L2
WPIPE
N2113
R2113
DN2112
N2113D
DN2121
US.BSN
PPSD
RPPSD
RBJBSN
PPK.C
RN2112
DN2122
K1
PPKEW3
OUTLET
N22B
N21F
CN21F
DN22B
RN22BE
N22B1

```
1****************************************
*************************************
 *                                      *                                        *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                        *    U.S. ARMY CORPS OF
ENGINEERS     *
 *               JUN   1998              *                                        *    HYDROLOGIC ENGINEERING
CENTER    *
 *            VERSION 4.1                *                                        *          609 SECOND
STREET          *
 *                                      *                                        *       DAVIS, CALIFORNIA
95616       *
 *  RUN DATE   16NOV04  TIME  08:28:29   *                                        *           (916) 756-1104
*
 *                                      *                                        *
*
 ****************************************
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```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.

THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION

NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


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

   1          ID
   2          ID   83REV4.DAT
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```
3          ID   REVISED 11/16/04 BY JPF TO REMOVE DIVERSIONS NPIPE, WPIPE AND PPKES
4          ID   REVISED 11/15/04 BY JPF FOR PINNACLE PEAK BASIN MODIFICATIONS
5          ID   REVISED 11/4/04 BY JPF FOR CHANGES IN FAX TO JEFF H 11/2/04
6          ID   83RD AVENUE AND PINNACLE PEAK DRAINAGE IMPROVEMENTS
7          ID   THIS FILE MODELS THE HYDRYOLOGY FOR THE PROPOSED
8          ID   DRAINAGE IMPROVEMENTS FROM THE SUNRISE MOUNTAINS SOUTH TO
9          ID   TO PINNACLE PEAK ROAD AND FROM 89TH AVE WEST TO 81ST AVE
10         ID
11         ID   J2 MODIFIED THE ENTELLUS GLENDALE/PEORIA ADMP UPDATE
12         ID   LEVEL3.DAT
13         ID   J2 UPDATED THE HYDROLOGY MODEL AND REDUCED THE LIMITS TO AREAS PERTINENT
14         ID   TO THIS PROJECT.
15         ID
16         ID   PREPARED BY: KBD
17         ID   DATE: SEPTEMBER 2004
18         ID   REVISED OCTOBER 2004
19         ID   UPDATED FOR FCD PREDESIGN COMMENTS FROM STEVE TUCKER
20         ID
21         ID   STEVE TUCKER COMMENTS:
22         ID
23         ID   1) In the schematic, all triangles should have 2 arrows going outward.
24         ID      All other symbols should have 1 arrow pointing outward.
25         ID      Specifically, QINCL - CLBRK, RN21ZW - 1/2ST,
26         ID      and PPK_E - 83_S are drawn incorrectly.
27         ID
28         ID      J2 RESPONSE: AGREE WILL UPDATE THE HEC-1 DIAGRAM
29         ID
30         ID   2) The diamond RI1/2ST should be moved to the southside of R21I3 for clarity.
31         ID
32         ID      J2 RESPONSE: AGREE WILL UPDATE THE HEC-1 DIAGRAM
33         ID
34         ID   3) The model should include the total areas that contribute to the channel
35         ID      at the downstream exit of the storm drain (at Deer Valley Estates).
36         ID      I think this should involve no more than cut and paste of the original
37         ID      Model.
38         ID
39         ID      J2 RESPONSE: THE ADDITIONAL AREAS WERE ADDED. THE SUBBASINS ADDED FROM
40         ID                   THE LEVEL3.DAT FILE WERE N22B AND N21F.
41         ID
42         ID   4) The alternative of taking flows from east of 83rd Avenue and
43         ID      Pinnacle Peak should be addressed, advantages and disadvantages.
44         ID
45         ID      J2 RESPONSE: THE FLOWS ARRIVEING ALONG PINNACLE PEAK FORM THE EAST AT
46         ID                   83RD AVENUE AND PINNACLE PEAK WERE ROUTED INTO PINNACLE
47         ID                   PEAK BASIN.
48         ID
49         ID   5) The diversions east and south for N212 do not appear to conform to what
50         ID      I saw in the field. It says that at 300 cfs, the entire flow would turn to
51         ID      the west, and at 400 cfs, almost all the flow would travel west. It
52         ID      appeared to me that there would be significant flows east and south.
53         ID
```

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 54          ID      J2 RESPONSE: THROUGH DISCUSIONS WITH THE FCD AND BY CONDUCTING A SITE
 55          ID                   VISIT 10-26-2004, THE DESIGN TEAM DETERMINED THAT THE

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

 56          ID                   FLOW SPLIT OCCURRING AT 81ST AVE AND PINNACLE PEAK HAD
 57          ID                   A RATIO OF 50% TRAVELING SOUTH AND 50% WEST. SEE "DN21Z*"
 58          ID
 59          ID
 60          ID
 61          ID   MODEL ID: 83REV.DAT
 62          ID
 63          ID   ==============================================================================
 64          ID   ==============================================================================
 65          ID
 66          ID   Project ID: GP - Major Basin: 01 - Return Period: 100 Years 6-HR
 67          ID
 68          ID   ******************************************************************************
 69          ID   **                                                                          **
 70          ID   **                     Glendale/Peoria ADMP Update                          **
 71          ID   **                                                                          **
 72          ID   ******************************************************************************
 73          ID   ******************************************************************************
 74          ID   PROJECT:                 Glendale Peoria ADMP Update
 75          ID   CLIENT:                  Flood Control District of Maricopa County
 76          ID   PREPARED BY:             Entellus, Inc.
 77          ID   PROJECT No:              FCD 99-44              Entellus 310.017
 78          ID   FILE NAME: LEVEL3.DAT              CREATED DATE: JUNE 6, 2001
 79          ID   MODIFIED:
 80          ID   STORM:                   100-year 6-hour Storm
 81          ID   DEVELOPMENT CONDITIONS: LEVEL 3 HYDROLOGY
 82          ID
 83          ID   ==============================================================================
 84          ID   ==============================================================================
 85          ID
 86          ID   DDM MCUHP1
             *
             * ******************************************************************************
 87          IT       2                     1000
 88          IO       5
             *
             *DIAGRAM
 89          IN      15
             *
             * ******************************************************************************
             * ******************************************************************************
             * **********************      83RD AVENUE    ***********************************
             * ******************************************************************************
             *
```

```
 90          KK   N11P5   BASIN
 91          KM   THE ADMP UPDATE SHOWED N11P5 BASIN ENDING AT HATFIELD ROAD.
 92          KM   J2 MODIFIED THE DRAINAGE AREA DELINEATION AND EXTENDED TO
 93          KM   CALLE LEJOS ROAD
 94          BA    .088
 95          KM   ORIG. PRECIP JD AND CARDS AND JC DISTRIBUTIONS WERE REPLACED BY SINGLE
 96          KM   PB AND SINGLE PC DISTRIBUTION
 97          KM   RAINFALL DEPTH OF 3.20 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
 98          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
 99          PB   3.200
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

100          KM   THE FOLLOWING PC RECORD USED A 6-HOUR STORM WITH A PATTERN No. OF 1.00
101          PC    .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
102          PC    .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
103          PC    .962    .972    .983    .991   1.000
104          LG    .350    .350   2.650   1.200    .000
105          UC    .371    .399
106          UA       0       3       5       8      12      20      43      75      90      96
107          UA     100
             *

108          KK  R11P5E
109          KM   ROUTE N11P5 FLOWS EAST IN CALLE LEJOS PROPOSED CHANNEL
110          KM   THEN THRU BOX AT 88TH AVE
111          RK    1430    .002    .018            TRAP      10       4
             *

112          KK   N11P6   BASIN
113          BA    .203
114          LG    0.35    0.35    2.65    1.20       0
115          UC   0.213   0.128
116          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
117          UA     100
             *

118          KK  R11P6S
119          KM   ROUTE THRU N11P2 TO JUST NORTH OF THE PROPOSED CALLE LEJOS BASIN
120          KM   ROUTE R11P6S IS 1620 FT WITH A SLOPE OF 0.0222
121          KM   CROSS SECTION IS A MEDIUM WASH
122          RS       3    FLOW       0
123          RC     .05     .05     .05    1620  0.0222
124          RX       0     100     300     360     380     420     620     720
125          RY      10       8       6       2       0       6       8      10
             *

126          KK   N11P2   BASIN
127          BA    .063
128          LG    0.35    0.35    2.65    1.20       0
```

```
129          UC   0.338   0.327
130          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
131          UA     100
             *

132          KK  CN11P2
133          KM   COMBINE N11P6 AND BASIN N11P2
134          KM   BASICALLY THESE BASIN FLOWS OUTFALL TO THE NORTH SIDE OF THE PROPOSED CALLE
135          KM   LEJOS BASIN
136          HC       2
             *

137          KK   LEJOS
138          KM   COMBINE INFLOWS FROM N11P5 AND COMBINED FLOWS FROM N11P6 AND N11P2
139          KO       3                                22
140          HC       2
             *
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

141          KK    RBSN
142          KM   CALLE LEJOS DETENTION BASIN ROUTING
143          KM   THE ADMP ALLOWS FOR 45 CFS METERED OUT
144          KM   IN OUTFLOW PIPE
145          KO       3                                22
146          RS       1    STOR       0
147          SV       0    1.58    3.36    5.33     7.5    9.87   12.45   15.26   18.27   18.27
148          SE    1340    1341    1342    1343    1344    1345    1346    1347    1348    1350
149          SQ       0       5      19      36      44      46      48      50      52      56
             *

150          KK  CLPIPE
151          KM   CALLE LEJOS DETETNION BASIN OUTLET PIPE
152          KM   DRAIN BASIN VIA PROPOSED CONC. OUTLET PIPE
153          KM   ROUTE RN21I IS APPROX. 2055 FT WITH A SLOPE OF 0.0025 '/FT
154          KM   USED MORE CONSERVATIVE SIZE TO ROUTE
155          KM   PIPE OUTFALL IS PROPOSED 83RD RCBC
156          RK    2000    .004    .013            CIRC       3
             *

157          KK   N11P7   BASIN
158          KM   SUBBASIN NORTH OF LA CAILLE DEV.
159          BA    .103
160          LG    0.35    0.35    2.83    1.06       9
161          UC   0.162 | 0.091
162          UA       0 |   3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
163          UA     100
             *
```

```
164          KK  DN11P7
165          KM   DIVERSION DN11P7 SPLITS FLOWS EAST ALONG HATFIELD THEN SOUTH ALONG
166          KM   832RD AVE TO 83RD AND CALLE LEJOS INTERSECTION
167          DT  N11P7S
168          DI       0      10      50      80     125     200     300     400
169          DQ       0       8      40      64     100     160     240     320
             *

170          KK  R11P7E
171          KM   ROUTE R11P7E IS 2356 FT WITH A SLOPE OF 0.0144
172          KM   ROUTE EAST TO NORTHWEST CORNER OF 83RD AVE AND CALLE LEJOS RD - VIA
173          KM   HATFIELD ROAD AND RIPRAP SWALE ON WEST SIDE OF 83RD AVE
174          RS       4    FLOW       0
175          RC    0.05    0.05    0.05    2356  0.0144
176          RX       0     200     250     260     270     280     330     530
177          RY       3       2       1       0       0       1       2       8
             *

178          KK   D2-18
179          KM   DIVERT FLOWS VIA 2-18" PIPE AT SE CORNER OF LA CAILLE DEV.
180          KM   SUMMIT AT SUNRISE MOUTAIN REPORT INDICATED 34 CFS BEING
181          KM   PASSED DURING THE 100-YEAR STORM. J2 ESTIMATED 20 CFS.
182          DT  EAST83
183          DI       0       6      12      18    1000    2000
184          DQ       0       6      12      18      20      20
             *
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

185          KK  RD11P7
186          KM   DIVERSION RECOVER N11P7S
187          KM   RECOVER FLOWS FROM DN11P7 (SOUTHERN DIVERT)
188          DR  N11P7S
             *

189          KK  R11P7S
190          KM   ROUTE R11P7S
191          KM   ROUTE R11P7S IS 2707 FT WITH A SLOPE OF 0.0111
192          KM   ROUTE IS LENGTH IS TO
193          KM   CROSS SECTION IS SHALLOW CONCENTRATED FLOW
194          RS       4   FLOW       0
195          RC    0.05    0.05    0.05    1465   0.016       8
196          RX       0     200     250     260     270     280     330     530
197          RY       3       2       1       0       0       1       2       8
             *

198          KK   LACAI
199          KM   SUB-BASIN CAILLE
200          KM   LA CAILLE DEVELOPMENT
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201          KM   OFFSITE CONVEYANCE SYSTEM IS A PASS THRU SYSTEM
202          KM   REFER TO "DRAINAGE REPORT FOR LA CAILLE" DEC. 22, 1994
203          KM   BY CMX - MICHAEL M. LLOYD, PE
204          KM   IMPERVIOUS AREA BASED ON 1 ACRE LOTS OF SIMILAR AND TYPICAL SUBDIVISION TYPE
205          KM   3,000 SQUARE FOOT HOUSE, DRIVEWAY AND 1/2 STREETS USED AS IMPERVIOUS
206          KM   AREA OUT OF TOTAL 43,560 SQUARE FT
207          KM   ADMP UPDATE GREEN-AMPT PARAMETERS MATCHED
208          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
209          KM     L =  .36  Kb = .060  Adj. Slope =  177.0
210          BA    .044
211          LG    .320    .350   2.650   1.200   3.000      12
212          UC    .192    .155
213          UA       0       5      16      30      65      77      84      90      94      97
214          UA     100
             *

215          KK   RTCAI
216          KM   ROUTE LA CAILLE FLOWS SOUTH THROUGH SUMMIT AT SUNRISE
217          KM   CALLE LEJOS ROAD
218          RS       1    FLOW       0
219          RC    .035   0.020   0.016     572  0.009   100.17
220          RX     0.0     8.8    17.5    32.4    32.9      33      49      65
221          RY     100   97.08   98.54  100.03  100.03   99.53   99.85  100.17
             *

222          KK  SUMMIT
223          KM   SUMMIT AT SUNRISE MOUNTAIN DEVELOPMENT
224          KM   REFER TO "PRELIMINARY DRAINAGE REPORT FOR SUMMIT AT SUNRISE MOUNTAIN"
225          KM   JAN 25, 1999, REV. OCTOBER 30, 1999
226          KM   SCOTT M. LARSON, P.E. & ROY B. MCDANIEL
227          KM   IMPERVIOUS AREA BASED ON 1 ACRE LOTS OF SIMILAR AND TYPICAL SUBDIVISION TYPE
228          KM   3,000 SQUARE FOOT HOUSE, DRIVEWAY AND 1/2 STREETS USED AS IMPERVIOUS
229          KM   AREA OUT OF TOTAL 43,560 SQUARE FT
230          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

231          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
232          KM     L =  .35  Kb = .063  Adj. Slope =   23.0
233          BA    .027
234          LG    .320    .350   2.650   1.200   3.000      12
235          UC    .458    .527
236          UA       0       5      16      30      65      77      84      90      94      97
237          UA     100
             *

238          KK   N11P4   BASIN
239          KM   SUBDIVIDE BASIN N11P4 INTO 3 SUBBASINS. EAST BASIN - CALL N11P4,
240          KM   LACAI- THE LA CAILLE DEVELOPMENT
241          KM   SUMMIT - SUMMIT AT SUNRISE MOUTAIN DEVELOPMENT
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242          KM   ORIGINAL BASIN SIZE WAS 0.124
243          KM   ADMP UPDATE GREEN-AMPT PARAMETERS MATCHED
244          KM     L =  .33  Kb = .061  Adj. Slope =  112.0
245          BA    .039
246          LG    .320    .350   2.650   1.200   3.000
247          UC    .213    .174
248          UA       0       3       5       8      12      20      43      75      90      96
249          UA     100
             *

250          KK  R11P4S
251          KM   ROUTE R11P4 IS 1570 WITH A SLOPE OF 0.002 FT/FT
252          RS       5    FLOW       0
253          RC    .016   0.020   0.035    1570   0.002  100.33
254          RX     0.0      24      26    26.1      29      33      38      40
255          RY     100     100     100  100.33  100.33   99.13  100.33  100.33
             *

256          KK   QINCL
257          KM   Q IN CALLE LEJOS ROAD
258          HC       4
             *

259          KK  CLBRK
260          KM   CALLE LEJOS BREAKOUT FLOWS
261          KM   FLOWS IN CALLE LEJOS ROAD WHICH BREAK OUT AS OVERLAND SHEET FLOW TO THE
262          KM   SOUTHEAST TOWARDS PROPOSED 83RD AVE RCBC
263          DT  OVRLND
264          DI       0      10      35     200     300     400     500    1000
265          DQ       0       0      35     165     265     365     465     965
             *

266          KK    83CL
267          KM   COMBINE R11P4, RCAI, SUMMIT AND R11PE
268          KM   LOCATION IS NW CORNER OF 83RD AVE AND CALLE LEJOS
269          KM   FLOW IS FROM THE NORTH ONLY
270          KM   CONC POINT IS LOCATED JUST BEFORE THE ENTRANCE TO THE 3-24 INCH CROSS PIPES
271          KM   USED TO BE CALLED CNP11P4 IN ADMP UPDATE MODEL
272          HC       3
             *
```



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

273          KK  24PIPE
274          KM   DIVERT FLOWS THAT PASS THRU EXISTING 3-24" CMPS (PASSED TO EAGLE CANYON
275          KM   RETENTION BASIN)
276          KM   CULVERT CAPACITY FOR 3-24 INCH PIPES WAS CALCUALTED TO BE ABOUT 60 CFS.
277          KM   OUTFALL IS AT THE EAGLE CANYON DEVLOPMENT DETENTION BASIN ON THE SE CORNER
278          KM   OF 83RD AND CALLE LEJOS
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279          KM   FLOWS UP TO 60 CFS DIVERTED TO EAGLE CANYON ESTATES - OVERFLOWS TO SOUTH
280          KM
281          DT   EAGLE
282          DI       0      30      60     100    1000    2000
283          DQ       0      30      60      60      60      60
             *

284          KK   N11P3   BASIN
285          BA    .041
286          LG    0.27    0.35    2.65    1.17       2
287          UC   0.308   0.274
288          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
289          UA     100
             *

290          KK  RE_CAI
291          KM   RETRIEVE CALLE LEJOS ROADWAY BREAKOUT FLOW
292          DR  OVRLND
             *

293          KK    83SD
294          KM   FLOWS AT BEGINNING OF PROPOSED 83RD AVE RCBC
295          KM   INCLUDES FLOWS FROM N11P3, FLOWS FROM CALLE LEJOS BASIN PIPE
296          KM   OVERLAND FLOWS BREAKING OUT FROM CALLE LEJOS ROAD
297          KM   DETENTION BASIN AND FLOWS THAT BYPASSS THE 24" PIPES TO EAGLE CANYON BASIN
298          HC       3
             *

299          KK   R83SD
300          KM   ROUTE THRU PROPOSED 2-8x4 RCBC
301          RK    1975    .008    .013            DEEP      20     0.01
             *

302          KK   N11L5   BASIN
303          KM   SUBBASIN CONTRIBUTING TO 89TH AND PINNACLE PEAK ROAD
304          KM   FLOWS TO BE COLLECTED BY INLETS ALONG 89TH AVE.
305          KM   AND ENTER PROPOSED STORMDRAIN (RCBC) ALONG PINNACLE PEAK DIRECTLY.
306          BA    .074
307          LG    0.32    0.32    2.65    1.20       3
308          UC   0.517   0.568
309          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
310          UA     100
             *
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```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

311          KK   N11L3   BASIN
312          KM   SUBBASIN CONTRIBUTES TO PROPOSED STORMDRAIN AT 87TH AVE
313          BA    .063
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314          LG    0.30    0.29    2.65    1.38      14
315          UC   0.342   0.313
316          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
317          UA     100
             *

318          KK    87SD
319          KM   87TH AVE STORMDRAIN
320          KM   COLLECT FLOWS IN PROPOSED STORMDRAIN AND ROUTE
321          RK     855    .002    .013            CIRC     3.5    0.01
             *

322          KK   N11L2   BASIN
323          KM   ASSUMED THAT FLOWS GENERATED ARE COLLECTED BY INLETS
324          KM   AND ENTER PROPOSED STORMDRAIN ALONG PINNACLE PEAK DIRECTLY.
325          BA    .010
326          LG    .300    .350   2.650   1.400  15.000
327          UC    .425    .479
328          UA       0       5      16      30      65      77      84      90      94      97
329          UA     100
             *

330          KK   N11L4   BASIN
331          KM   FLOWS COLLECTED BY INLETS AND
332          KM   ENTER PROPOSED STORMDRAIN ALONG PINNACLE PEAK DIRECTLY.
333          BA    .010
334          LG    .300    .350   2.650   1.390  14.000
335          UC    .396    .544
336          UA       0       3       5       8      12      20      43      75      90      96
337          UA     100
             *

338          KK   N21I1   BASIN
339          KM   CONTRIBUTES TO PROPOSED STORMDRAIN AT 85TH AVE.
340          BA    .111
341          LG    0.32    0.32    2.65    1.20       3
342          UC   0.412   0.308
343          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
344          UA     100
             *

345          KK    85SD
346          KM   COLLECT FLOWS IN SECOND PROPOSED STORMDRAIN AND ROUTE
347          KM   85TH AVE STORMDRAIN
348          RK     855    .002    .013            CIRC     3.5    0.01
             *
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

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KK    PPSD
KM   COMBINE TO ROUTE THRU PROPOSED 1-6X4 RCBC ALONG PINNACLE PEAK ROAD
KM   TRUNKLINE ALONG PINNACLE PEAK INCREASES FROM 42" TO 1-6X4 RCBC
HC       5
*

KK   RPPSD
KM   ROUTE IN PROPOSED 1-6X4 RCBC AND ROUTE TO PINNACLE PEAK BASIN
RK    1870    .001    .013            DEEP       6     0.01
*

KK   N21I2   BASIN
KM   ASSUME THE FLOWS FROM N21I2 ENTER THE PINNACLE PEAK DETENTION BASIN DIRECTLY
BA    .057
LG    0.32    0.29    4.65    0.32       3
UC   0.392   0.436
UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
UA     100
*

KK   N21I3
KM   ADMP UPDATE BASIN N21I3 RE-DELINEATED
KM   ORIGINAL BASIN SIZE WAS 0.115 SQ MILES
KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
KM     L =  .17  Kb = .063  Adj. Slope =   38.0
BA    .027
LG    .330    .350   2.650   1.300   8.000
UC    .221    .131
UA       0       5      16      30      65      77      84      90      94      97
UA     100
*
* ==============================================================================
* ADMP FLOWS FROM EAST FACE OF SUNRISE MOUNTAINS AND DEVLOPMENTS EAST OF
* 83RD AVE
* RUNOFF GENERATED ON EAST FACE OF SUNRISE MOUNTAINS FLOWS SOUTHEAST TO
* 83RD AVE.  FLOWS ARE ROUTED EAST UNDER 83RD VIA 48" CMPS.
* FLOWS IS ROUTED AROUND CALLE LEJOS ESTATES TO 81ST AVE WHERE FLOWS ROUTE
* SOUTH AND EAST.
* ==============================================================================
*
* ADMP UPDATE SUBBASIN N21J NOT INCLUDED AS PART OF THE CONTRIBUTING AREA
* TO THE PROJECT SITE
* PORTION OF SUBBASIN ABOVE HATFIELD ROAD IS CUT OFF BY A CONCRETE
* TRAPEZOIDAL CHANNEL THAT RUNS WEST TO EAST FROM 83RD AVENUE TO THE OUTFALL
* AT NEW RIVER (APPROXIMATELY 79TH AVE)
* THE CHANNEL WAS BUILT AS PART OF THE CALLE LEJOS ESTATES AND SILVER CREST AT
* TREASURE CANYON DEVLOPMENTS
* CALLE LEJOS ROAD FROM 83RD AVENUE TO END OF STREET (79TH AVE - NEW RIVER) ACTS
* AS A COLLECTOR OF FLOWS GNERATED BETWEEN HATFIELD ROADS AND CALLE LEJOS BETWEE
* 83RD AVENUE AND 79TH AVE.
```

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

 374            KK    N21Z   BASIN
 375            KM   APPEARS THAT FLOWS FROM N21J ARE DIVERTED BY WALL AROUND
 376            KM   CALLE LEJOS ESTATES TO WASH ON WEST
 377            KM   CALLE LEJOS PICKS UP REST OF FLOWS GENERATED NORTH AND DIVERTS EAST
 378            KM   THEREFORE N21J HAS BEEN ELIMINATED FROM THE PROJECT WATERSHED
 379            KM   THIS SUB-BASIN INCLUDES EAGLE DEV
 380            KM     L =  .52  Kb = .038  Adj. Slope =   33.0
 381            BA    .109
 382            LG    0.18    0.35    6.40    0.14       6
 383            UC   0.300   0.203
 384            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 385            UA     100
                *

 386            KK   LN21Z
 387            KM   EAST SIDE OF EAGLE STORAGE ACCOUNTED FOR
 388            KM   EAGLE WEST OF 81ST AVE AVAILABLE RETENTION = 3.42 ACRE-FT
 389            DT  N21I3O    3.42
 390            DI       0     100    1000   10000
 391            DQ       0     100    1000   10000
                *

 392            KK  DN21ZO
 393            KM   DIVERSION DN21Z
 394            KM   SPLIT EAST TO NEW RIVER ALONG PINNACLE PEAK
 395            KM   ORIGINAL ADMP COMMENT INDICATED FLOWS WENT WEST
 396            KM   THIS WAS VERIFIED AS A TYPOGRAPHICAL ERROR AND HAS BEEN CORRECTED HERE
 397            KM   KBD PER PAW 9-2004
 398            DT  DN21ZI
 399            DI       0       1     100     200     300     400     450     500
 400            DQ       0     .05      .1      .2      .3       5      27      35
                *

 401            KK  DN21Z*
 402            KM   FLOW SPLIT AT 81ST AVENUE AND PINNACLE PEAK ROAD
 403            KM   FLOW SPLIT ESTIMATED IN THE FIELD WITH FCD (ST) 10-26-2004
 404            KM   MAIN FLOWS WEST ALONG PINNACLE PEAK TO 83RD, SPLIT CONTINUES SOUTH
 405            DT  N21ZI*
 406            DI       0       1     300     500
 407            DQ       0      .5     150     250
                *

 408            KK  RN21ZW
 409            KM   ROUTE RN21ZW
 410            KM   ROUTE RN21ZW IS 871 FT WITH A SLOPE OF 0.0011
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411          KM   CROSS SECTION IS MEDIUM ROAD WITH FENCE ON WEST SIDE
412          KM   ALONG PINNACLE PEAK RD
413          KM   ROUTE FLOW FROM 81ST AVE (CN21Z) TO 83RD AVE, (CN21I)
414          RS       1    FLOW       0
415          RC    .035    .035    .035     871   .0011
416          RX       0       1      15      16      56      57      82     582
417          RY    9.25    1.25    0.25       0       0    0.25    1.25    4.25
             *
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

418          KK  1/2ST
419          KM   DIVERT 1/2 STREET FLOW (NORTH SIDE PINNACLE PEAK)
420          KM   TO CLEARVIEW BASIN
421          DT  D1/2ST
422          DI       0       1      12      50     100     500    1000
423          DQ       0       1      12      12      12      12      12
             *

424          KK  R1/2ST
425          KM   RECALL DIVERT 1/2 STREET INTERCEPT
426          DR  D1/2ST
             *

427          KK  18PIPE
428          KM   RECALL DIVERT FROM 2-18" PIPES PASSING FLOW FROM LA CAILLE
429          KM   WEST SIDE 83RD AVE SWALE TO EAST SIDE SWALE
430          DR  EAST83
             *

431          KK   CLDIV
432          KM   RECALL DIVERT FROM 3-24" PIPES PASSING FLOW FROM NW CORNER OF
433          KM   CALLE LEJOS ROAD AND 83RD AVE
434          DR   EAGLE
             *

435          KK   N21I3
436          KM   BASIN INCLUDES THE WEST HALF OF EAGLE AND CLEARVIEW DEV
437          BA    .115
438          LG    0.33    0.35    2.65     1.3       8
439          UC   0.433    .287
440          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
441          UA     100
             *

442          KK  CN21I3
443          KM   COMBINE N21I3, 3-24" PIPE AND 2-18" PIPE INFLOWS
444          HC       4
             *
```

```
445          KK  R21I3
446          KM   WEST SIDE OF EAGLE AND CLEARVIEW RETENTION ACCOUNTED FOR
447          KM   EAGLE WEST SIDE TRACTS ARE F AND L COMBINED IS 2.2 AND E = 9.8
448          KM   CLEARVIEW WEST OF 81ST AVE AVAILABLE RETETNION = 5.19
449          DT  N21I3O    17.2
450          DI       0     100    1000   10000
451          DQ       0     100    1000   10000
             *
             * ==============================================================================
             *
1                                          HEC-1 INPUT                                                    PAGE 12

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

452          KK   PPK_E
453          KM   COMBINE FLOWS TRAVELING ALONG PINNACLE PEAK FROM THE EAST
454          KM   INTERCEPT ENTIRETY VIA CULVERT AND CONVEY PART TO 48" STORM DRAIN
455          HC       2
             *

456          KK  PPKEW2
457          KM   DIVERSION PPKEW2 AT PINNACLE PEAK RD AND 83RD AVE
458          DT  PPKEW3
459          DI       0      10      20      30      40      50      70     100
460          DQ       0      10      20      30      40      50      70     100
             *

461          KK  US_BSN
462          KO       3                              22
463          KM   COMBINE INLFOWS JUST AS THEY ENTER PROPOSED 83RD
464          KM   SEE OUTPUT FOR VOLUME AND PEAK FLOW ENTERING BASIN
465          HC       5
             *

466          KK  R83BSN
467          KM   STORAGE ROUTING REGIONAL BASIN ON 83RD AVENUE AND PINNACLE PEAK
468          KO       3                              22
469          RS       1    STOR       0
470          SV       0    2.56    8.30   11.49   14.96   22.76   31.68   36.52
471          SE    1303    1304    1306    1307    1308    1310    1312    1313
472          SQ       0     9.8    19.8    23.4    26.4    31.6    26.0    38.0
             *

473          KK    RESD
474          KM   RETRIEVE FLOWS DIVERTED IN EAST PIPE
475          DR  PPKEW3
             *

476          KK     JCT
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```
477          KM   COMBINE DIVERTED PIPE FLOWS FROM THE NORTH, EAST AND WEST WITH BASIN ROUTE FL
478          HC       2
             *

479          KK  OUTLET
480          KM   ROUTE FLOWS IN PROPOSED PIPE
481          KM   ROUTE RN21I IS 3117 FT WITH A SLOPE OF 0.004
482          KM   ALONG 83RD AVE. ROADWAY TO JUST SOUTH OF WILLIAMS DRIVE
483          KO       3                                22
484          RK    3117  .004    .013             CIRC       4
             *
             * ***************************************************************************
             * FROM THE LEVEL.DAT HEC-1 MODEL
             * ***************************************************************************
             *
1                                        HEC-1 INPUT                                                PAGE 13

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

485          KK    N22B  BASIN
486          KM   SUB-BASIN N22B
487          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
488          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
489          KM     L =  .53  Kb = .052  Adj. Slope =   34.0
490          BA    .185
491          LG    0.30    0.17    7.00    0.12       5
492          UC   0.342   0.177
493          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
494          UA     100
             *
             * MAIN TO 83RD AVE & SPLIT SOUTH TO DEER VALLEY RD

495          KK   DN22B
496          DT   N22BI
497          DI       0       1      10     100     200     300     400
498          DQ       0      .9       9      90     180     270     360
             *
             * ROUTE RN22BE IS 1403 FT WITH A SLOPE OF 0.0007
             * CROSS SECTION IS A SMALL ROAD WITH A FENCE ON THE EAST SIDE
             * FLOW ALONG WILLIAMS RD.
             * ROUTE FLOW FROM 85TH AVE. (CN21F) TO 83RD AVE. (CN22B)
             *

499          KK  RN22BE
500          RS       1    FLOW       0
501          RC    0.05    0.04    0.05    1403   .0007
502          RX       0     500     525     526     556     557     567     568
503          RY    4.25    1.25    0.25       0       0    0.25    1.25    9.25
             *
             * BASIN N21F
```

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                    *

504                 KK    N21F   BASIN
505                 KM   SUB-BASIN N21F
506                 KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
507                 KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
508                 KM     L =  .34  Kb = .055  Adj. Slope =   15.0
509                 BA    .104
510                 LG    0.30    0.10   11.20    0.03      15
511                 UC   0.554   0.507
512                 UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
513                 UA     100
                    *

514                 KK   CN21F
515                 KM   COMBINE N22B, CN21I, N21F, RPPKES
516                 KM   INTERSECTION OF 83RD AVE. AND WILLIAMS RD.
517                 HC       3
                    *
518                 ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE       (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   90         N11P5
                  V
                  V
  108        R11P5E
                  .
                  .
  112             .       N11P6
                  .           V
                  .           V
  118             .      R11P6S
                  .           .
                  .           .
  126             .           .       N11P2
                  .           .           .
                  .           .           .
  132             .      CN11P2............
                  .           .
                  .           .
  137         LEJOS............
                  V
                  V
  141          RBSN
                  V
                  V
```

```
150     CLPIPE
            .
            .
157         .       N11P7
            .           .
            .           .
167         .           .-------> N11P7S
164         .      DN11P7
            .           V
            .           V
170         .      R11P7E
            .           .
            .           .
182         .           .-------> EAST83
178         .       D2-18
            .           .
            .           .
188         .           .          .<-------  N11P7S
185         .           .      RD11P7
            .           .          V
            .           .          V
189         .           .      R11P7S
            .           .           .
            .           .           .
198         .           .           .       LACAI
            .           .           .           V
            .           .           .           V
215         .           .           .       RTCAI
            .           .           .           .
            .           .           .           .
222         .           .           .           .      SUMMIT
            .           .           .           .           .
            .           .           .           .           .
238         .           .           .           .           .       N11P4
            .           .           .           .           .           V
            .           .           .           .           .           V
250         .           .           .           .           .      R11P4S
            .           .           .           .           .           .
            .           .           .           .           .           .
256         .           .       QINCL.......................................
            .           .           .
            .           .           .
263         .           .           .-------> OVRLND
259         .           .      CLBRK
            .           .           .
            .           .           .
266       83CL........................
            .
            .
281         .------->   EAGLE
273     24PIPE
```

```
                .
                .
284             .       N11P3
                .           .
                .           .
292             .           .            .<-------  OVRLND
290             .           .      RE_CAI
                .           .            .
                .           .            .
293          83SD.......................
                V
                V
299         R83SD
                .
                .
302             .       N11L5
                .           .
                .           .
311             .           .       N11L3
                .           .           V
                .           .           V
318             .           .        87SD
                .           .            .
                .           .            .
322             .           .            .       N11L2
                .           .            .           .
                .           .            .           .
330             .           .            .           .       N11L4
                .           .            .           .           .
                .           .            .           .           .
338             .           .            .           .           .       N21I1
                .           .            .           .           .           V
                .           .            .           .           .           V
345             .           .            .           .           .        85SD
                .           .            .           .           .           .
                .           .            .           .           .           .
349             .        PPSD.......................................................
                .           V
                .           V
353             .       RPPSD
                .           .
                .           .
356             .           .       N21I2
                .           .            .
                .           .            .
363             .           .            .       N21I3
                .           .            .           .
                .           .            .           .
374             .           .            .           .        N21Z
                .           .            .           .           .
                .           .            .           .           .
```

```
389                                                  .-------> N21I3O
386                                            LN21Z
                                                     .
                                                     .
398                                                  .-------> DN21ZI
392                                           DN21ZO
                                                     .
                                                     .
405                                                  .-------> N21ZI*
401                                           DN21Z*
                                                     V
                                                     V
408                                           RN21ZW
                                                     .
                                                     .
421                                                  .-------> D1/2ST
418                                           1/2ST
                                                     .
                                                     .
426                                                  .            .<-------  D1/2ST
424                                                  .      R1/2ST
                                                     .            .
                                                     .            .
430                                                  .            .            .<-------  EAST83
427                                                  .            .      18PIPE
                                                     .            .            .
                                                     .            .            .
434                                                  .            .            .           .<-------   EAGLE
431                                                  .            .            .       CLDIV
                                                     .            .            .           .
                                                     .            .            .           .
435                                                  .            .            .           .       N21I3
                                                     .            .            .           .           .
                                                     .            .            .           .           .
442                                                  .      CN21I3.....................................
                                                     .            .
                                                     .            .
449                                                  .            .-------> N21I3O
445                                                  .      R21I3
                                                     .            .
                                                     .            .
452                                           PPK_E............
                                                     .
                                                     .
458                                                  .-------> PPKEW3
456                                           PPKEW2
                                                     .
                                                     .
461      US_BSN.......................................
              V
              V
```

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466      R83BSN
              .                    |
              .                    |
475           .            .<-------+-  PPKEW3
473           .        RESD         |
              .            .
              .            .
476         JCT............
              V
              V
479      OUTLET
              .
              .
485           .        N22B
              .            .
              .            .
496           .            .-------->   N22BI
495           .       DN22B
              .           V
              .           V
499           .      RN22BE
              .            .
              .            .
504           .            .        N21F
              .            .           .
              .            .           .
514       CN21F.......................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
****************************************
 *                                      *                                    *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *    U.S. ARMY CORPS OF
ENGINEERS     *
 *               JUN   1998             *                                    *    HYDROLOGIC ENGINEERING
CENTER    *
 *            VERSION 4.1               *                                    *          609 SECOND
STREET          *
 *                                      *                                    *       DAVIS, CALIFORNIA
95616       *
 *  RUN DATE   16NOV04  TIME  08:28:29  *                                    *           (916) 756-1104
*
 *                                      *                                    *
*
 ****************************************
****************************************
```

83REV4.DAT
REVISED 11/16/04 BY JPF TO REMOVE DIVERSIONS NPIPE, WPIPE AND PPKES
REVISED 11/15/04 BY JPF FOR PINNACLE PEAK BASIN MODIFICATIONS
REVISED 11/4/04 BY JPF FOR CHANGES IN FAX TO JEFF H 11/2/04
83RD AVENUE AND PINNACLE PEAK DRAINAGE IMPROVEMENTS
THIS FILE MODELS THE HYDRYOLOGY FOR THE PROPOSED
DRAINAGE IMPROVEMENTS FROM THE SUNRISE MOUNTAINS SOUTH TO
TO PINNACLE PEAK ROAD AND FROM 89TH AVE WEST TO 81ST AVE

J2 MODIFIED THE ENTELLUS GLENDALE/PEORIA ADMP UPDATE
LEVEL3.DAT
J2 UPDATED THE HYDROLOGY MODEL AND REDUCED THE LIMITS TO AREAS PERTINENT
TO THIS PROJECT.

PREPARED BY: KBD
DATE: SEPTEMBER 2004
REVISED OCTOBER 2004
UPDATED FOR FCD PREDESIGN COMMENTS FROM STEVE TUCKER

STEVE TUCKER COMMENTS:

1) In the schematic, all triangles should have 2 arrows going outward.
   All other symbols should have 1 arrow pointing outward.
   Specifically, QINCL - CLBRK, RN21ZW - 1/2ST,
   and PPK_E - 83_S are drawn incorrectly.

   J2 RESPONSE: AGREE WILL UPDATE THE HEC-1 DIAGRAM

2) The diamond RI1/2ST should be moved to the southside of R21I3 for clarity.

   J2 RESPONSE: AGREE WILL UPDATE THE HEC-1 DIAGRAM

3) The model should include the total areas that contribute to the channel
   at the downstream exit of the storm drain (at Deer Valley Estates).
   I think this should involve no more than cut and paste of the original
   Model.

   J2 RESPONSE: THE ADDITIONAL AREAS WERE ADDED. THE SUBBASINS ADDED FROM
                THE LEVEL3.DAT FILE WERE N22B AND N21F.

4) The alternative of taking flows from east of 83rd Avenue and
   Pinnacle Peak should be addressed, advantages and disadvantages.

   J2 RESPONSE: THE FLOWS ARRIVEING ALONG PINNACLE PEAK FORM THE EAST AT
                83RD AVENUE AND PINNACLE PEAK WERE ROUTED INTO PINNACLE
                PEAK BASIN.

5) The diversions east and south for N212 do not appear to conform to what
   I saw in the field. It says that at 300 cfs, the entire flow would turn to

the west, and at 400 cfs, almost all the flow would travel west. It appeared to me that there would be significant flows east and south.

J2 RESPONSE: THROUGH DISCUSIONS WITH THE FCD AND BY CONDUCTING A SITE VISIT 10-26-2004, THE DESIGN TEAM DETERMINED THAT THE FLOW SPLIT OCCURRING AT 81ST AVE AND PINNACLE PEAK HAD A RATIO OF 50% TRAVELING SOUTH AND 50% WEST. SEE "DN21Z*"

```
MODEL ID: 83REV.DAT

==============================================================================
==============================================================================

Project ID: GP - Major Basin: 01 - Return Period: 100 Years 6-HR

******************************************************************************
**                                                                          **
**                    Glendale/Peoria ADMP Update                           **
**                                                                          **
******************************************************************************
******************************************************************************
PROJECT:                  Glendale Peoria ADMP Update
CLIENT:                   Flood Control District of Maricopa County
PREPARED BY:              Entellus, Inc.
PROJECT No:               FCD 99-44              Entellus 310.017
FILE NAME: LEVEL3.DAT              CREATED DATE: JUNE 6, 2001
MODIFIED:
STORM:                    100-year 6-hour Storm
DEVELOPMENT CONDITIONS: LEVEL 3 HYDROLOGY

==============================================================================
==============================================================================

DDM MCUHP1

88 IO        OUTPUT CONTROL VARIABLES
                 IPRNT          5  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       1000  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     2    0  ENDING DATE
                NDTIME       0918  ENDING TIME
                 ICENT         19  CENTURY MARK
```

```
          COMPUTATION INTERVAL     .03 HOURS
               TOTAL TIME BASE   33.30 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


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


              **************
              *            *
  137 KK      *    LEJOS   *
              *            *
              **************

  139 KO           OUTPUT CONTROL VARIABLES
                         IPRNT           3  PRINT CONTROL
                         IPLOT           0  PLOT CONTROL
                         QSCAL          0.  HYDROGRAPH PLOT SCALE
                         IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                          IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                         ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                         ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                        TIMINT        .033  TIME INTERVAL IN HOURS


  140 HC           HYDROGRAPH COMBINATION
                         ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                        HYDROGRAPH AT STATION    LEJOS

  PEAK FLOW      TIME                              MAXIMUM AVERAGE FLOW
                                           6-HR        24-HR        72-HR      33.30-HR
+   (CFS)        (HR)
                                 (CFS)
+     472.       4.20                       34.           9.           6.           6.
                               (INCHES)    .904         .904         .904         .904
                                (AC-FT)     17.          17.          17.          17.
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                    CUMULATIVE AREA =      .35 SQ MI


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

                                  |
            **************
            *            *
  141 KK    *      RBSN  *
            *            *
            **************

  145 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS


                HYDROGRAPH ROUTING DATA

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

  147 SV            STORAGE          .0       1.6       3.4       5.3       7.5       9.9      12.4      15.3      18.3
18.3


  148 SE          ELEVATION     1340.00   1341.00   1342.00   1343.00   1344.00   1345.00   1346.00   1347.00   1348.00
1350.00


  149 SQ          DISCHARGE          0.        5.       19.       36.       44.       46.       48.       50.       52.
56.


                                                                  ***

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

HYDROGRAPH AT STATION RBSN

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	33.30-HR
+ (CFS)	(HR)					
		(CFS)				
+ 48.	4.80		31.	9.	6.	6.
		(INCHES)	.815	.903	.904	.904
		(AC-FT)	15.	17.	17.	17.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	33.30-HR
+ (AC-FT)	(HR)				
13.	4.80	7.	2.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	33.30-HR
+ (FEET)	(HR)				
1346.23	4.80	1343.40	1341.01	1340.73	1340.73

CUMULATIVE AREA = .35 SQ MI

WARNING --- ROUTED OUTFLOW (35.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (45.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (53.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (60.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (63.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (62.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (56.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (49.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (41.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (34.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (28.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (35.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (45.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (53.) IS GREATER THAN MAXIMUM OUTFLOW (26.) IN STORAGE-OUTFLOW TABLE

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WARNING --- ROUTED OUTFLOW (     59.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     61.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     60.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     55.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     48.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     40.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     34.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     28.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     35.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     45.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     53.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     58.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     60.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     58.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     53.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     47.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     40.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     34.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     28.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     34.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     45.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     52.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     57.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     58.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     56.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     52.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (     46.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     39.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     33.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     28.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     33.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     44.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     51.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     56.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     57.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     55.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     51.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     45.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     39.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     33.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     28.) IS GREATER THAN MAXIMUM OUTFLOW (     26.) IN STORAGE-OUTFLOW TABLE


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              **************
              *            *
  461 KK      *    US_BSN  *
              *            *
              **************

  462 KO            OUTPUT CONTROL VARIABLES
                          IPRNT           3  PRINT CONTROL
                          IPLOT           0  PLOT CONTROL
                          QSCAL          0.  HYDROGRAPH PLOT SCALE
                          IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                           IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                          ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                          ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
```

```
                    TIMINT        .033  TIME INTERVAL IN HOURS

                        COMBINE INLFOWS JUST AS THEY ENTER PROPOSED 83RD
                        SEE OUTPUT FOR VOLUME AND PEAK FLOW ENTERING BASIN

  465 HC          HYDROGRAPH COMBINATION
                        ICOMP           5  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

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

                        HYDROGRAPH AT STATION   US_BSN

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     33.30-HR
+   (CFS)        (HR)
                             (CFS)
+     673.       4.20                    66.         16.         12.          12.
                         (INCHES)      .514        .515        .515         .515
                          (AC-FT)       32.         33.         33.          33.

                         CUMULATIVE AREA =    1.18 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
*** *** ***
                                   |

            **************
            *            *
  466 KK    *    R83BSN  *
            *            *
            **************

  468 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS

                 HYDROGRAPH ROUTING DATA

  469 RS          STORAGE ROUTING
```

```
                  NSTPS            1  NUMBER OF SUBREACHES
                   ITYP        |STOR  TYPE OF INITIAL CONDITION
                 RSVRIC        | .00  INITIAL CONDITION
                      X        | .00 WORKING R AND D COEFFICIENT
                               |
 470 SV         STORAGE          .0       2.6       8.3      11.5      15.0      22.8      31.7      36.5

 471 SE       ELEVATION     1303.00   1304.00   1306.00   1307.00   1308.00   1310.00   1312.00   1313.00

 472 SQ       DISCHARGE          0.       10.       20.       23.       26.       32.       26.       38.

                                                       ***

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

                      HYDROGRAPH AT STATION   R83BSN

 PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     33.30-HR
+   (CFS)       (HR)
                           (CFS)
+       32.      8.03                    30.         16.         12.         12.
                         (INCHES)       .232        .510        .515        .515
                          (AC-FT)        15.         32.         33.         33.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR       72-HR     33.30-HR
+  (AC-FT)      (HR)
        28.      5.37                    24.         10.          7.          7.

 PEAK STAGE     TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR       72-HR     33.30-HR
+   (FEET)      (HR)
   1311.20       5.40                1310.13     1306.13     1305.26     1305.26

                      CUMULATIVE AREA =    1.18 SQ MI


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


              **************
              *            *
 479 KK       *   OUTLET   *
              *            *
              **************

 483 KO           OUTPUT CONTROL VARIABLES
```

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE
IPNCH	0	PUNCH COMPUTED HYDROGRAPH
IOUT	22	SAVE HYDROGRAPH ON THIS UNIT
ISAV1	1	FIRST ORDINATE PUNCHED OR SAVED
ISAV2	1000	LAST ORDINATE PUNCHED OR SAVED
TIMINT	.033	TIME INTERVAL IN HOURS

HYDROGRAPH ROUTING DATA

484 RK KINEMATIC WAVE STREAM ROUTING

L	3117.	CHANNEL LENGTH
S	.0040	SLOPE
N	.013	CHANNEL ROUGHNESS COEFFICIENT
CA	.00	CONTRIBUTING AREA
SHAPE	CIRC	CHANNEL SHAPE
WD	4.00	BOTTOM WIDTH OR DIAMETER
Z	.00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
MAIN	4.93	1.25	1.64	1039.00	93.67	261.48	.72	11.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4562E+02 EXCESS= .0000E+00 OUTFLOW= .4562E+02 BASIN STORAGE= .2448E-02 PERCENT ERROR= .0

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	4.93	1.25	2.00	93.66	260.00	.72

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

HYDROGRAPH AT STATION OUTLET

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW (CFS) 6-HR	24-HR	72-HR	33.30-HR
+					

+	94.	4.33		52.	23.	17.	17.
			(INCHES)	.411	.718	.723	.723
			(AC-FT)	26.	45.	46.	46.

CUMULATIVE AREA = 1.18 SQ MI

1

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

TIME OF STAGE	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	MAX
+	HYDROGRAPH AT	N11P5	83.	4.23	9.	2.	2.	.09		
+	ROUTED TO	R11P5E	83.	4.30	9.	2.	2.	.09		
+	HYDROGRAPH AT	N11P6	370.	4.10	20.	5.	4.	.20		
+	ROUTED TO	R11P6S	354.	4.17	20.	5.	4.	.20		
+ 4.17									2.77	
+	HYDROGRAPH AT	N11P2	69.	4.20	6.	2.	1.	.06		
+	2 COMBINED AT	CN11P2	418.	4.17	26.	6.	5.	.27		
+	2 COMBINED AT	LEJOS	472.	4.20	34.	9.	6.	.35		
+	ROUTED TO	RBSN	48.	4.80	31.	9.	6.	.35		
+ 4.80									1346.23	
+	ROUTED TO	CLPIPE	48.	4.83	31.	9.	6.	.35		
+	HYDROGRAPH AT	N11P7	236.	4.07	13.	3.	2.	.10		

	DIVERSION TO							
+		N11P7S	189.	4.07	10.	3.	2.	.10
	HYDROGRAPH AT							
+		DN11P7	47.	4.07	3.	1.	0.	.10
	ROUTED TO							
+		R11P7E	34.	4.27	3.	1.	0.	.10
+								
4.27								.78
	DIVERSION TO							
+		EAST83	18.	4.27	2.	1.	0.	.10
	HYDROGRAPH AT							
+		D2-18	16.	4.27	1.	0.	0.	.10
	HYDROGRAPH AT							
+		RD11P7	189.	4.07	10.	3.	2.	.00
	ROUTED TO							
+		R11P7S	172.	4.17	10.	3.	2.	.00
+								
4.17								1.49
	HYDROGRAPH AT							
+		LACAI	77.	4.07	5.	1.	1.	.04
	ROUTED TO							
+		RTCAI	75.	4.07	5.	1.	1.	.04
+								
4.07								99.04
	HYDROGRAPH AT							
+		SUMMIT	20.	4.20	3.	1.	1.	.03
	HYDROGRAPH AT							
+		N11P4	64.	4.13	4.	1.	1.	.04
	ROUTED TO							
+		R11P4S	57.	4.27	4.	1.	1.	.04
+								
4.27								100.64
	4 COMBINED AT							
+		QINCL	294.	4.17	22.	5.	4.	.11
	DIVERSION TO							
+		OVRLND	259.	4.07	17.	4.	3.	.11
	HYDROGRAPH AT							

+	CLBRK	35.	4.07	4.	1.	1.	.11
3 COMBINED AT							
+	83CL	93.	4.27	35.	10.	7.	.57
DIVERSION TO							
+	EAGLE	60.	4.27	34.	10.	7.	.57
HYDROGRAPH AT							
+	24PIPE	33.	4.27	1.	0.	0.	.57
HYDROGRAPH AT							
+	N11P3	53.	4.20	4.	1.	1.	.04
HYDROGRAPH AT							
+	RE_CAI	259.	4.17	17.	4.	3.	.00
3 COMBINED AT							
+	83SD	316.	4.20	22.	6.	4.	.61
ROUTED TO							
+	R83SD	314.	4.20	22.	6.	4.	.61
HYDROGRAPH AT							
+	N11L5	52.	4.23	8.	2.	1.	.07
HYDROGRAPH AT							
+	N11L3	77.	4.13	8.	2.	1.	.06
ROUTED TO							
+	87SD	76.	4.17	8.	2.	1.	.06
HYDROGRAPH AT							
+	N11L2	9.	4.17	1.	0.	0.	.01
HYDROGRAPH AT							
+	N11L4	8.	4.27	1.	0.	0.	.01
HYDROGRAPH AT							
+	N21I1	122.	4.17	12.	3.	2.	.11
ROUTED TO							
+	85SD	122.	4.17	12.	3.	2.	.11
5 COMBINED AT							
+	PPSD	263.	4.17	30.	8.	6.	.27
ROUTED TO							
+	RPPSD	261.	4.23	30.	8.	6.	.27
HYDROGRAPH AT							

+		N21I2	76.	4.17	10.	2.	2.	.06	
	HYDROGRAPH AT								
+		N21I3	50.	4.07	3.	1.	1.	.03	
	HYDROGRAPH AT								
+		N21Z	251.	4.10	22.	6.	4.	.11	
	DIVERSION TO								
+		N21I3O	210.	4.10	7.	2.	1.	.11	
	HYDROGRAPH AT								
+		LN21Z	251.	4.10	15.	4.	3.	.11	
	DIVERSION TO								
+		DN21ZI	0.	4.10	0.	0.	0.	.11	
	HYDROGRAPH AT								
+		DN21ZO	250.	4.10	15.	4.	3.	.11	
	DIVERSION TO								
+		N21ZI*	125.	4.10	8.	2.	1.	.11	
	HYDROGRAPH AT								
+		DN21Z*	125.	4.10	8.	2.	1.	.11	
	ROUTED TO								
+		RN21ZW	80.	4.27	8.	2.	1.	.11	
+									1.08
4.27									
	DIVERSION TO								
+		D1/2ST	12.	4.27	3.	1.	0.	.11	
	HYDROGRAPH AT								
+		1/2ST	68.	4.27	5.	1.	1.	.11	
	HYDROGRAPH AT								
+		R1/2ST	12.	4.07	3.	1.	0.	.00	
	HYDROGRAPH AT								
+		18PIPE	18.	4.23	2.	1.	0.	.00	
	HYDROGRAPH AT								
+		CLDIV	60.	4.17	34.	10.	7.	.00	
	HYDROGRAPH AT								
+		N21I3	129.	4.17	13.	3.	2.	.12	
	4 COMBINED AT								
+		CN21I3	219.	4.17	51.	14.	10.	.12	

	DIVERSION TO							
+		N21I3O	219.	5.90	35.	9.	6.	.12
	HYDROGRAPH AT							
+		R21I3	50.	5.90	19.	5.	4.	.12
	2 COMBINED AT							
+		PPK_E	68.	4.27	23.	7.	5.	.22
	DIVERSION TO							
+		PPKEW3	68.	.00	23.	7.	5.	.22
	HYDROGRAPH AT							
+		PPKEW2	0.	.00	0.	0.	0.	.22
	5 COMBINED AT							
+		US_BSN	673.	4.20	66.	16.	12.	1.18
	ROUTED TO							
+		R83BSN	32.	8.03	30.	16.	12.	1.18
+								1311.20
5.40								
	HYDROGRAPH AT							
+		RESD	68.	4.27	23.	7.	5.	.00
	2 COMBINED AT							
+		JCT	94.	4.30	52.	23.	17.	1.18
	ROUTED TO							
+		OUTLET	94.	4.33	52.	23.	17.	1.18
	HYDROGRAPH AT							
+		N22B	458.	4.10	40.	10.	7.	.19
	DIVERSION TO							
+		N22BI	412.	4.10	36.	9.	7.	.19
	HYDROGRAPH AT							
+		DN22B	46.	4.10	4.	1.	1.	.19
	ROUTED TO							
+		RN22BE	24.	4.33	4.	1.	1.	.19
+								.78
4.33								
	HYDROGRAPH AT							
+		N21F	159.	4.23	28.	7.	5.	.10
	3 COMBINED AT							

```
+                         CN21F       271.    4.30          81.          31.          22.        1.47
1
```

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

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
R11P5E	MANE	1.58	83.40	257.22	.90	2.00	83.17	258.00	.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4239E+01 EXCESS= .0000E+00 OUTFLOW= .4244E+01 BASIN STORAGE= .3723E-06 PERCENT ERROR= -.1

CLPIPE	MANE	1.21	48.45	290.26	.90	2.00	48.45	290.00	.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1706E+02 EXCESS= .0000E+00 OUTFLOW= .1706E+02 BASIN STORAGE= .2232E-03 PERCENT ERROR= .0

R83SD	MANE	.73	314.40	252.31	.34	2.00	313.92	252.00	.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1114E+02 EXCESS= .0000E+00 OUTFLOW= .1115E+02 BASIN STORAGE= .1737E-08 PERCENT ERROR= -.1

87SD	MANE	.65	76.35	249.16	1.20	2.00	75.67	250.00	1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4045E+01 EXCESS= .0000E+00 OUTFLOW= .4047E+01 BASIN STORAGE= .3841E-11 PERCENT ERROR= .0

85SD	MANE	.60	122.07	250.84	1.00	2.00	121.74	250.00	1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5907E+01 EXCESS= .0000E+00 OUTFLOW= .5910E+01 BASIN STORAGE= .3647E-11 PERCENT ERROR= .0

RPPSD	MANE	1.39	261.44	253.89	1.06	2.00	261.20	254.00	1.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1514E+02 EXCESS= .0000E+00 OUTFLOW= .1515E+02 BASIN STORAGE= .2735E-07 PERCENT ERROR= .0

OUTLET	MANE	1.64	93.67	261.48	.72	2.00	93.66	260.00	.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4562E+02 EXCESS= .0000E+00 OUTFLOW= .4562E+02 BASIN STORAGE= .2448E-02 PERCENT ERROR= .0

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

HEC-1 Input – Sub-basin Information

83rd Avenue and Pinnacle peak Drainage Improvements - Watershed Subbasin Charactersitics

	Basin ID	Note	Area	Area	Area							Fig. 5.4		Kb Determination		
			Sq. Ft	Acres	Sq. Miles	Top El	Bottom El	L	L	So	So	So (Corr)	Type	Table 3 1		
						ft	ft	ft	mi.	ft/ft	ft/mi	ft/mi	A-D	m	b	KB
	ADMP Concept															
1	N11P5	Basin combined with part of N11P1	2,465,378	56.60	0.088	1700	1344	3928	0.744	0.0906	479	315	C	-0.025	0.15	0.1062
2	N11P4	Origin N11P4 split	1,099,573	25.24	0.039	1375	1338	1750	0.331	0.0211	112	112	B	-0.01375	0.08	0.0607
3	LACAI	Part of old N11P4	1,227,951	28.19	0.044	1400	1337	1884	0.357	0.0334	177	177	B	-0.01375	0.08	0.0601
4	SUMMIT	Part of old N11P5	764,073	17.54	0.027	1340	1332	1835	0.348	0.0044	23	23	B	-0.01375	0.08	0.0629
5	N11L3	New flow paths and slopes used and area redelineated.	4,091,530	93.93	0.147	1345	1313	3916	0.742	0.0082	43	43	B	-0.01375	0.08	0.0529
6	N11I3	Basin was redelineated	751,843	17.26	0.027	1322.4	1316	890	0.169	0.0072	38	38	B	-0.01375	0.08	0.0630
7																
8																
9																
10																
	Powerline Concept															
1	ST9	West most Basin	1,404,805	32.25	0.050	1716	1366	2493	0.472	0.1404	741	315	C	-0.025	0.15	0.1123
2	ST8	Middle Basin	1,339,490	30.75	0.048	1666	1374	2432	0.461	0.1201	634	315	C	-0.025	0.15	0.1128
3	ST7	East Most Basin	4,787,889	109.91	0.172	1825	1366	3964	0.751	0.1158	611	315	C	-0.025	0.15	0.0990
4	N11P5*	Undeveloped	1,107,990	25.44	0.040	1367	1344	1377	0.261	0.0167	88	88	B	-0.01375	0.08	0.0607
5	N11P2*	Undeveloped	1,526,367	35.04	0.055	1373	1343	2287	0.433	0.0131	69	69	B	-0.01375	0.08	0.0588
6																
7																
8																
9																
10																

Note:

Kb Type

A	Minimal Roughness	Commercial Industrial Areas /Residential area parks and golf courses
B	Moderately low roughness	Agricultural fields Pastures Desert Rangelands and Undeveloped urban lands
C	Moderaltely high roughness	Hillslopes brushy alluvial fans Hilly rangeland Disturbed land mining etc. Forests with underbrush
D	Maximum Roughness	Mountains and some wetlands

HEC-1 Input – Detention Basin Storage Relationships

By: DES
Ckd: JPF

83RD AVENUE - PINNACLE PEAK DRAINAGE IMPROVEMENT PROJECT
W7X74300
Last updated: 9/20/2004

83RD AVE / PINNACLE PEAK BASIN
CONFIGURATION: PP3

	Storage	Storage
Elev	Volume cf	Volume af
1301	0	0.00
1302	94924	2.18
1303	197797	4.54
1304	309162	7.10
1305	429510	9.86
1306	559111	12.84
1307	698351	16.03
1308	849400	19.50
1309	1012889	23.25
1310	1189296	27.30
1311	1377985	31.63
1312	1577931	36.22
1313	1788644	41.06

Note:
PP3 is modified using J2 landscaping concept, based on PP2.

By: DES
Ckd: JPF

83RD AVENUE - PINNACLE PEAK DRAINAGE IMPROVEMENT PROJECT
W7X74300
Last updated: 8/31/2004

ADMP BASIN — ALT 2
CONFIGURATION: A9

Elev	Volume cf	Volume af
1340	0	0.00
1341	68990	1.58
1342	146300	3.36
1343	232104	5.33
1344	326577	7.50
1345	429892	9.87
1346	542381	12.45
1347	664837	15.26
1348	795657	18.27

Note:
ADMP-Alt 2 is a single basin, per J2 layout 8-24-04.
Adjusted to fit parcel defined by Jacobs Civil Inc.
Deepened by 1 foot, and added 1' berm on south side.

By: DES
Ckd: JPF

83RD AVENUE - PINNACLE PEAK DRAINAGE IMPROVEMENT PROJECT
W7X74300
Last updated: 9/16/2004

ALTERNATIVE: CALLE LEJOS BASINS (linear, on north side of Calle Le

CONFIGURATION: CL_1

	Storage	Storage
Elev	Volume cf	Volume af
1340	0	0.00
1341	8681	0.20
1342	29902	0.69
1343	57348	1.32
1344	90613	2.08
1345	127868	2.94

CONFIGURATION: CL_2

	Storage	Storage
Elev	Volume cf	Volume af
1342	0	0.00
1343	9578	0.22
1344	22498	0.52
1345	38813	0.89

CONFIGURATION: CL_3

	Storage	Storage
Elev	Volume cf	Volume af
1340	0	0.00
1341	105	0.00
1342	2333	0.05
1343	8655	0.20
1344	19303	0.44
1345	33092	0.76

Note:
CL_1 (west), CL_2 (middle), and CL_3 (east).
Depths vary, a 4:1 side slope was used, no bottom grade was used.
CL_2 drains eastward into CL_3 by means of a bleedoff structure.

By: DES
Ckd: JPF

83RD AVENUE - PINNACLE PEAK DRAINAGE IMPROVEMENT PROJECT
W7X74300
Last updated: 8/31/2004

STATE LAND BASINS 7, 8, & 9

ST 7	Volume	Volume	east basin
Elev	cu ft	ac ft	
1372	393	0.01	
1373	30694	0.70	
1374	67728	1.55	
1375	112286	2.58	
1376	164962	3.79	
ST8			middle basin
Elev			
1369	136	0.00	
1370	43330	0.99	
1371	96189	2.21	
1372	159334	3.66	
1373	233441	5.36	
1374	319155	7.33	
ST9			west basin
Elev			
1360	0	0.00	
1361	25459	0.58	
1362	56246	1.29	
1363	92595	2.13	
1364	134780	3.09	
1365	183135	4.20	
1366	238288	5.47	

Note:
ADMP-Alt 1 is Basin A4 and A5 together.
ADMP-Alt 2 is just Basin A5.
ADMP-Alt 3 is Basin A6 and A7 together.
STATE LANDS is Basin ST1, ST2, and ST3 together.

HEC-1 Input – Channel Routing

Engineering and Environmental Design

Normal Depth Routing
ADOT Hydrology Manual

Project:	83rd Ave Detention Basins				By:	KBD
KK ID :	R11P4				Date:	19-Aug-04
Routing:	From:	N11P4	To:	QINCL	Project #	3077

Normal Depth Routing Parameters

Card	Fields							
RS	3	FLOW	0					
RC	0.035	0.020	0.035	1570	0.002	1336.81		
RX	0.0	29.9	30.2	54.1	67.6	78.9	84.2	92.7
RY	1336.81	1336.09	1335.68	1336.01	1335.83	1334.99	1335.70	1336.50

1) Reach Data

Reach Length, RLNTH = 1570 ft.

Channel Slope, SEL:

Upstream Elev. 1335 ft.

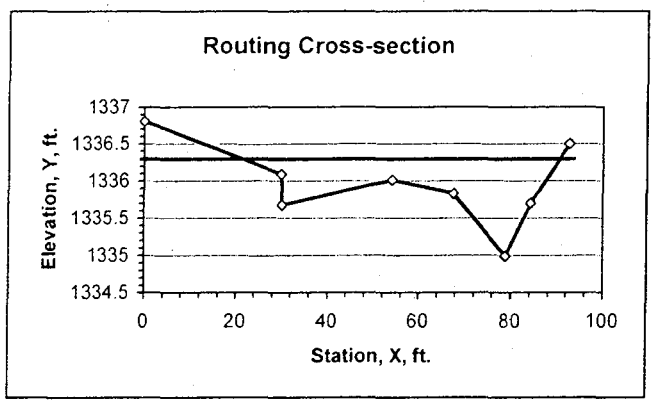
Downstream Elev. 1332 ft.

Slope = 0.001911 ft/ft

2) Cross-section Data

Geometry:

Point	Sta., X, ft.	Elev., Y, ft.
1	0	1336.81
2	29.9	1336.09
3	30.15	1335.68
4	54.05	1336.01
5	67.6	1335.83
6	78.91	1334.99
7	84.24	1335.70
8	92.71	1336.50



Max. elev. for routing, ELMAX = 1336.81 ft.
(default is max. Y)

3) Manning's n

Left Overbank ANL	Main Channel - ANCH Component	Value	Right Overbank ANR
0.035	n0, base	0.020	0.035
	n1, irregularity	0.000	
	n2, obstruction	0.000	
	n3, vegetation	0.000	
	n4, variation	0.000	
	m5, meandering	1.000	
	n =	0.020	

4) Discharge

Base Flow, RSVRIC =	0	cfs
Est. Peak Flow =	70	cfs
Total	70	cfs

Est. Av. Velocity = 2.07 ft/s

5) NSTPS

NMIN = 5 minutes

NSTPS = RLNTH/(Velocity*60*NMIN)
= 3

Engineering and Environmental Design

Normal Depth Routing
ADOT Hydrology Manual

Project:	83rd Ave Detention Basins			By:	KBD
KK ID :	R11P7S			Date:	20-Sep-04
Routing:	From: N11P7	To:	QINCL	Project #	3077

Normal Depth Routing Parameters

Card	Fields							
RS	1	FLOW	0					
RC	0.050	0.050	0.050	1465	0.016	8.00		
RX	0.0	200.0	250.0	260.0	270.0	280.0	330.0	530.0
RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	8.00

1) Reach Data

Reach Length, RLNTH = 1465 ft.

Channel Slope, SEL.:

Upstream Elev. 1360 ft.

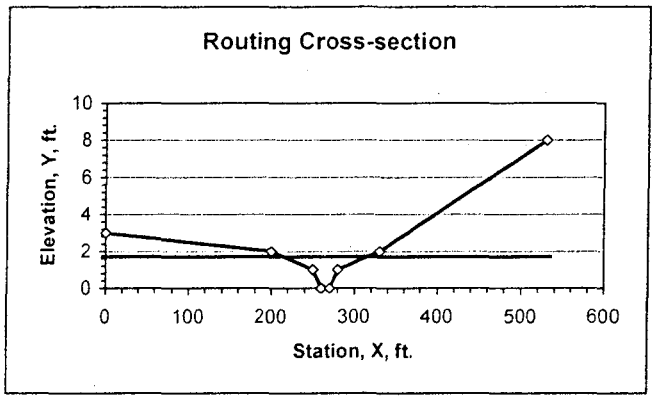
Downstream Elev. 1336 ft.

Slope = 0.016382 ft/ft

2) Cross-section Data

Geometry:

Point	Sta., X, ft.	Elev., Y, ft.
1	0	3
2	200	2
3	250	1
4	260	0.00
5	270	0.00
6	280	1.00
7	330	2.00
8	530	8.00



Max. elev. for routing, ELMAX = 8.00 ft.
(default is max. Y)

3) Manning's n

Left Overbank ANL	Main Channel - ANCH Component	Value	Right Overbank ANR
0.050	n0, base	0.050	0.050
	n1, irregularity	0.000	
	n2, obstruction	0.000	
	n3, vegetation	0.000	
	n4, variation	0.000	
	m5, meandering	1.000	
	n =	0.050	

4) Discharge

Base Flow, RSVRIC = 0 cfs

Est. Peak Flow = 240 cfs

Total 240 cfs

Est. Av. Velocity = 3.68 ft/s

5) NSTPS

NMIN = 5 minutes

NSTPS = RLNTH/(Velocity*60*NMIN)

= 1

Engineering and Environmental Design

Normal Depth Routing
ADOT Hydrology Manual

Project:	83rd Ave Detention Basins				By:	KBD
KK ID :	RTCAI				Date:	23-Jul-04
Routing:	From:	LACAI	To:	83_CL	Project #	3077

Normal Depth Routing Parameters

Card	Fields							
RS	1	FLOW	0					
RC	0.035	0.020	0.016	572	0.009	1338.32		
RX	0.0	8.8	17.5	32.4	32.9	33.0	49.0	65.0
RY	1338.15	1335.23	1336.69	1338.18	1338.18	1337.68	1338.00	1338.32

1) Reach Data

Reach Length, RLNTH = 572 ft.

Channel Slope, SEL.:

Upstream Elev. 1337 ft.

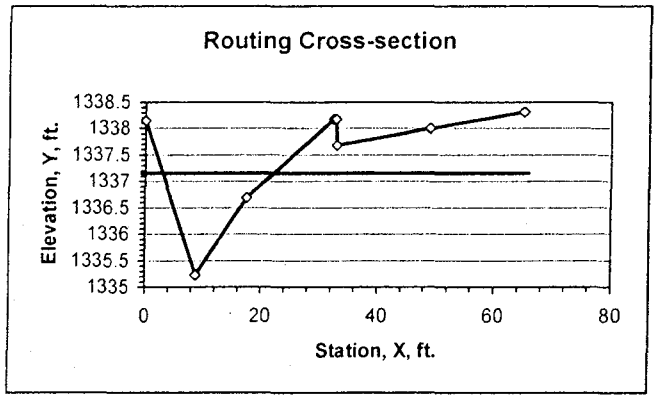
Downstream Elev. 1332 ft.

Slope = 0.008741 ft/ft

2) Cross-section Data

Geometry:

Point	Sta., X, ft.	Elev., Y, ft.
1	0	1338.15
2	8.75	1335.23
3	17.5	1336.69
4	32.42	1338.18
5	32.9	1338.18
6	33	1337.68
7	49	1338.00
8	65	1338.32



Max. elev. for routing, ELMAX = 1338.32 ft.
(default is max. Y)

3) Manning's n

Left Overbank ANL	Main Channel - ANCH Component	Value	Right Overbank ANR
0.035	n0, base	0.020	0.016
	n1, irregularity	0.000	
	n2, obstruction	0.000	
	n3, vegetation	0.000	
	n4, variation	0.000	
	m5, meandering	1.000	
	n =	0.020	

4) Discharge

Base Flow, RSVRIC =	0	cfs
Est. Peak Flow =	70	cfs
Total	70	cfs

Est. Av. Velocity = 4.09 ft/s

5) NSTPS

NMIN = 5 minutes

NSTPS = RLNTH/(Velocity*60*NMIN)
= 1

HEC-1 Input – Storage Routing

HEC-1 Storage Route

Project: 83rd Ave Detention Basins **By:** KBD

Location: 83rd Ave and Pinnacle Peak Road **Date:** Sep-04

Subject: HEC-1 Storage Route **J2 Project #:** 3077

Notes: Storage realtionship for the basin was provided by Jacobs.
Depth of basin is 12 feet and max volume is 41.06 acre-ft

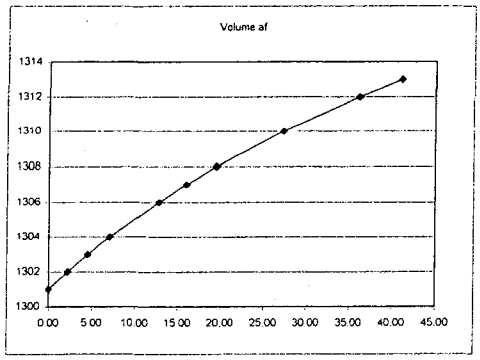
	1	2	3	4	5	6	7	8	9	10
RS	1	STOR	0.00							
SV	0.0	2.18	4.54	7.10	12.84	16.03	19.50	27.30	36.22	41.06
SE	1301.0	1302.0	1303.0	1304.0	1306.0	1307.0	1308.0	1310.0	1312.0	1313.0
SQ	0.00	1.76	1.93	2.08	2.36	2.49	2.61	2.84	3.05	3.15

Pinnacle Peak Detention Basin Route - ADMP Concept

ADMP Concept Basin Parameters

Fr. Jacobs 8-31-2004

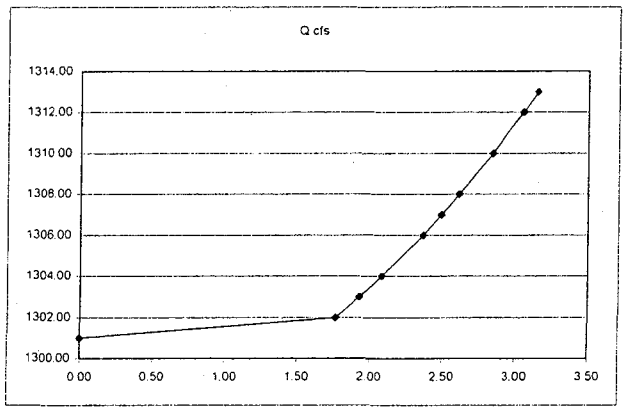
	Elev	Volume af
1	1301	0.00
2	1302	2.18
3	1303	4.54
4	1304	7.10
5	1306	12.84
6	1307	16.03
7	1308	19.50
8	1310	27.30
9	1312	36.22
10	1313	41.06



Outlet Works - CMP

'np = Number of pipes	1	
'dia = Pipe diameter	1	
'Length = Pipe culvert length	2000	ft
'Slope = Pipe culvert slope	0.004	ft/ft
'mn =Manning's n	0.013	
'ke = Entrance loss coefficient	0.5	
'TW = Downstream tailwater depth	4	ft
'IEL = Inlet El (Inlet Invert)	1301	
Total Q	3.5	cfs
HW @ Qmax	15.74	ft

	El.	HW D	Q cfs
1	1301.00	0.00	0.00
2	1302.00	1.00	1.76
3	1303.00	2.00	1.93
4	1304.00	3.00	2.08
5	1306.00	5.00	2.36
6	1307.00	6.00	2.49
7	1308.00	7.00	2.61
8	1310.00	9.00	2.84
9	1312.00	11.00	3.05
10	1313.00	12.00	3.15



Note: Pipe culvert calcs assume full flow loss for outlet control. Inlet control calc based on inlet control equations from HY-6.
User must ensure that the Max Q creates a HW greater than or equal to the depth of basin.
Results based on ADOT Pipe Culvert Program

HEC-1 Storage Route

Project: 83rd Ave Detention Basins **By:** KBD

Location: Calle Lejos and 85th Ave **Date:** Sep-04

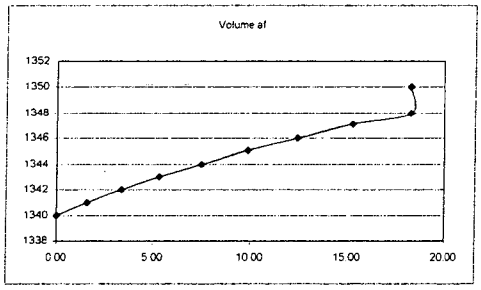
Subject: HEC-1 Storage Route **J2 Project #:** 3077

Notes: Storage realtionship for the basin was provided by Jacobs
Depth of basin is 8 feet and max volume is 18 3 acre-ft

	1	2	3	4	5	6	7	8	9	10
RS	1	STOR	0.00							
SV	0.0	1.58	3.36	5.33	7.50	9.87	12.45	15.26	18.27	18.27
SE	1340.0	1341.0	1342.0	1343.0	1344.0	1345.0	1346.0	1347.0	1348.0	1350.0
SQ	0	5	19	36	44	46	48	50	52	56

Calle Lejos Detention Basin Route - ADMP Concept

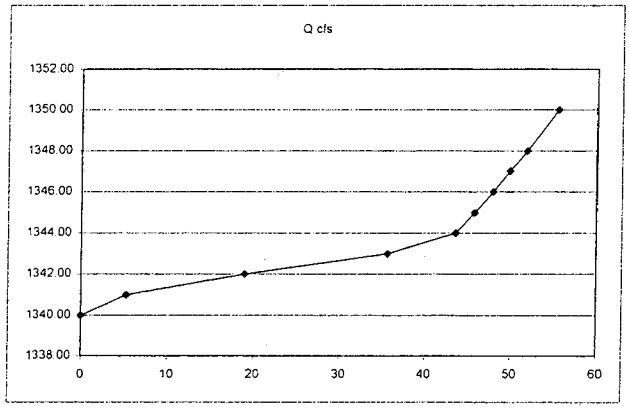
ADMP Concept Basin Parameters		
Fr. Jacobs 8-31-2004		
Elev	Volume cf	Volume af
1340	0	0.00
1341	68990	1.58
1342	146300	3.36
1343	232104	5.33
1344	326577	7.50
1345	429892	9.87
1346	542381	12.45
1347	664837	15.26
1348	795657	18.27
1350	795657	18.27



Outlet Works - CMP

'np = Number of pipes	1	
'dia = Pipe diameter	3	
'Length = Pipe culvert length	2000	ft
'Slope = Pipe culvert slope	0.004	ft/ft
'mn =Manning's n	0.013	
'ke = Entrance loss coefficient	0.5	
'TW = Downstream tailwater depth	2	ft
'IEL = Inlet El (Inlet Invert)	1340	
Total Q	80	cfs
HW @ Qmax	26.61	ft

	El.	HW D	Q cfs
1	1340.00	0.00	0
2	1341.00	1.00	5
3	1342.00	2.00	19
4	1343.00	3.00	36
5	1344.00	4.00	44
6	1345.00	5.00	46
7	1346.00	6.00	48
8	1347.00	7.00	50
9	1348.00	8.00	52
10	1350.00	10.00	56



Note: Pipe culvert calcs assume full flow loss for outlet control. Inlet control calc based on inlet control equations from HY-6.
User must ensure that the Max Q creates a HW greater than or equal to the depth of basin.
Results based on ADOT Pipe Culvert Program.

Project: 83rd Ave Detention Basins **By:** KBD

Location: ST7 **Date:** Aug-04

Subject: HEC-1 Storage Route **J2 Project #:** 3077

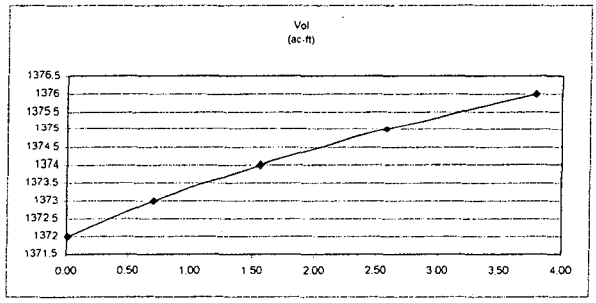
Notes:

	1	2	3	4	5	6	7	8	9	10
SV	0.0	0.70	1.55	2.58	3.79	0.00	0.00	0.00	0.00	0.00
SE	1372.0	1373.0	1374.0	1375.0	1376.0	0.0	0.0	0.0	0.0	0.0
SQ	0.0	0.0	0.0	11.0	15.5	0.0	0.0	0.0	0.0	0.0

Calle Lejos Basins - Statelands Alt

ADMP Concept Basin Parameters
Fr. Jacobs 8-31-2004

	Elev	Vol (cf)	Vol (ac-ft)
1	1372	393	0.01
2	1373	30694	0.70
3	1374	67728	1.55
4	1375	112286	2.58
5	1376	164962	3.79
6			
7			
8			
9			
10			



Grate Parameters

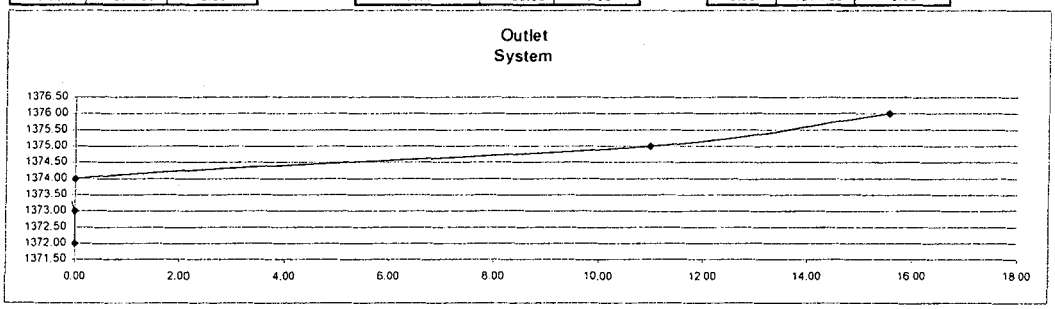
Inlet Std:	15.80	
Capture Ratio:	0.5	
Effective Area	4.09	sq. ft
Effective Perimeter	9	ft
Grate El. =	1374.00	ft
Max Q (rating Curve)	80.00	cfs

DS Pipe

'np = Number of pipes	1	
'dia = Pipe diameter	2	
'Length = Pipe culvert length	50	ft
'Slope = Pipe culvert slope	0.005	ft/ft
'mn =Manning's n	0.013	
'ke = Entrance loss coefficient	0.5	
'TW = Downstream tailwater depth	2	ft
'IEL = Inlet El (Inlet Invert)	1368	ft
Total Q	80.00	cfs

4' deep CB assumed

	Grate Inlet				DS Conveyance Pipe				System Rating Curve		
1	El.	HW D	Q cfs		El	HW D	Q cfs		El.	HW D	Q cfs
2	1372.00	-2.00	0.00		1372.00	4.00	0.00		1372.00	-2.00	0.00
3	1373.00	-1.00	0.00		1373.00	5.00	0.00		1373.00	-1.00	0.00
4	1374.00	0.00	0.00		1374.00	6.00	0.00		1374.00	0.00	0.00
5	1375.00	1.00	10.99		1375.00	7.00	38.04		1375.00	1.00	10.99
6	1376.00	2.00	15.54	========>	1376.00	8.00	41.27	======>	1376.00	2.00	15.54
7	0.00	-1374.00	0.00		0.00	-1368.00	0.00		0.00	-1374.00	0.00
8	0.00	-1374.00	0.00		0.00	-1368.00	0.00		0.00	-1374.00	0.00
9	0.00	-1374.00	0.00		0.00	-1368.00	0.00		0.00	-1374.00	0.00
10	0.00	-1374.00	0.00		0.00	-1368.00	0.00		0.00	-1374.00	0.00
11	0.00	-1374.00	0.00		0.00	-1368.00	0.00		0.00	-1374.00	0.00



Project: 83rd Ave Detention Basins — By: KBD

Location: ST8 — Date: Aug-04

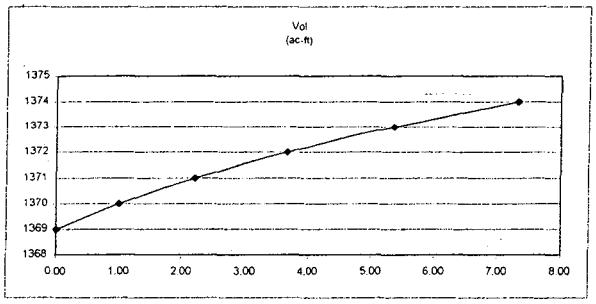
Subject: HEC-1 Storage Route — J2 Project #: 3077

Notes:

	1	2	3	4	5	6	7	8	9	10
SV	0.0	0.99	2.21	3.66	5.36	7.33	0.00	0.00	0.00	0.00
SE	1369.0	1370.0	1371.0	1372.0	1373.0	1374.0	0.0	0.0	0.0	0.0
SQ	0.0	0.0	0.0	11.0	15.5	19.0	0.0	0.0	0.0	0.0

Calle Lejos Basins - Statelands Alt

	ADMP Concept Basin Parameters		
	Fr. Jacobs 8-31-2004		
	Elev	Vol (cf)	Vol (ac-ft)
1	1369	136	0.00
2	1370	43330	0.99
3	1371	96189	2.21
4	1372	159334	3.66
5	1373	233441	5.36
6	1374	319155	7.33
7			
8			
9			
10			



Grate Parameters

Inlet Std:	15.80	
Capture Ratio:	0.5	
Effective Area	4.09	sq. ft
Effective Perimeter	9	ft
Grate El. =	1371.00	ft
Max Q (rating Curve)	80.00	cfs

DS Pipe

'np = Number of pipes	1	
'dia = Pipe diameter	2	
'Length = Pipe culvert length	50	ft
'Slope = Pipe culvert slope	0.005	ft/ft
'mn =Manning's n	0.013	
'ke = Entrance loss coefficient	0.5	
'TW = Downstream tailwater depth	2	ft
'IEL = Inlet El (Inlet Invert)	1365	ft
Total Q	80.00	cfs

4' deep CB assumed

	Grate Inlet		
1	El.	HW D	Q cfs
2	1369.00	-2.00	0.00
3	1370.00	-1.00	0.00
4	1371.00	0.00	0.00
5	1372.00	1.00	10.99
6	1373.00	2.00	15.54
7	1374.00	3.00	19.03
8	0.00	-1371.00	0.00
9	0.00	-1371.00	0.00
10	0.00	-1371.00	0.00
11	0.00	-1371.00	0.00

=========>

DS Conveyance Pipe		
El	HW D	Q cfs
1369.00	4.00	0.00
1370.00	5.00	0.00
1371.00	6.00	0.00
1372.00	7.00	38.04
1373.00	8.00	41.27
1374.00	9.00	44.27
0.00	-1365.00	0.00
0.00	-1365.00	0.00
0.00	-1365.00	0.00
0.00	-1365.00	0.00

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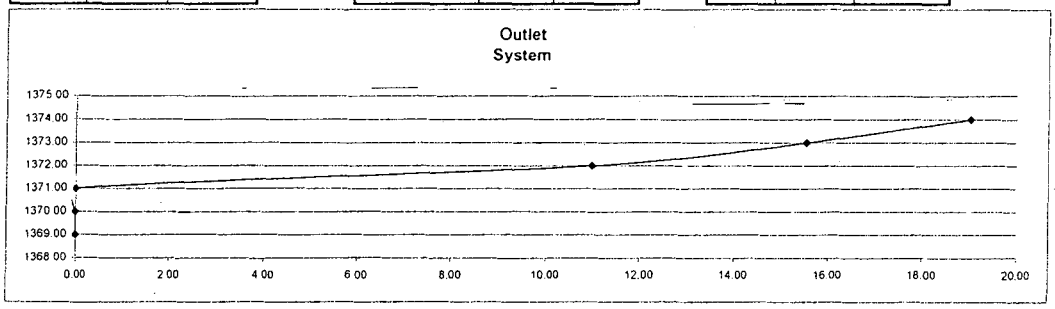
System Rating Curve		
El.	HW D	Q cfs
1369.00	-2.00	**0.00**
1370.00	-1.00	**0.00**
1371.00	0.00	**0.00**
1372.00	1.00	**10.99**
1373.00	2.00	**15.54**
1374.00	3.00	**19.03**
0.00	-1371.00	**0.00**
0.00	-1371.00	**0.00**
0.00	-1371.00	**0.00**
0.00	-1371.00	**0.00**



HEC-1 Storage Route

Project: 83rd Ave Detention Basins — By: KBD

Location: ST9 — Date: Aug-04

Subject: HEC-1 Storage Route — J2 Project #: 3077

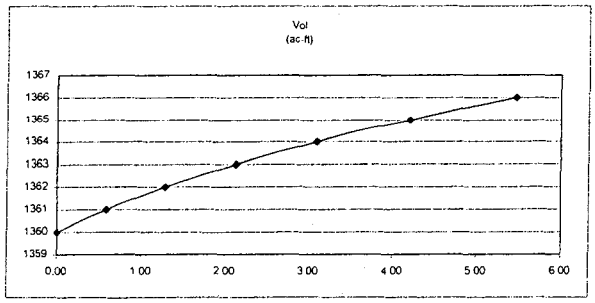
Notes

	1	2	3	4	5	6	7	8	9	10
SV	0.0	0.58	1.29	2.13	3.09	4.20	5.47	0.00	0.00	0.00
SE	1360.0	1361.0	1362.0	1363.0	1364.0	1365.0	1366.0	0.0	0.0	0.0
SQ	0.0	0.0	0.0	11.0	15.5	19.0	22.0	0.0	0.0	0.0

Calle Lejos Basins - Statelands Alt

ADMP Concept Basin Parameters
Fr. Jacobs 8-31-2004

	Elev	Vol (cf)	Vol (ac-ft)
1	1360	0	0.00
2	1361	25459	0.58
3	1362	56246	1.29
4	1363	92595	2.13
5	1364	134780	3.09
6	1365	183135	4.20
7	1366	238288	5.47
8			
9			
10			



Grate Parameters

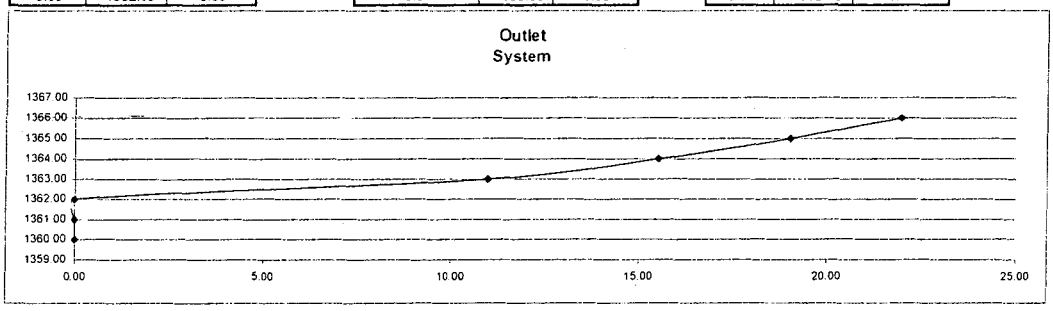
Inlet Std	15.80	
Capture Ratio	0.5	
Effective Area	4.09	sq ft
Effective Perimeter	9	ft
Grate El =	1362.00	ft
Max Q (rating Curve)	80.00	cfs

DS Pipe

'np = Number of pipes	1	
'dia = Pipe diameter	2	
'Length = Pipe culvert length	50	ft
'Slope = Pipe culvert slope	0.005	ft/ft
'mn =Manning's n	0.013	
'ke = Entrance loss coefficient	0.5	
'TW = Downstream tailwater depth	2	ft
'IEL = Inlet El (Inlet Invert)	1356	ft
Total Q	80.00	cfs

4' Deep CB assumed

	Grate Inlet				DS Conveyance Pipe				System Rating Curve		
1	El	HW D	Q cfs		El.	HW D	Q cfs		El.	HW D	Q cfs
2	1360.00	-2.00	0.00		1360.00	4.00	0.00		1360.00	-2.00	0.00
3	1361.00	-1.00	0.00		1361.00	5.00	0.00		1361.00	-1.00	0.00
4	1362.00	0.00	0.00		1362.00	6.00	0.00		1362.00	0.00	0.00
5	1363.00	1.00	10.99		1363.00	7.00	38.04		1363.00	1.00	10.99
6	1364.00	2.00	15.54	==========>	1364.00	8.00	41.27	=======>	1364.00	2.00	15.54
7	1365.00	3.00	19.03		1365.00	9.00	44.27		1365.00	3.00	19.03
8	1366.00	4.00	21.98		1366.00	10.00	47.09		1366.00	4.00	21.98
9	0.00	-1362.00	0.00		0.00	-1356.00	0.00		0.00	-1362.00	0.00
10	0.00	-1362.00	0.00		0.00	-1356.00	0.00		0.00	-1362.00	0.00
11	0.00	-1362.00	0.00		0.00	-1356.00	0.00		0.00	-1362.00	0.00



HEC-1 Storage Route

Project: 83rd Ave Detention Basins - Calle Lejos State Land Alt — **By:** KBD

Location: Calle Lejos and 87th Ave — **Date:** Sep-04

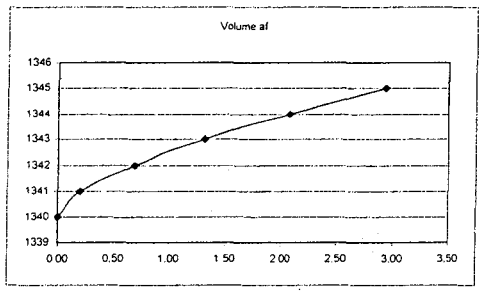
Subject: HEC-1 Storage Route CL1 — **J2 Project #:** 3077

Notes. Storage realtionship for the basin was provided by Jacobs
Depth of basin is 8 feet and max volume is 18.3 acre-ft

	1	2	3	4	5	6	7	8	9	10
RS	1	STOR	0.00							
SV	0.0	0.20	0.69	1.32	2.08	2.94	0.00	0.00	0.00	0.00
SE	1340.0	1341.0	1342.0	1343.0	1344.0	1345.0	0.0	0.0	0.0	0.0
SQ	0	2	2	3	3	3	0	0	0	0

Calle Lejos Detention Basin Route - Peoria 60 Alt

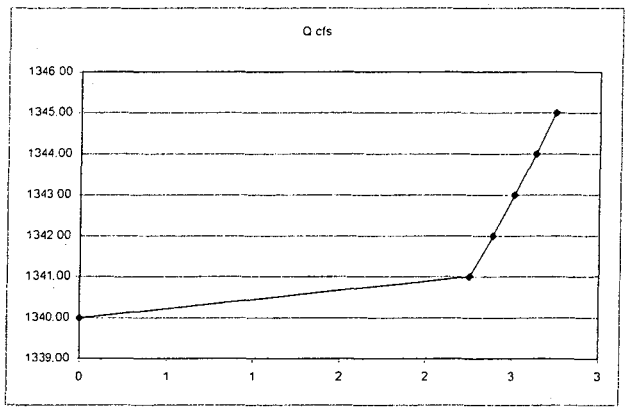
	ADMP Concept Basin Parameters		
	Fr. Jacobs 8-31-2004		
	Elev	Volume cf	Volume af
1	1340	0	0.00
2	1341	8681	0.20
3	1342	29902	0.69
4	1343	57348	1.32
5	1344	90613	2.08
6	1345	127868	2.94
7			
8			
9			
10			



Outlet Works - CMP

'np = Number of pipes	1	
'dia = Pipe diameter	1	
'Length = Pipe culvert length	2000	ft
'Slope = Pipe culvert slope	0.004	ft/ft
'mn =Manning's n	0.013	
'ke = Entrance loss coefficient	0.5	
'TW = Downstream tailwater depth	0.5	ft
'IEL = Inlet El (Inlet Invert)	1340	
Total Q	10	cfs
HW @ Qmax	154.18	ft

	El.	HW D	Q cfs
1	1340.00	0.00	0
2	1341.00	1.00	2
3	1342.00	2.00	2
4	1343.00	3.00	3
5	1344.00	4.00	3
6	1345.00	5.00	3
7	0.00	0.00	0
8	0.00	0.00	0
9	0.00	0.00	0
10	0.00	0.00	0



Note: Pipe culvert calcs assume full flow loss for outlet control. Inlet control calc based on inlet control equations from HY-6.
User must ensure that the Max Q creates a HW greater than or equal to the depth of basin.
Results based on ADOT Pipe Culvert Program.

Project: 83rd Ave Detention Basins - Calle Lejos State Land Alt **By:** KBD

Location: Calle Lejos and 87th Ave **Date:** Sep-04

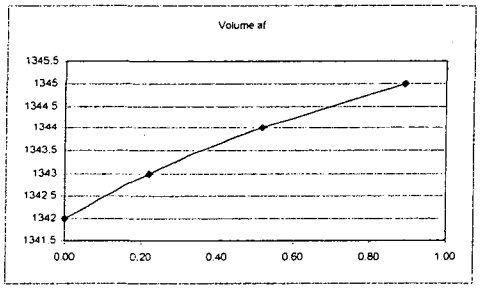
Subject: HEC-1 Storage Route CL2 **J2 Project #:** 3077

Notes: Storage realtionship for the basin was provided by Jacobs.
Depth of basin is 8 feet and max volume is 18.3 acre-ft

	1	2	3	4	5	6	7	8	9	10
RS	1	STOR	0.00							
SV	0.0	0.22	0.52	0.89	0.00	0.00	0.00	0.00	0.00	0.00
SE	1342.0	1343.0	1344.0	1345.0	0.0	0.0	0.0	0.0	0.0	0.0
SQ	0	2	2	3	0	0	0	0	0	0

Calle Lejos Detention Basin Route - Peoria 60 Alt

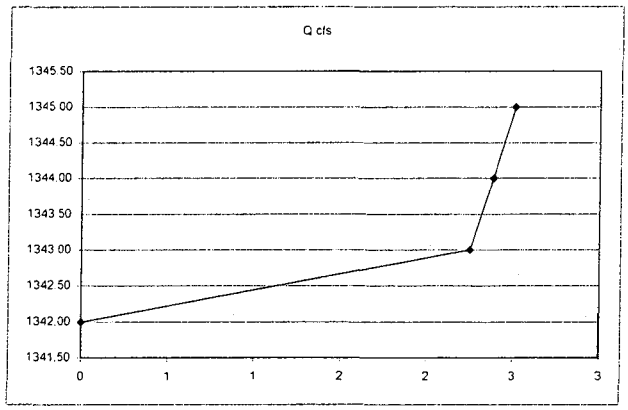
	ADMP Concept Basin Parameters		
	Fr. Jacobs 8-31-2004		
	Elev	Volume cf	Volume af
1	1342	0	0.00
2	1343	9578	0.22
3	1344	22498	0.52
4	1345	38813	0.89
5			
6			
7			
8			
9			
10			



Outlet Works - CMP

'np = Number of pipes	1	
'dia = Pipe diameter	1	
'Length = Pipe culvert length	2000	ft
'Slope = Pipe culvert slope	0.004	ft/ft
'mn =Manning's n	0.013	
'ke = Entrance loss coefficient	0.5	
'TW = Downstream tailwater depth	0.5	ft
'IEL = Inlet El (Inlet Invert)	1342	
Total Q	10	cfs
HW @ Qmax	154.18	ft

	El.	HW D	Q cfs
1	1342.00	0.00	0
2	1343.00	1.00	2
3	1344.00	2.00	2
4	1345.00	3.00	3
5	0.00	0.00	0
6	0.00	0.00	0
7	0.00	0.00	0
8	0.00	0.00	0
9	0.00	0.00	0
10	0.00	0.00	0



Note: Pipe culvert calcs assume full flow loss for outlet control: inlet control calc based on inlet control equations from HY-6.
User must ensure that the Max Q creates a HW greater than or equal to the depth of basin.
Results based on ADOT Pipe Culvert Program.

Project: 83rd Ave Detention Basins - Calle Lejos State Land Alt — **By:** KBD

Location: Calle Lejos and 87th Ave — **Date:** Sep-04

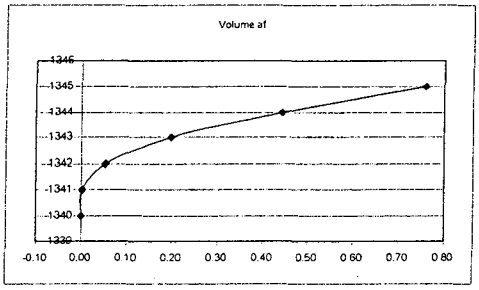
Subject: HEC-1 Storage Route CL3 — **J2 Project #:** 3077

Notes: Storage realtionship for the basin was provided by Jacobs
Depth of basin is 8 feet and max volume is 18.3 acre-ft

	1	2	3	4	5	6	7	8	9	10
RS	1	STOR	0.00							
SV	0.0	0.00	0.05	0.20	0.44	0.76	0.00	0.00	0.00	0.00
SE	1340.0	1341.0	1342.0	1343.0	1344.0	1345.0	0.0	0.0	0.0	0.0
SQ	0	5	19	36	44	46	0	0	0	0

Calle Lejos Detention Basin Route - Peoria 60 Alt

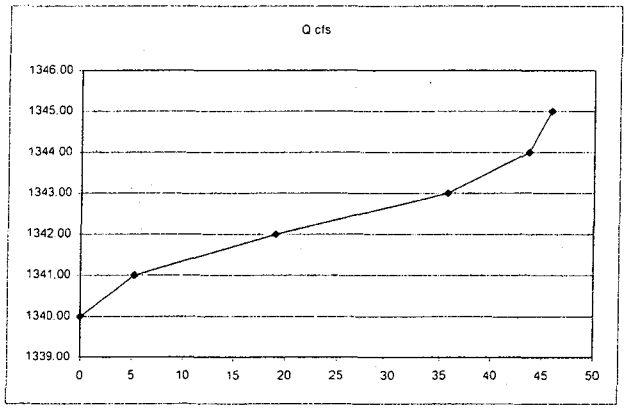
ADMP Concept Basin Parameters		
Fr. Jacobs 8-31-2004		
Elev	Volume cf	Volume af
1340	0	0.00
1341	105	0.00
1342	2333	0.05
1343	8655	0.20
1344	19303	0.44
1345	33092	0.76



Outlet Works - CMP

'np = Number of pipes	1	
'dia = Pipe diameter	3	
'Length = Pipe culvert length	2000	ft
'Slope = Pipe culvert slope	0.004	ft/ft
'mn =Manning's n	0.013	
'ke = Entrance loss coefficient	0.5	
'TW = Downstream tailwater depth	2	ft
'IEL = Inlet El (Inlet Invert)	1340	
Total Q	50	cfs
HW @ Qmax	7.04	ft

	El	HW D	Q cfs
1	1340.00	0.00	0
2	1341.00	1.00	5
3	1342.00	2.00	19
4	1343.00	3.00	36
5	1344.00	4.00	44
6	1345.00	5.00	46
7	0.00	0.00	0
8	0.00	0.00	0
9	0.00	0.00	0
10	0.00	0.00	0



Note: Pipe culvert calcs assume full flow loss for outlet control. Inlet control calc based on inlet control equations from HY-6.
User must ensure that the Max Q creates a HW greater than or equal to the depth of basin.
Results based on ADOT Pipe Culvert Program.

HEC-1 Input – Conveyance Capacity (For Diverts Ops)

Pipe Culvert Design
HDS-5 Methodology

Project: 83rd Ave Detention Basins **By:** KBD

Location: Calle Lejos and 83rd. Pass flows from NW corner to SE corner - Eagle Canyon Dev. **Date:** 7/23/2004

Subject: What is the diversion (capacity) of the 3x24" Pipes to Eagle Canyon detention Basin? **J2 Project #:** 3077

Note: Ans. - It appears to be 60 cfs is the 3 pipe capcity. Therefore 60 cfs is being diverted out to the Eagle Canyon Dev. Basin

Summary

	Q1	Q2	Q3	Qover
T (Yr)	100	100	100	
Q (cfs)	*60*	*60*	*60*	*61*
TW (ft)	1.03	1.03	1.03	1.04
HW (ft)	2.92	2.92	2.92	
Hwel. (ft)	1333.92	1333.92	1333.92	1334.00
Vo (fps)	7.88	7.88	7.88	NA
Vtw (fps)	3.61	3.61	3.61	3.63

Culvert Geometry

Number of pipes	3	
Pipe diameter	2	ft
Pipe culvert length	126	ft
Inlet El (Inlet Invert)	1331.00	ft
Outlet El (Outlet Invert	1330.00	ft
Pipe culvert slope	0.0079	ft/ft

Entrance Type headwall - Ke = 0.5

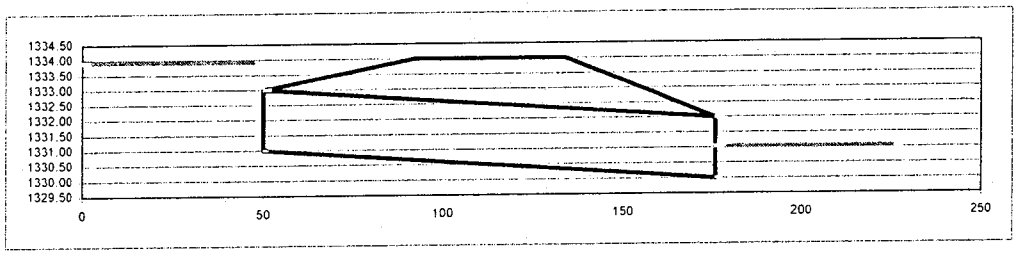
Ke	0.5	
Manning's n	0.012	

Critical El.'s

Allowable headwater	1334.00	ft
Overtopping El	1334.00	ft

TW

Ml (X:1) =	6	
Mr (X:1) =	6	
Bottom Width =	10	ft
Slope =	0.0079	f/ft
Manning's n =	0.03	



Q100 Output

Pipe Dc	1.61	ft
Pipe Dn	1.51	ft
Sequent Depth	1.71	ft
Inlet Control	*2.92*	*ft*
Outlet Control	*2.59*	*ft*
H	*1.78*	*ft*
Ho	*1.80*	*ft*
(Dc+D)/2	*1.80*	*ft*
Control HW	2.92	ft
HW/D	**1.46**	

Direct Step

Y at L = 126	NA	ft
V at L = 126	NA	fps
E =V^2/(2*32.2)	NA	ft
(1+Ke)	NA	
Dir. Hwo = (1+Ke)*E+Y	NA	ft

Calculated HW	**2.92**	ft
HW El	**1333.92**	ft
Based on	1.51	ft
Voutlet	**7.88**	fps

Q100 Output

Pipe Dc	1.61	ft
Pipe Dn	1.51	ft
Sequent Depth	1.71	ft
Inlet Control	*2.92*	*ft*
Outlet Control	*2.59*	*ft*
H	*1.78*	*ft*
Ho	*1.80*	*ft*
(Dc+D)/2	*1.80*	*ft*
Control HW	2.92	ft
HW/D	**1.46**	

Direct Step

Y at L = 126	NA	ft
V at L = 126	NA	fps
E =V^2/(2*32.2)	NA	ft
(1+Ke)	NA	
Dir. Hwo = (1+Ke)*E+Y	NA	ft

Calculated HW	**2.92**	ft
HW El.	**1333.92**	ft
Based on	1.51	ft
Voutlet	**7.88**	fps

Q100 Output

Pipe Dc	1.61	ft
Pipe Dn	1.51	ft
Sequent Depth	1.71	ft
Inlet Control	*2.92*	*ft*
Outlet Control	*2.59*	*ft*
H	*1.78*	*ft*
Ho	*1.80*	*ft*
(Dc+D)/2	*1.80*	*ft*
Control HW	2.92	ft
HW/D	**1.46**	

Direct Step

Y at L = 126	NA	ft
V at L = 126	NA	fps
E =V^2/(2*32.2)	NA	ft
(1+Ke)	NA	
Dir. Hwo = (1+Ke)*E+Y	NA	ft

Calculated HW	**2.92**	ft
HW El.	**1333.92**	ft
Based on	1.51	ft
Voutlet	**7.88**	fps

Note: H = (1 + Ke + 185 * Nmann ^ 2 * L / Diam ^ (4 / 3)) * Q ^ 2 / 39.725 / Diam ^ 4

Pipe Culvert Design
HDS-5 Methodology

Project: 83rd Ave Detention Basins **By:** KBD

Location: North of 83rd Ave and Calle Lejos - Exist 2-18" pipe conveys flow from west side of 83rd Ave to east side. **Date:** 8/15/2004

Subject: What is the diversion (capacity) of the 2x18" pipe. Flows diverted to east side of 83rd Ave. **J2 Project #:** 3077

Note: Ans - It appears to be 18 cfs is the 2 pipe capacity. Therefore 18 cfs is being diverted out to the east side of 83rd Ave

Summary

	Q1	Q2	Q3	Qover
T (Yr)	100	100	100	98.5
Q (cfs)	6	12	18	18
TW (ft)	0.29	0.43	0.53	0.53
HW (ft)	0.93	1.45	2.56	2.50
Hwel. (ft)	1335.93	1336.45	1337.56	1337.50
Vo (fps)	4.15	4.89	6.13	NA
Vtw (fps)	2.63	3.25	3.67	3.66

Culvert Geometry

Number of pipes	2	
Pipe diameter	1.5	ft
Pipe culvert length	105	ft
Inlet El (Inlet Invert)	1335.00	ft
Outlet El (Outlet Invert	1333.00	ft
Pipe culvert slope	0.0190	ft/ft

Entrance Type headwall - Ke = 0.5

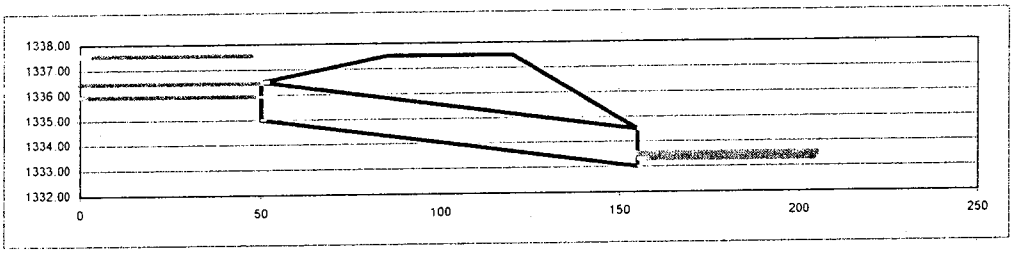
Ke	0.5	
Manning's n	0.024	

Critical El.'s

Allowable headwater	1337.50	ft
Overtopping El	1337.50	ft

TW

Ml (X:1) =	6	
Mr (X:1) =	6	
Bottom Width =	6	ft
Slope =	0.0190	f/ft
Manning's n =	0.03	



Q100 Output

Pipe Dc	0.66	ft
Pipe Dn	0.64	ft
Sequent Depth	0.67	ft
Inlet Control	*0.93*	*ft*
Outlet Control	*-0.56*	*ft*
H	*0.36*	*ft*
Ho	*1.08*	*ft*
(Dc+D)/2	*1.08*	*ft*
Control HW	0.93	ft
HW/D	**0.62**	HWo calc maybe invalid (cons

Use a Direct Step Estimate.

Direct Step

Y at L = 105	NA	ft
V at L = 105	NA	fps
E =V^2/(2*32.2)	NA	ft
(1+Ke)	NA	
Dir. Hwo = (1+Ke)*E+Y	NA	ft

Calculated HW	**0.93**	ft
HW El	**1335.93**	ft
Based on	0.64	ft
Voutlet	**4.15**	fps

Q100 Output

Pipe Dc	0.95	ft
Pipe Dn	0.98	ft
Sequent Depth	1.25	ft
Inlet Control	*1.45*	*ft*
Outlet Control	*0.66*	*ft*
H	*0.36*	*ft*
Ho	*1.22*	*ft*
(Dc+D)/2	*1.22*	*ft*
Control HW	1.45	ft
HW/D	**0.96**	

Direct Step

~~Y at L~~ = 105	NA	ft
V at L = 105	NA	fps
E =V^2/(2*32.2)	NA	ft
(1+Ke)	NA	
Dir. Hwo = (1+Ke)*E+Y	NA	ft

Calculated HW	**1.45**	ft
HW El	**1336.45**	ft
Based on	0.98	ft
Voutlet	**4.89**	fps

Q100 Output

Pipe Dc	1.16	ft
Pipe Dn	1.50	ft
Sequent Depth	1.16	ft
Inlet Control	*2.02*	*ft*
Outlet Control	*2.56*	*ft*
H	*3.23*	*ft*
Ho	*1.33*	*ft*
(Dc+D)/2	*1.33*	*ft*
Control HW	2.56	ft
HW/D	**1.71**	

Direct Step

Y at L = 105	NA	ft
V at L = 105	NA	fps
E =V^2/(2*32.2)	NA	ft
(1+Ke)	NA	
Dir. Hwo = (1+Ke)*E+Y	NA	ft

Calculated HW	**2.56**	ft
HW El	**1337.56**	ft
Based on	1.16	ft
Voutlet	**6.13**	fps

Note: H = (1 + Ke + 185 * Nmann ^ 2 * L / Diam ^ (4 / 3)) * Q ^ 2 / 39.725 / Diam ^ 4

J2 Engineering and Environmental Design

Circular Channel Hydraulic Calculations

Project: 83rd Ave Detention Basins
Subject: Pinnacle Peak Offline Diversion Pipes

By: KBD
Date: September-04
Checked:
Project No.: 3077

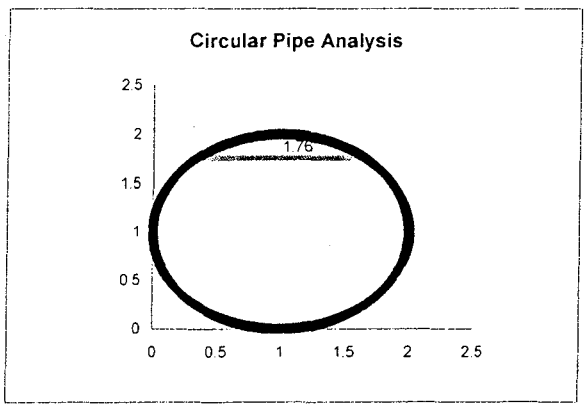
Input

Descriptor = Diversion Pipe Route (N and West inflow points

Design Event (Year) =	100	Yr
Flowrate =	25	cfs
Diameter =	2	ft
Slope =	0.0110	ft/ft
Manning's n =	0.0130	
Units	1	(1 for US Customary and 2 for SI)

Output

Normal Depth =	**1.76**	**ft**	Critical Depth =	1.76	ft
Velocity =	**8.54**	**fps**	Critical Velocity =	8.53	fps
Hydraulic Top Width =	1.30	ft	Qfull =	23.62	cfs
Flow Area =	2.93	Sq. ft.	Vfull =	7.57	fps
Froude Number =	1.005				



Engineering and Environmental Design

Irregular Channel Normal Depth Analysis

		By:	KBD
Project:	83rd Ave Detention Basins	Date:	8/18/2004
		Checked:	
Subject:	Determine the street capacity for Calle Lejos	Client Project No.:	
	Used to estimate divert in HEC-1 model	J2 Project No. :	3077
	Assume breakout is 3 inches above low pt on south side of street (about 1336)		

	Station	Elevation	N Value
1	0	1336.81	0.03
2	29.9	1336.09	0.03
3	30.15	1335.68	0.03
4	54.05	1336.01	0.03
5	67.6	1335.83	0.03
6	78.91	1334.99	0.03
7	84.24	1335.7	0.03
8	92.71	1335.75	0.03
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			

Input:

Q =	35	cfs
Slope =	0.006	'/ft

Output:

Normal depth =	1.00	ft
Wsel =	1335.99	
Max. Velocity=	2.84	fps
Average Velocity =	2.11	fps
Flow Area =	16.56	ft^2
Wetted Perimeter =	59.65	ft
Hydraulic Radius R =	0.28	ft
Top Width =	59.40	ft
Hydraulic Depth =	0.28	ft
Froude Number =	0.71	
(Q-Qcalced)/Q*100 =	8.88262E-08	%
Qcalced =	35.0000	cfs

Engineering and Environmental Design

Irregular Channel Normal Depth Analysis

		By:	KBD
Project:	83rd Ave Detention Basins	Date:	9/22/2004
		Checked:	
Subject:	Determine the flow that can be carried by 83rd Ave	Client Project No.:	
	east side swale, south of Pinnacle Peak	J2 Project No. :	3077

	Station	Elevation	N Value
1	0	3	0.03
2	12	0	0.03
3	18	0	0.03
4	30	3	0.03
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			

Input:

Q =	260	cfs
Slope =	0.004	'/ft

Output:

Normal depth =	2.99	ft
Wsel =	2.99	
Max. Velocity=	6.50	fps
Average Velocity =	4.84	fps
Flow Area =	53.67	ft^2
Wetted Perimeter =	30.65	ft
Hydraulic Radius R =	1.75	ft
Top Width =	29.91	ft
Hydraulic Depth =	1.79	ft
Froude Number =	0.64	
(Q-Qcalced)/Q*100 =	8.67979E-04	%
Qcalced =	259.9977	cfs

Engineering and Environmental Design

Irregular Channel Normal Depth Analysis

		By:	KBD
Project:	83rd Ave Detention Basins	Date:	9/22/2004
		Checked:	
Subject:	Determine the street capacity for Pinnacle Peak east of 83rd	Client Project No.:	
	1/2 street capacity to enter Clearview retention basin	J2 Project No. :	3077
	30' 1/2 street width		

	Station	Elevation	N Value
1	0	0	0.016
2	30	0.6	0.016
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			

Input:

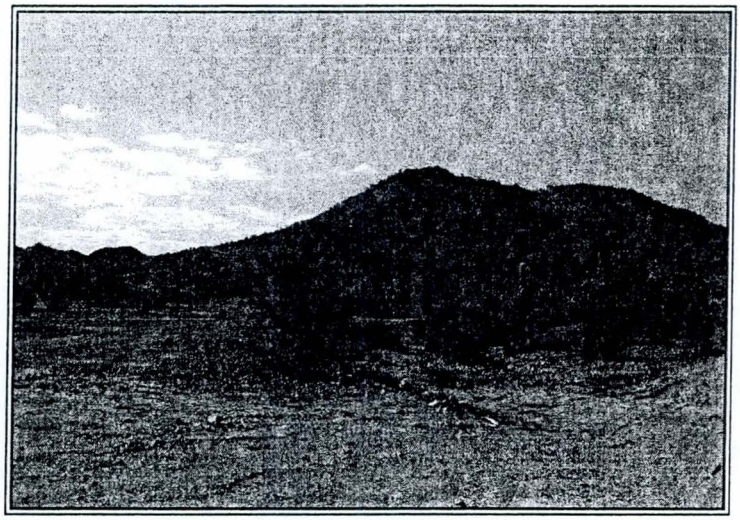
Q =	12	cfs
Slope =	0.0011	'/ft

Output:

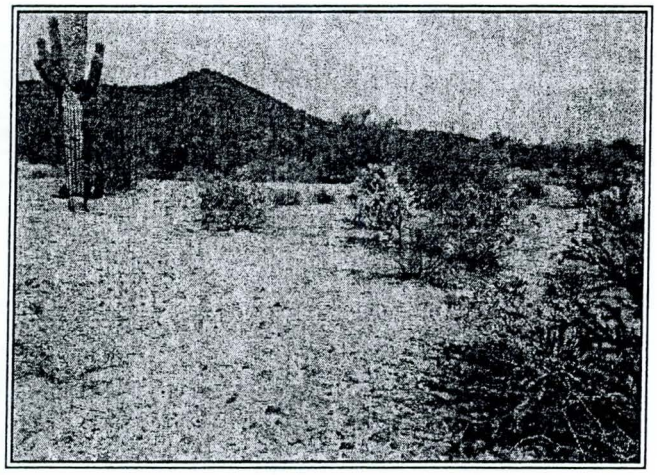
Normal depth =	0.59	ft
Wsel =	0.59	
Max. Velocity=	1.37	fps
Average Velocity =	1.37	fps
Flow Area =	8.77	ft^2
Wetted Perimeter =	29.62	ft
Hydraulic Radius R =	0.30	ft
Top Width =	29.61	ft
Hydraulic Depth =	0.30	ft
Froude Number =	0.44	
(Q-Qcalced)/Q*100 =	1.38875E-04	%
Qcalced =	12.0000	cfs

Appendix D: Photo Inventory

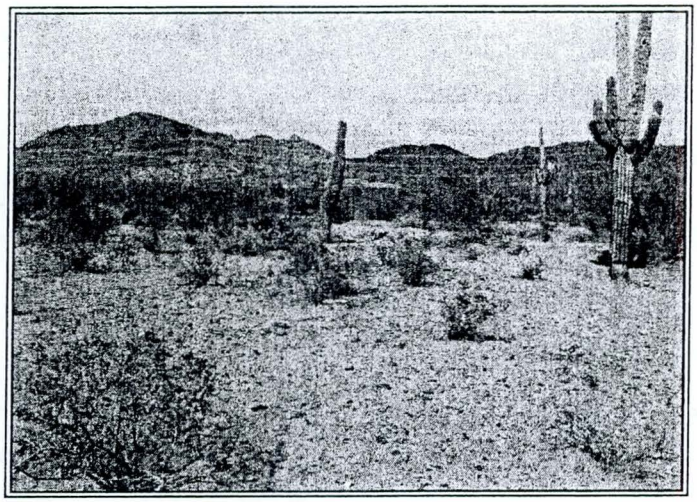
Drainage Photo Inventory



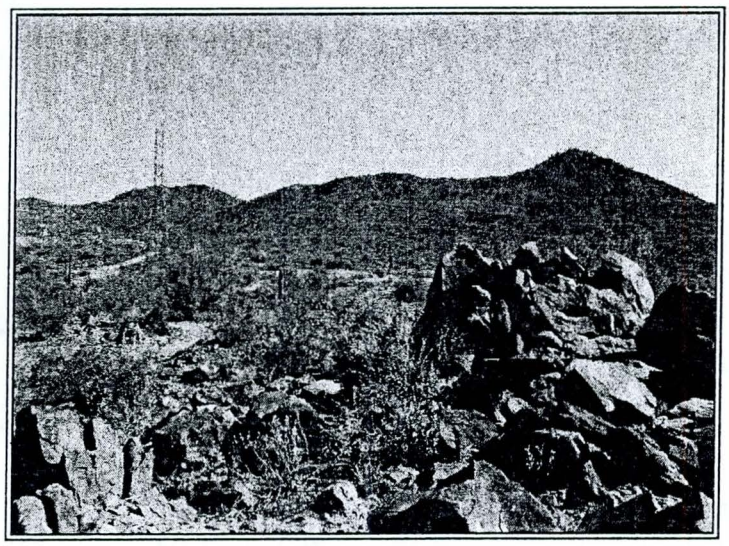
East side of Sunrise Mountain – This is the top of the contributing drainage area.



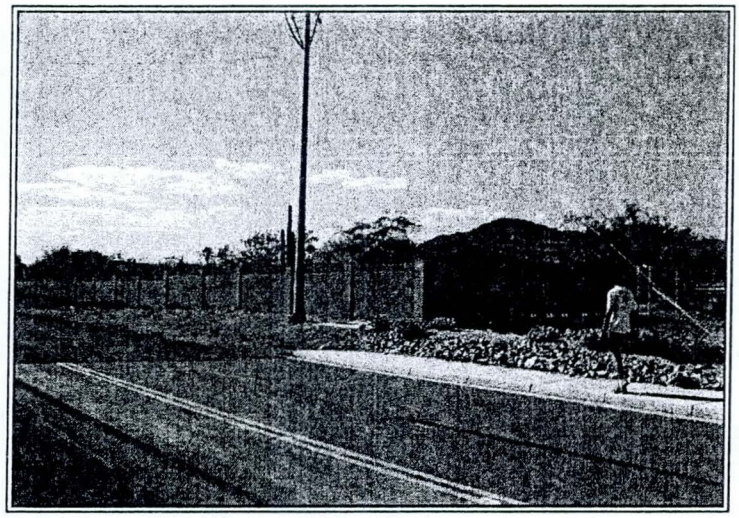
Calle Lejos detention basin site, view NE, Note Saguaros must be relocated



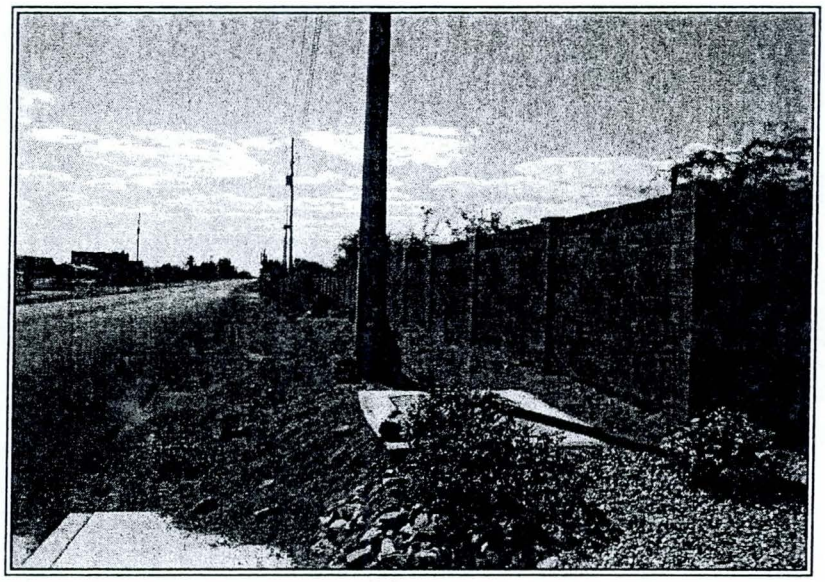
Calle Lejos detention basin site, view north (note transmission lines to north of parcel)



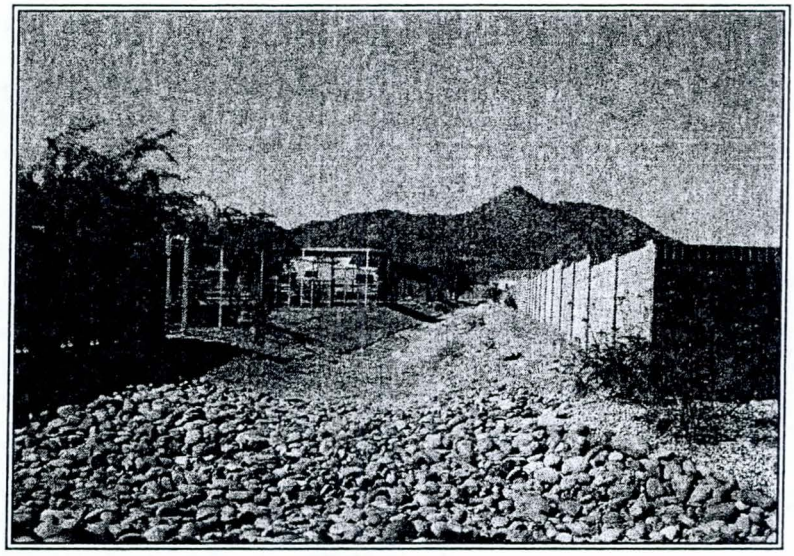
Looking from the knoll north of Calle Lejos Road. The power lines are 240 KV and are located in a ~~corridor~~ that also was considered as a possible site for a proposed northern detention basin.



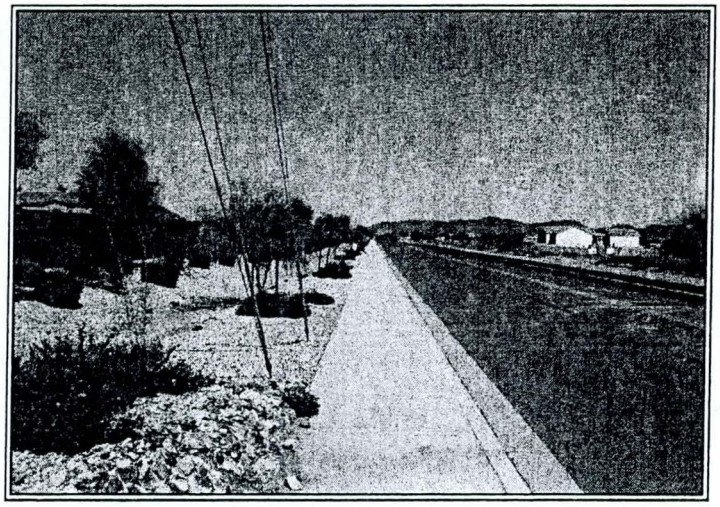
Calle Lejos Road near 85th Ave. looking northwest. Note the power lines and the riprap area indicating the incoming swale. The swale collects flows from the north and east and routes to Calle Lejos Road where it is turned ninety degrees to the east.



Looking east along Calle Lejos Road at approximately 85th Ave. Note location of power poles and width of shoulder.

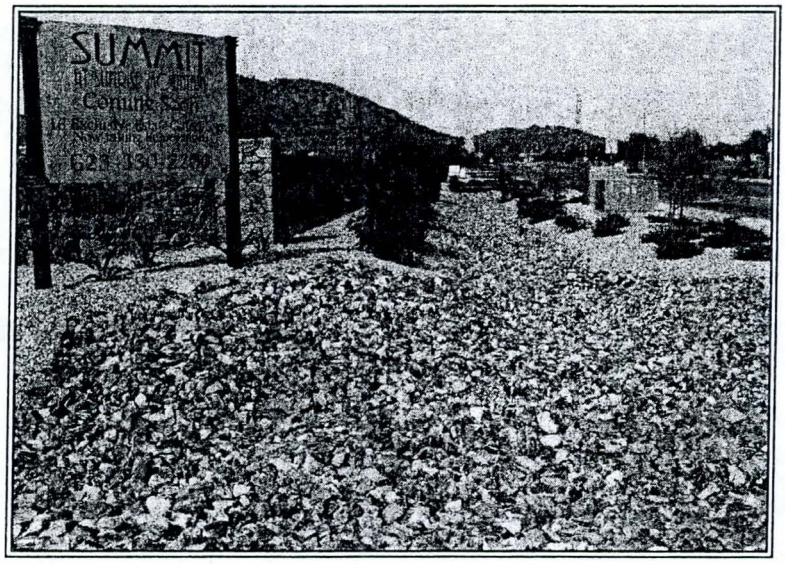


Looking north along the incoming swale on the south west side of the Summit at Sunrise development. The swale collects offsite flows impacting Summit at Sunrise.

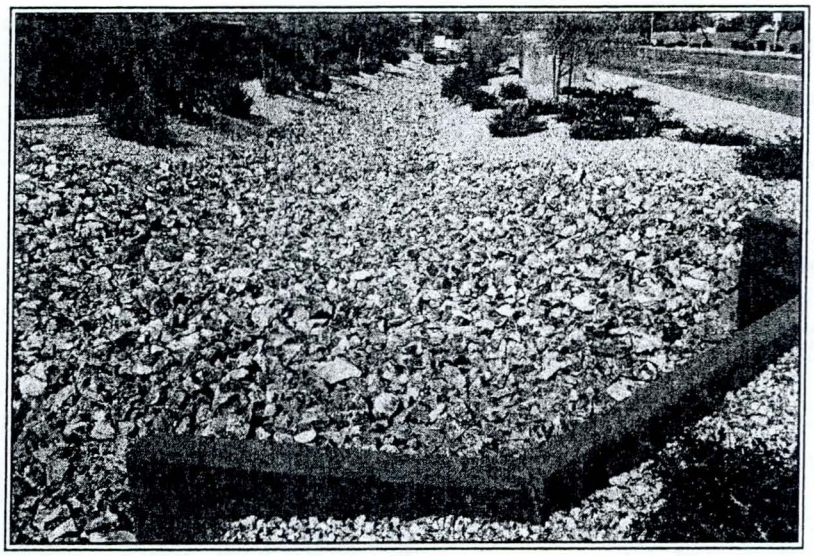


Looking east along Calle Lejos Road. The swale on the left does not have adequate capacity to carry the existing flows. Flows breakout into the roadway and once the street capacity is exceeded, the flows breakout to the southeast towards 83rd Avenue.

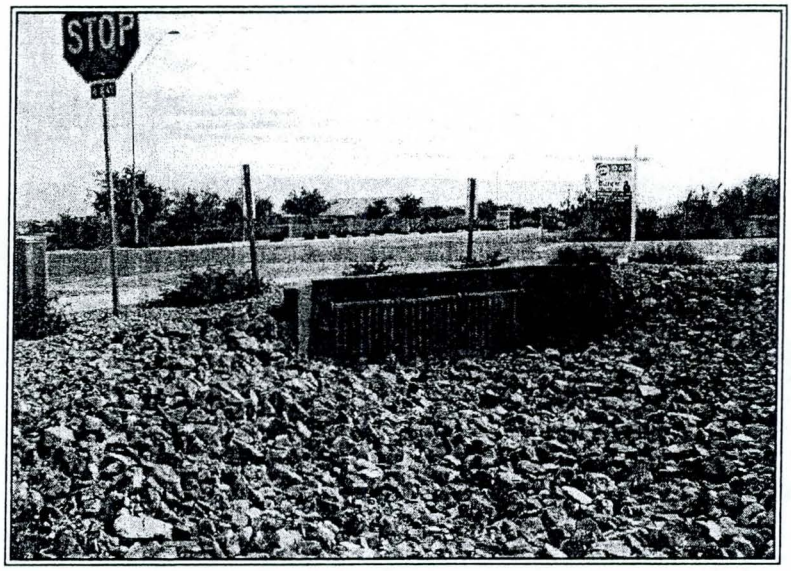
3-24" concrete pipe culverts. Looking to the west at 83rd and Calle Lejos.



83rd Ave at Calle Lejos Road , View North, Note existing landscaping that will be emulated on new 83rd Avenue channel.

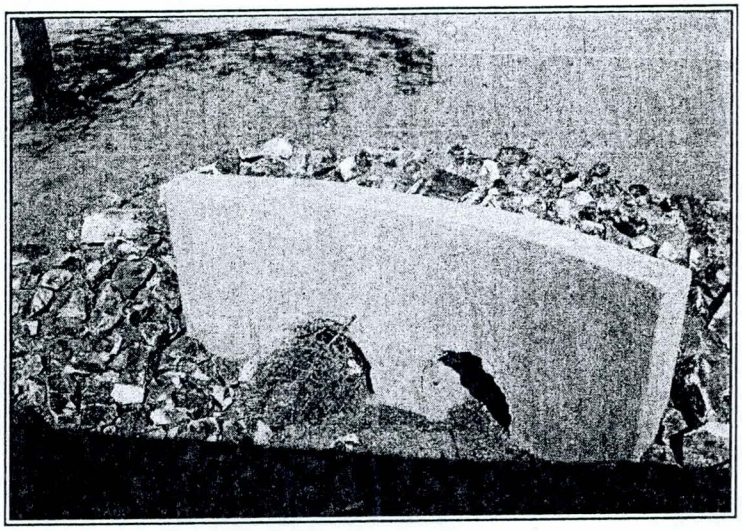


Headwall at 83rd Ave and Calle Lejos Road, northwest corner, Note skew angle



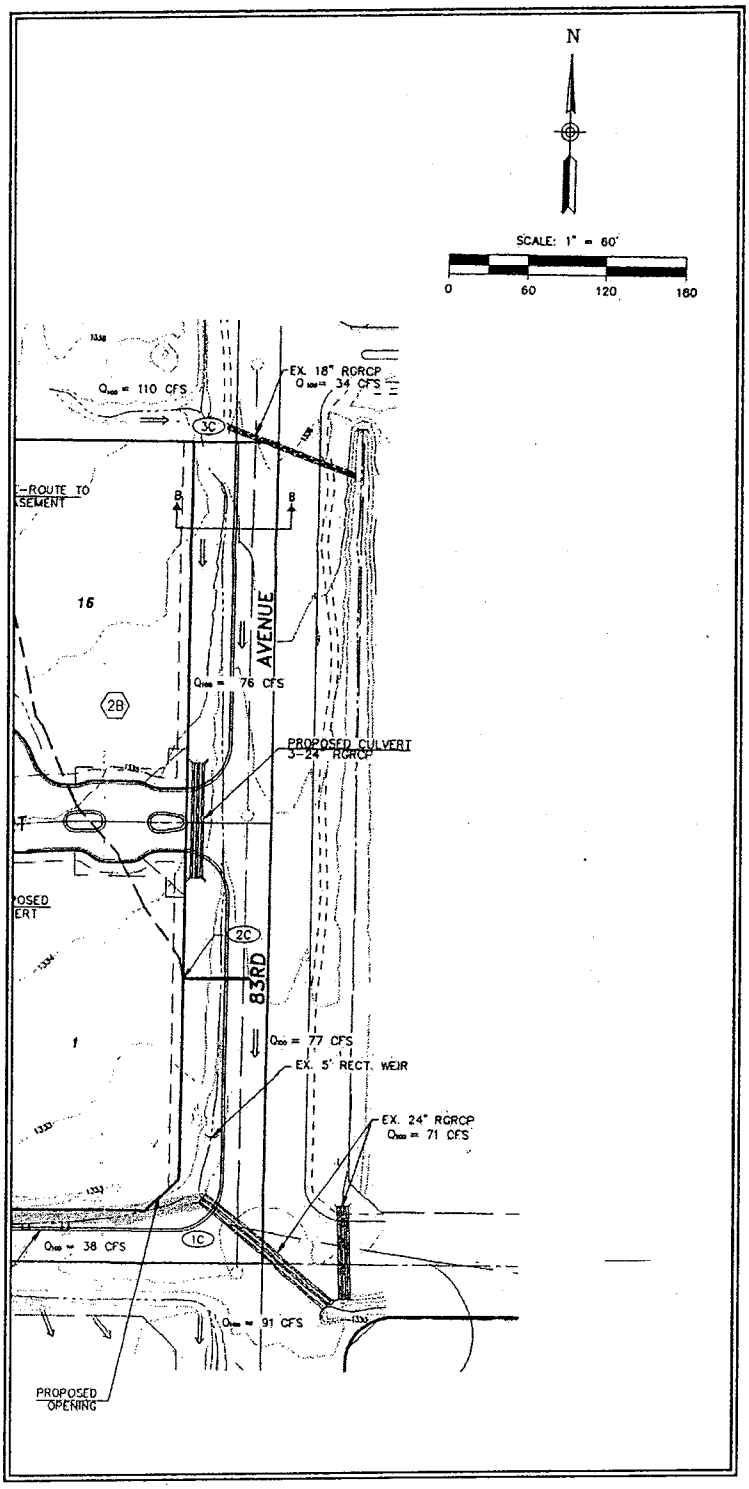
Same inlet headwall looking SE at 83rd Ave and Calle Lejos Road.

Three (3)-24-inch concrete pipe culverts are located at the end of the Calle Lejos Road north swale, at 83rd Avenue and Calle Lejos Road. The pipes route flows to the southeast corner of the intersection – to a detention basin. Flows are also conveyed from the north via a similar riprap swale. Flows that breakout at this point flow south along 83rd Avenue towards Pinnacle Peak Road.

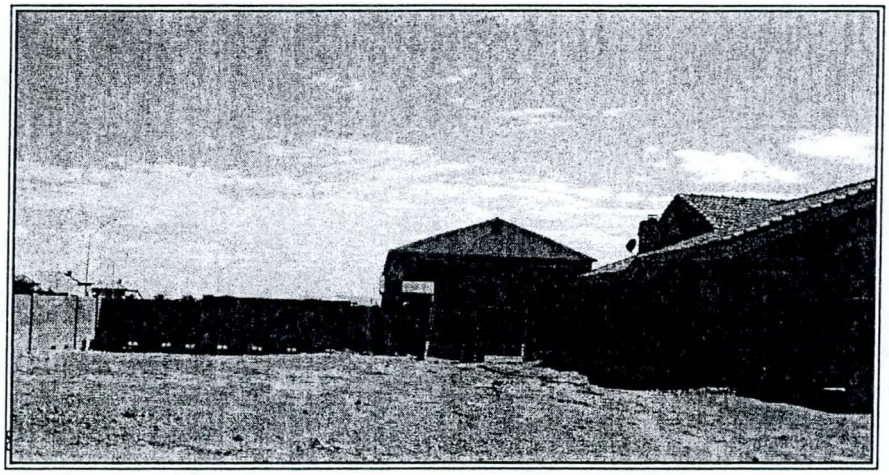


The swale located along the west side of 83rd Avenue north of Calle Lejos Road includes 2-18" concrete pipe culverts at approximately Park View. The pipes cross 83rd Avenue to the east side riprap swale and flow south. These pipes pass a portion of the flow to the east side of 83rd Avenue. The reminder continues to Calle Lejos. The east and west swales route flows to the Eagle Canyon development detention basin.

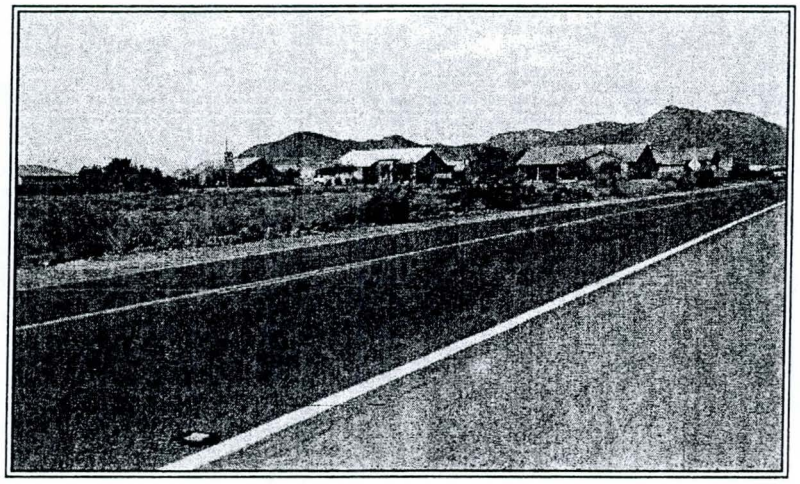
The figure below shows the overall drainage scheme along 83rd Avenue north of Calle Lejos Road. The schematic was taken from the Summit at Sunrise Mountain Development drainage report.


N
SCALE: 1" = 60'
0
60
120
160
EX. 18" RGRCP
Q100 = 34 CFS
Q100 = 110 CFS
3C
ROUTE TO
SEMENT
B
B
16
AVENUE
Q100 = 76 CFS
2B
PROPOSED CULVERT
3-24" RGRCP
POSED
ERT
2C
83RD
1
Q100 = 77 CFS
EX. 5' RECT. WEIR
EX. 24" RGRCP
Q100 = 71 CFS
1C
Q100 = 38 CFS
Q100 = 91 CFS
PROPOSED
OPENING

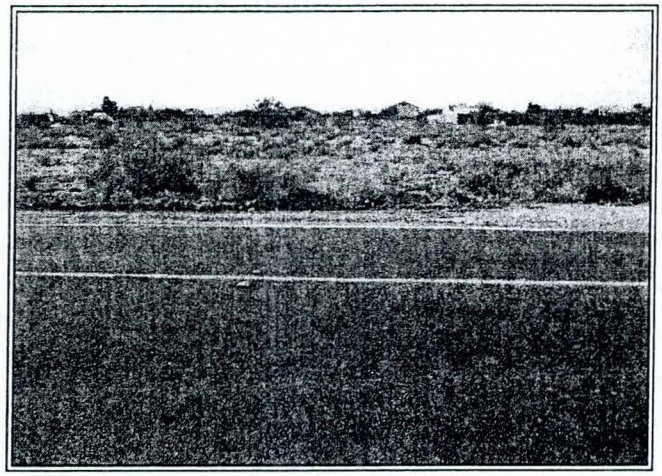
Sheet flow is the predominant drainage pattern between Calle Lejos Road and Pinnacle Peak Roads. The land-use between Calle Lejos Road and Pinnacle Peak Road is light residential. A readily identifiable drainage problem is located on the southwest corner of south of Avenida del Sol and 83rd Avenue. Sheet flows from the northwest concentrate at the corner of 83rd and Avenida del Sol. The flow crosses south over Avenida del Sol and impact the block wall of the corner property. Flows have undercut the corner of the wall causing failure. A 1 foot high berm was constructed on the north side of Avenida del Sol as an attempt to divert flows.



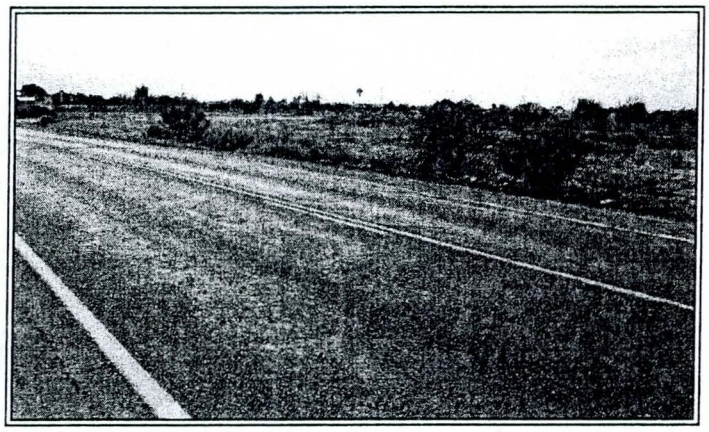
Damaged property located on the southwest corner of Avenida del Sol and 83rd Avenue.



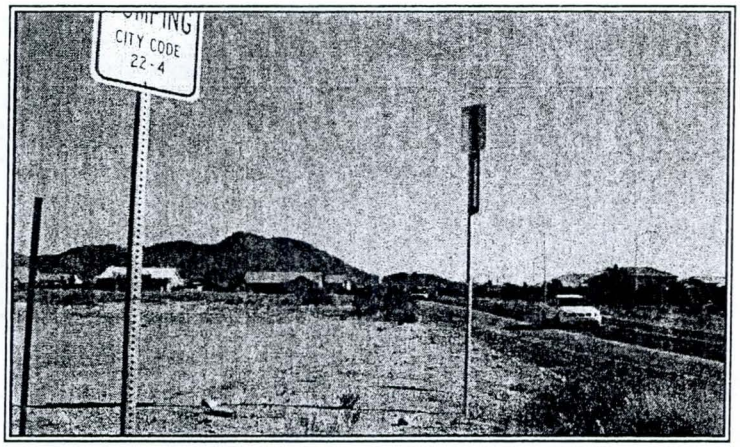
Looking northwest along 83rd Avenue north of Pinnacle Peak Road. Note the grade of the roadway. The predominant flow pattern is sheet flow to the southeast, towards New River.



83rd Ave just north of Pinnacle Peak Road, View west across Pinnacle Peak Basin Site

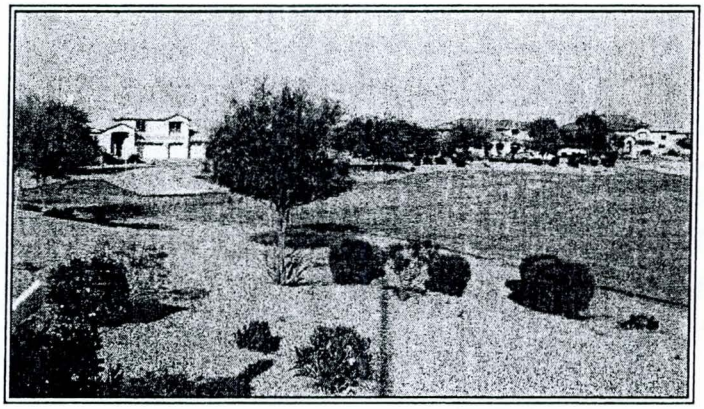


83rd Ave just north of Pinnacle Peak Road, View southwest

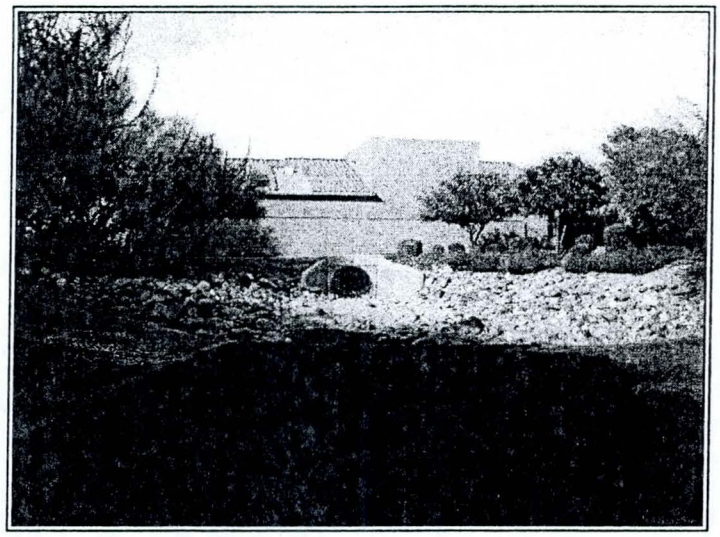


The northwest corner of Pinnacle Peak Road and 83rd Avenue. Photo taken looking north from the east side. The open lot area is where the proposed Pinnacle Peak detention basin will be located. Note the roadside swale on the west side of 83rd Avenue.

A retention basin is located on the northeast corner of 83rd Avenue and Pinnacle Peak Road. The following photo shows the basin.



The Clear View Estates retention basin is a 6.2 acre-ft. turfed basin. It is drained within 36 hours via percolation through the basin floor. It was designed to hold the onsite 100-year 2-hour storm volume including the half street flows along Pinnacle Peak Road adjacent to the development.



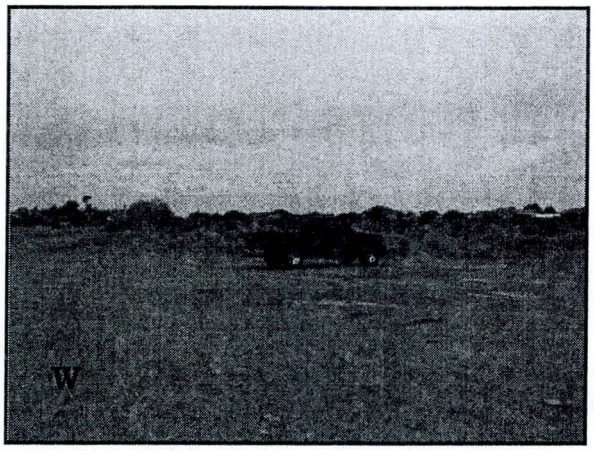
Existing 42x29-inch elliptical pipe at the proposed outfall point (Deer Valley Estates) south of Williams Road along east side of 83rd Avenue. Photo is taken looking north.

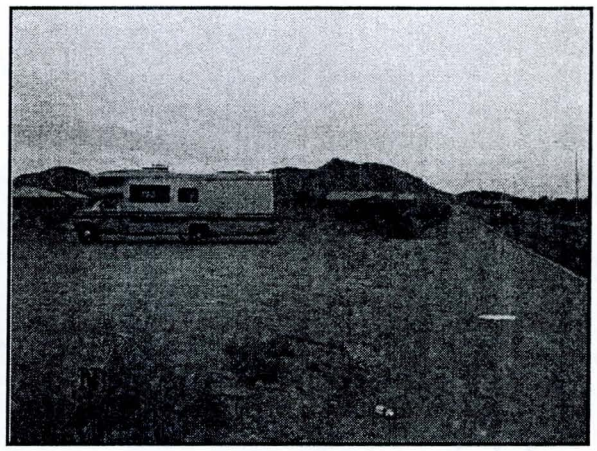
Appendix B

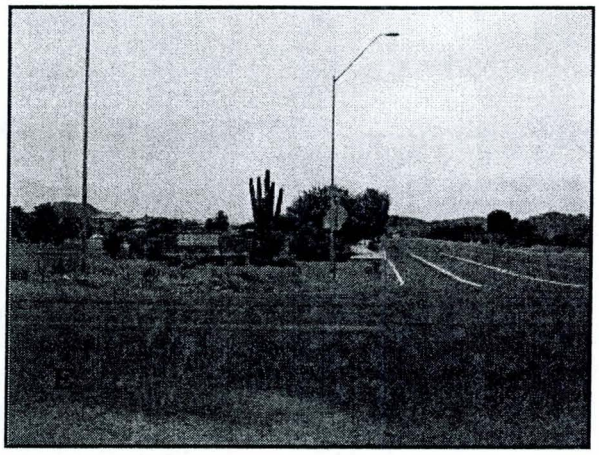
Photograph Inventory

Landscape Photograph Inventory

The design team photographed the project site during the data collection phase of the project. Those photographs are documented in this appendix. The locations where the photographs were taken are shown in the Scenery Resources Assessment.







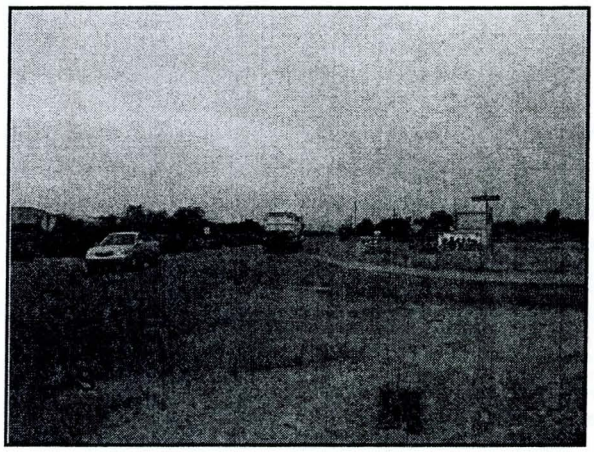
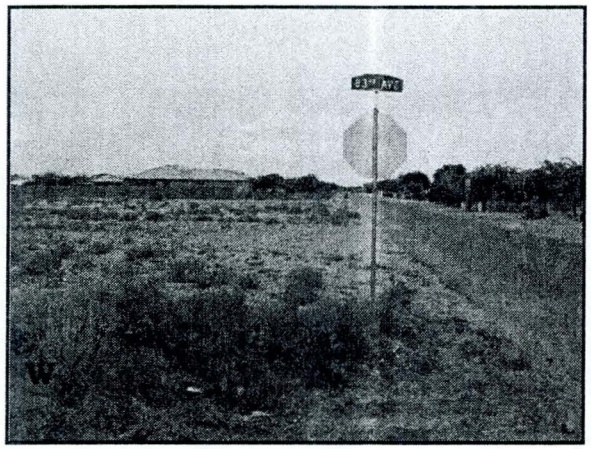
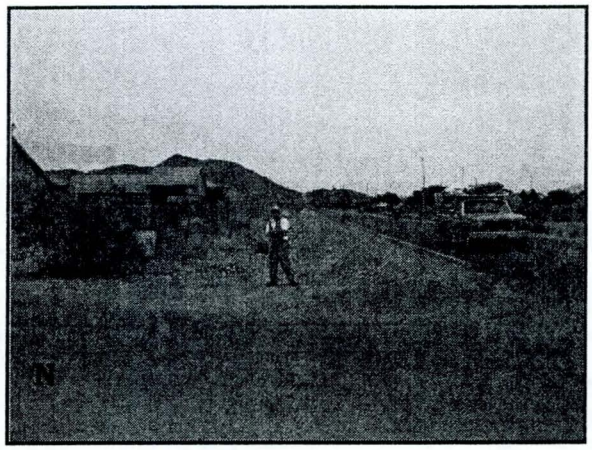
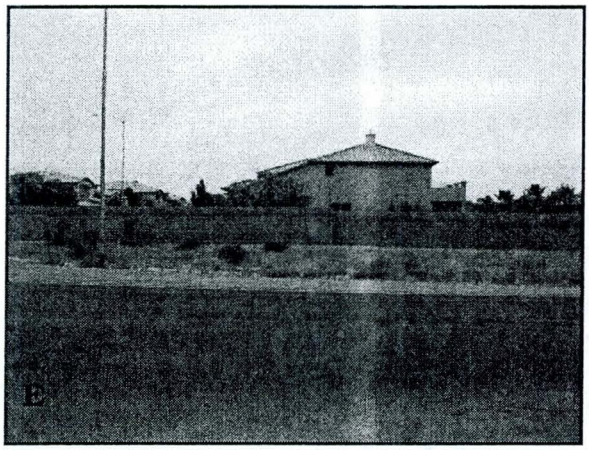


Photo location 1, taken at the NW corner of Pinnacle Peak Road and 83rd Avenue.







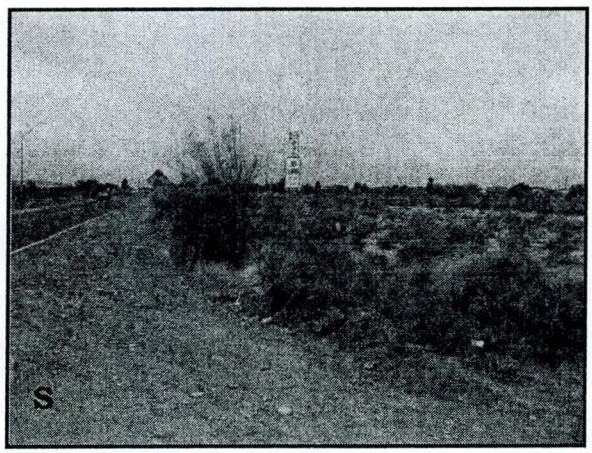
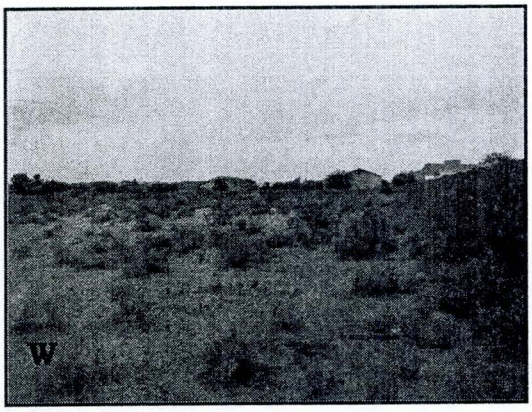


Photo location 2, taken at the SW corner of Camino de Oro Road and 83rd Avenue.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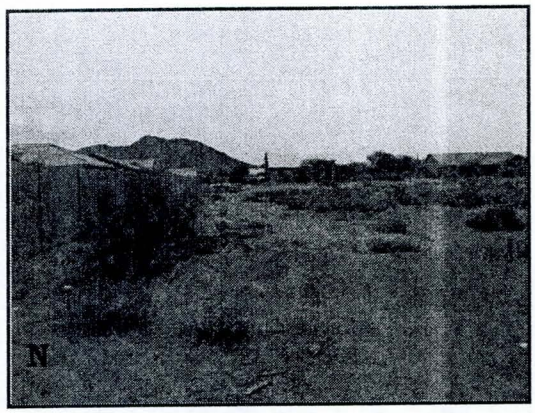
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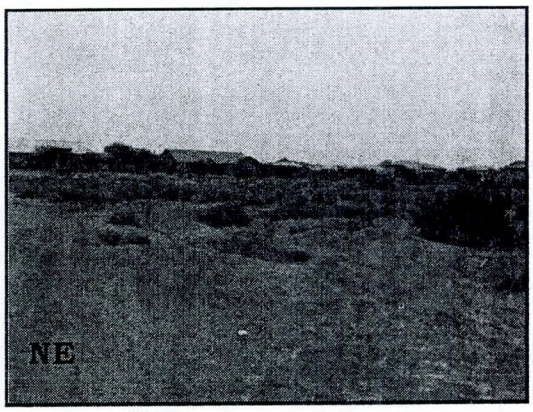
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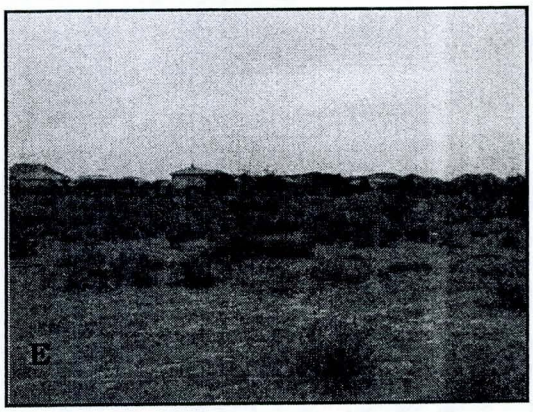
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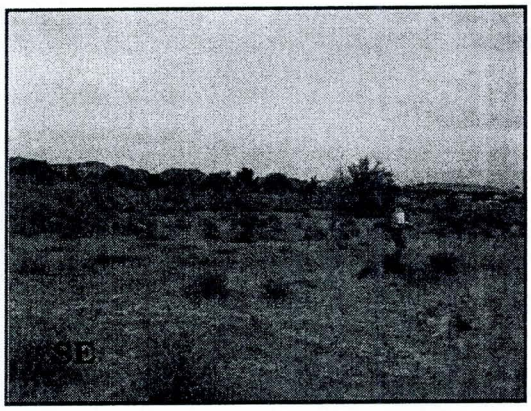
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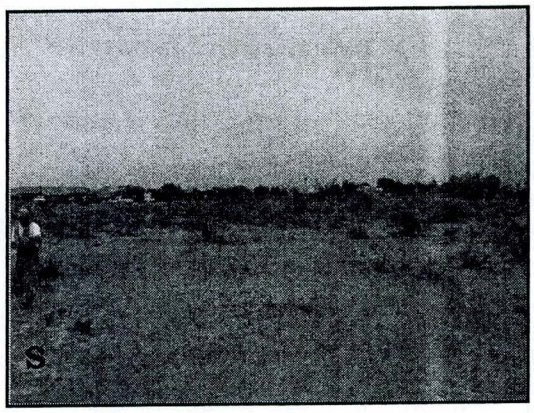

S

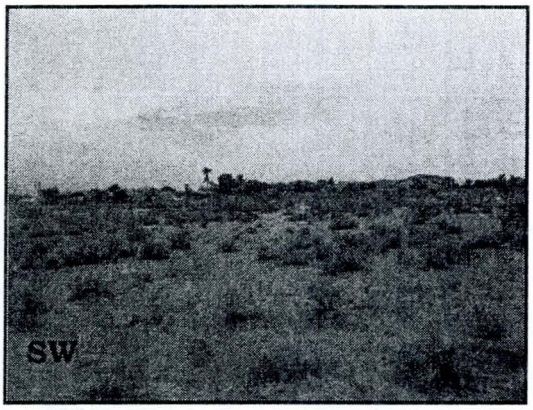
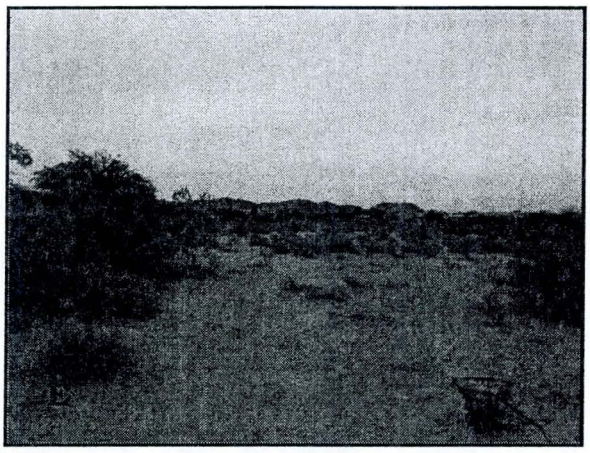
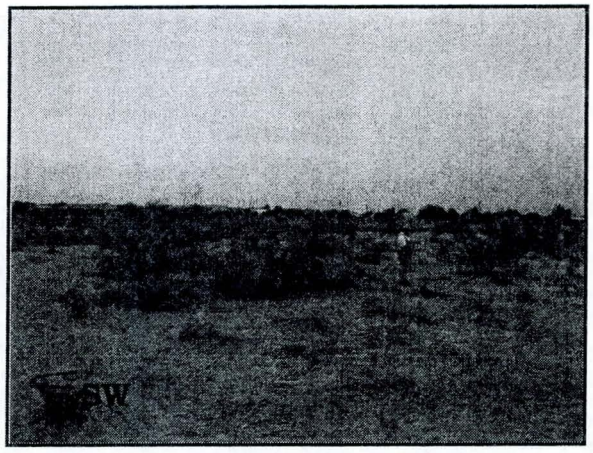


Photo location 3, taken at the middle area of the proposed Pinnacle Peak basin zone.





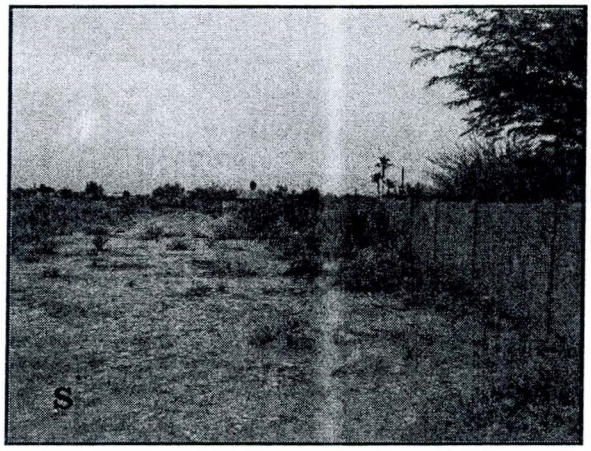
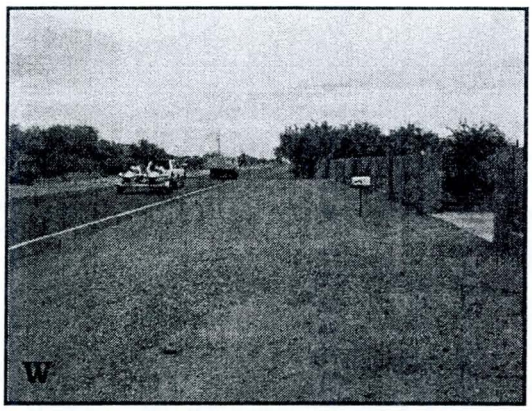
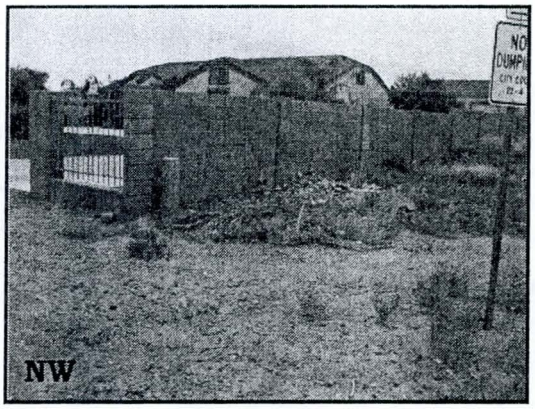
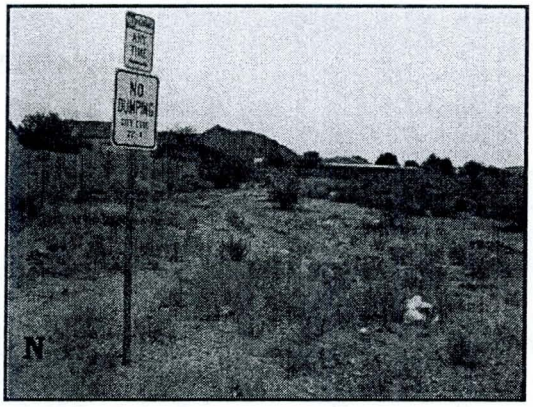
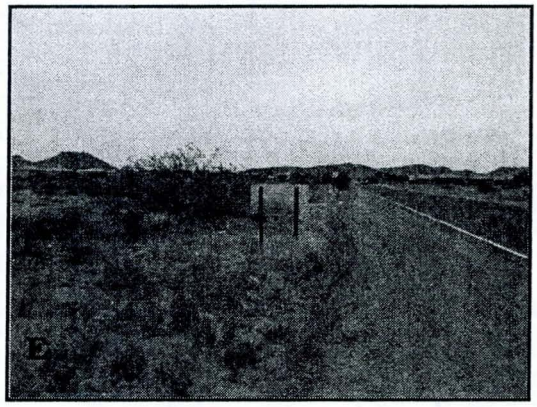


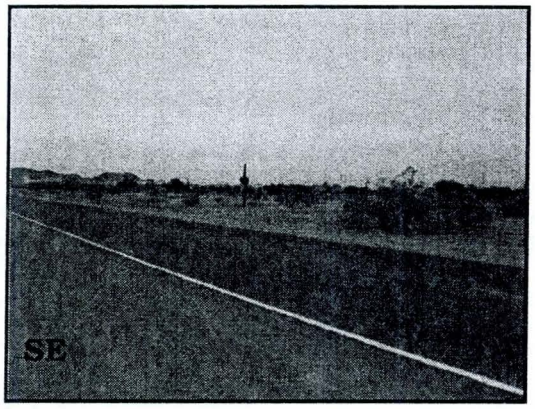
Photo location 4, taken at the western side of the proposed Pinnacle Peak basin zone.











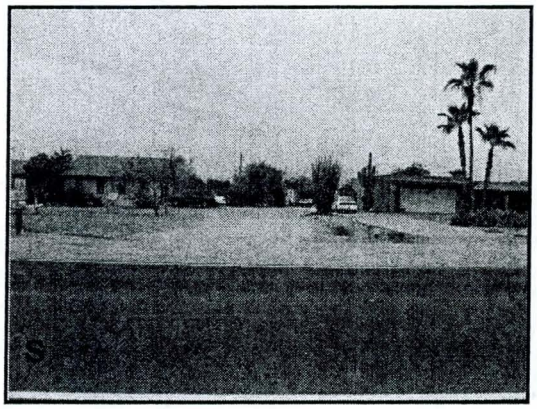
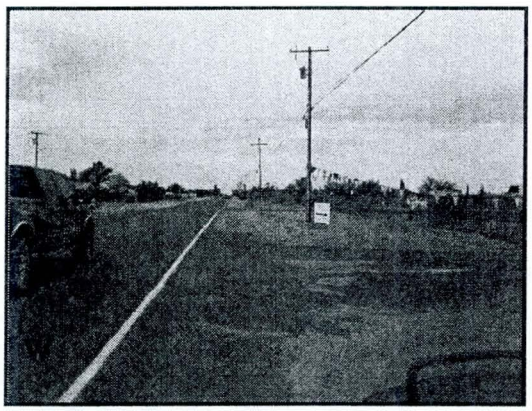


Photo location 5, taken at the southwestern corner of the proposed Pinnacle Peak basin zone, along Pinnacle Peak Road.



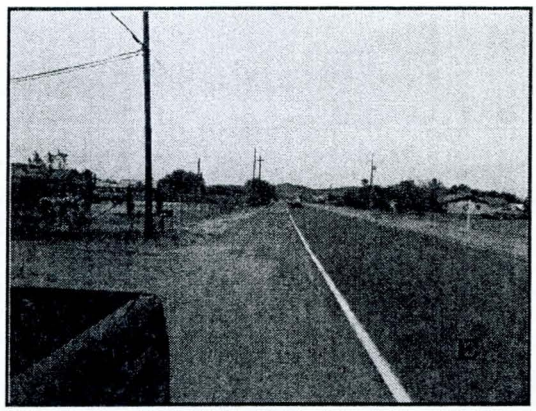
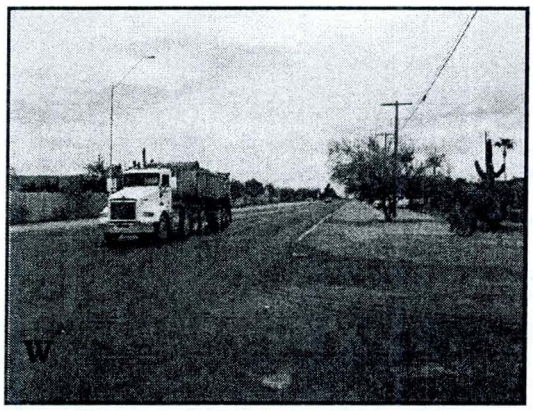
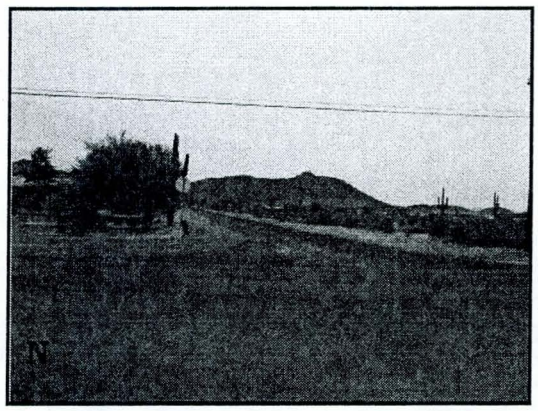
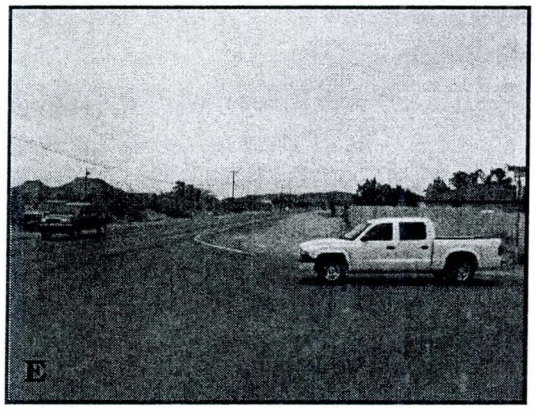


Photo location 6, (two photos above) taken along Pinnacle Peak Road at the entrance to a commercial garden center.







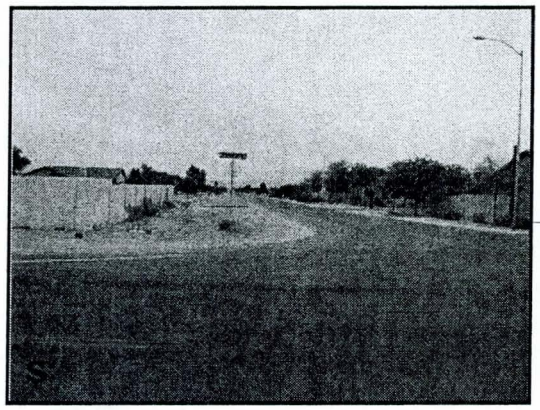
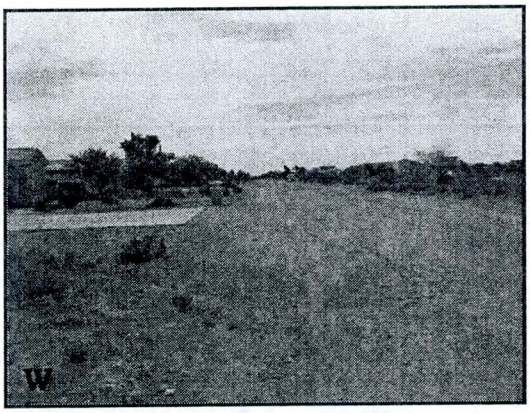
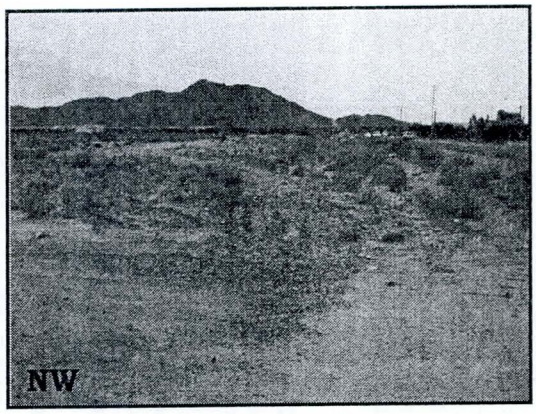
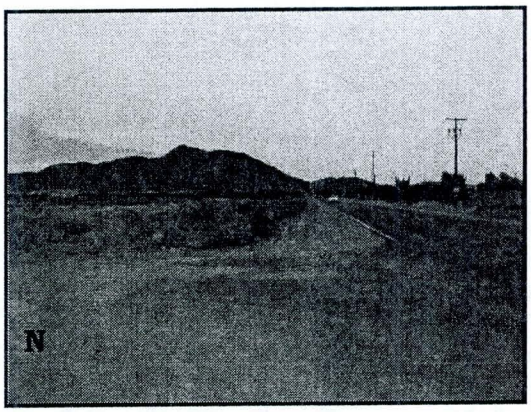
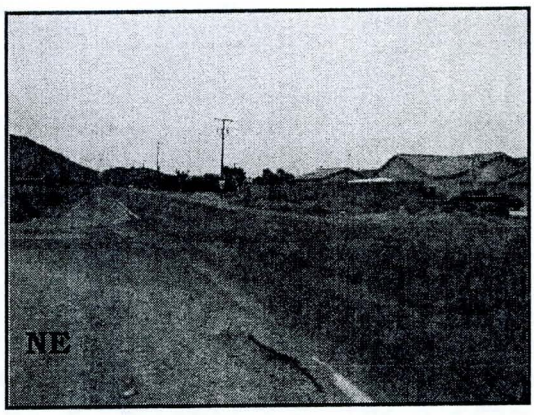


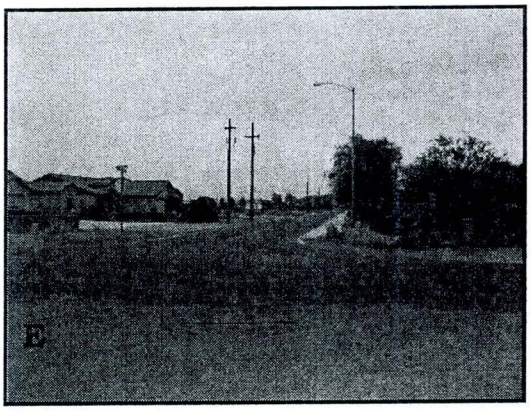
Photo location 7, (four photos above) taken at the corner of 87th Avenue and Pinnacle Peak Road.

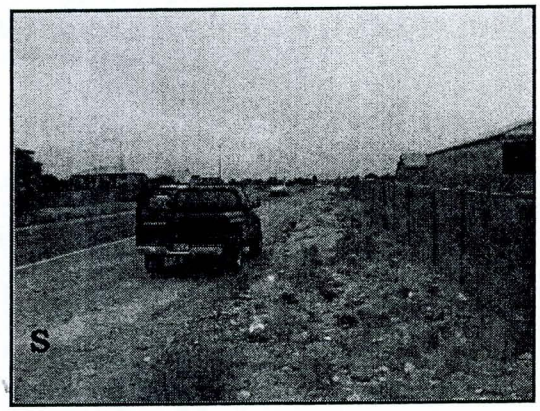












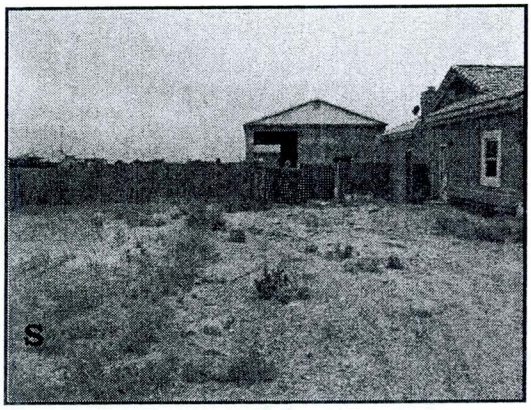
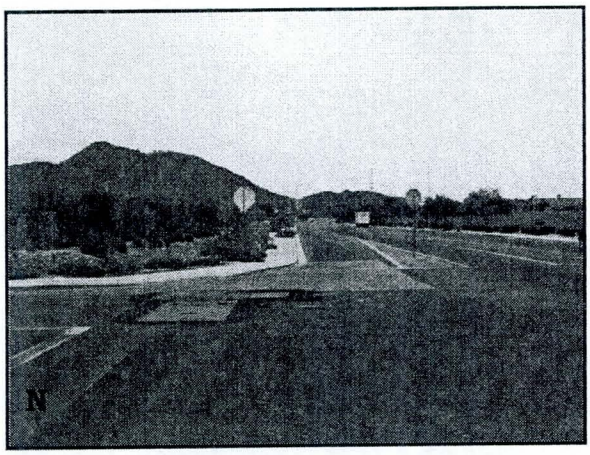
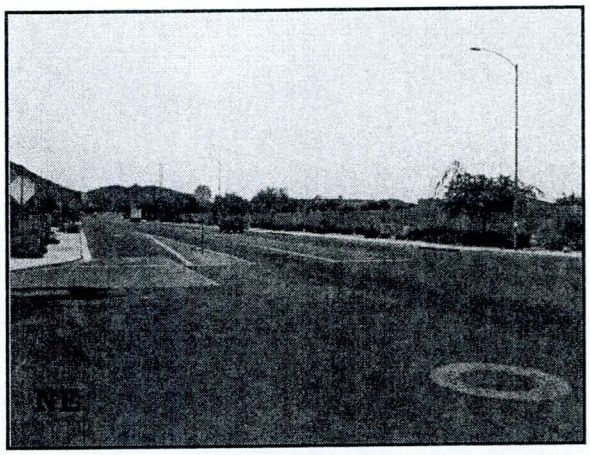
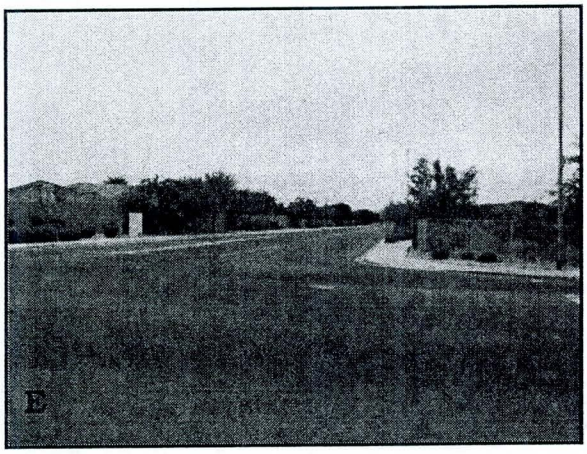
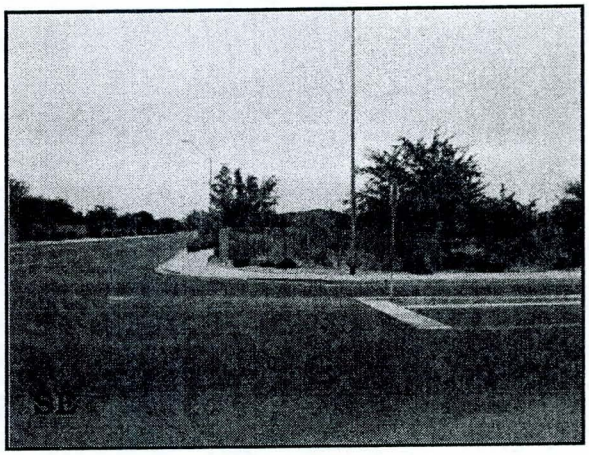


Photo location 8, taken at the corner of Avenida del Sol and 83rd Avenue.









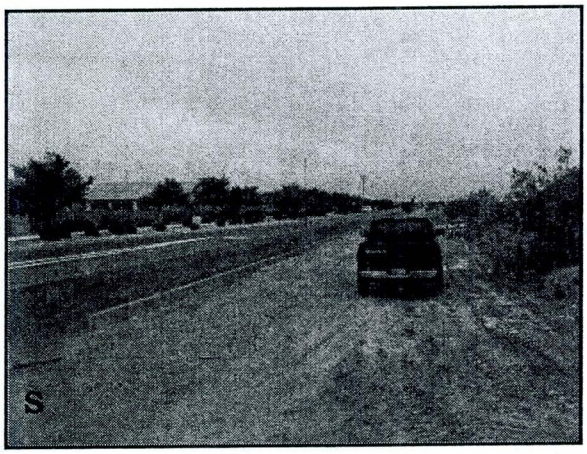
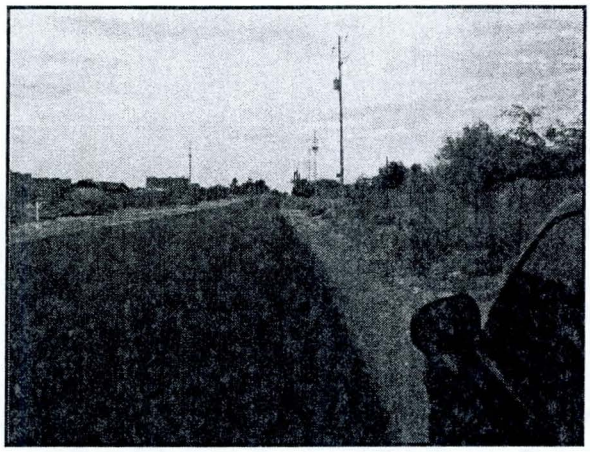
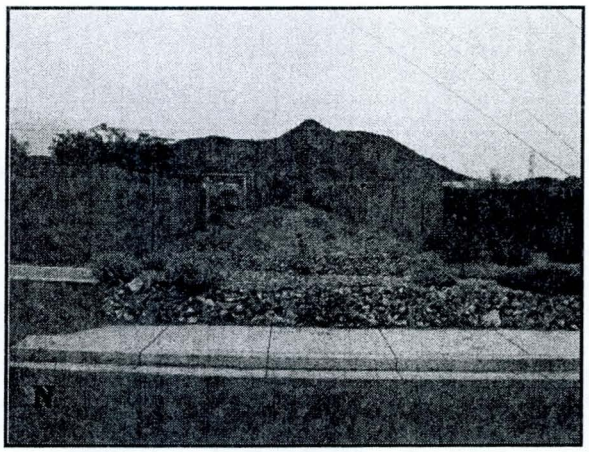


Photo location 9, taken at the corner of Calle Lejos and 83rd Avenue.





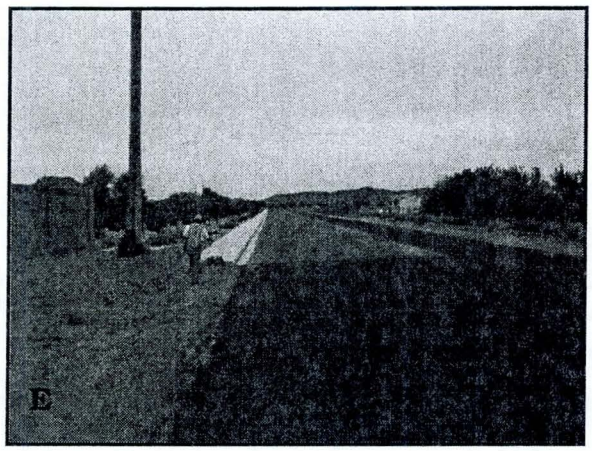
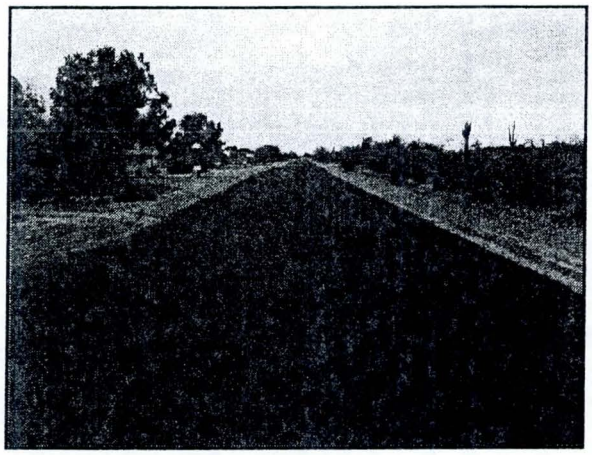
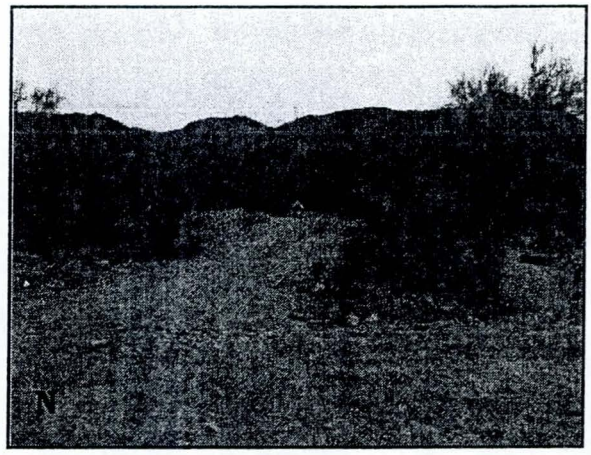
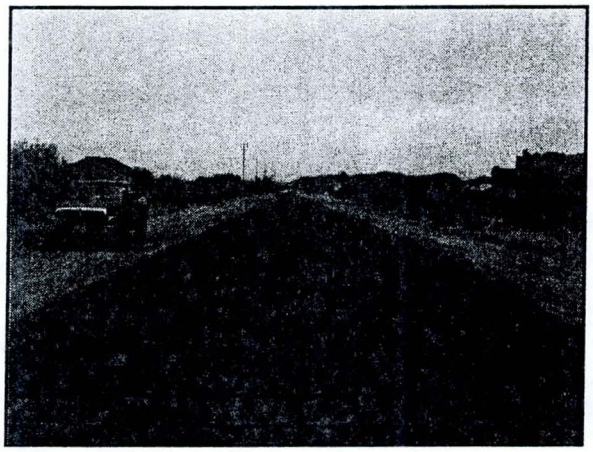


Photo location 10, taken along Calle Lejos at the drainage easement.







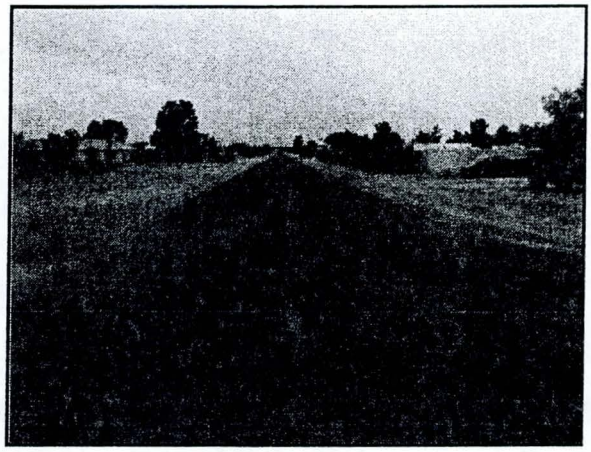
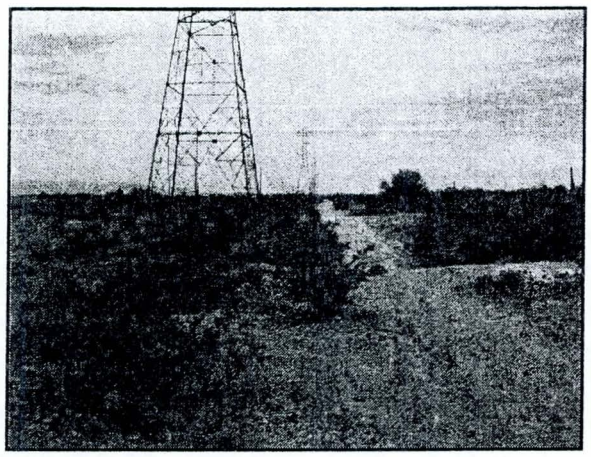


Photo location 11, taken at the corner of 87th Avenue and Calle Lejos.



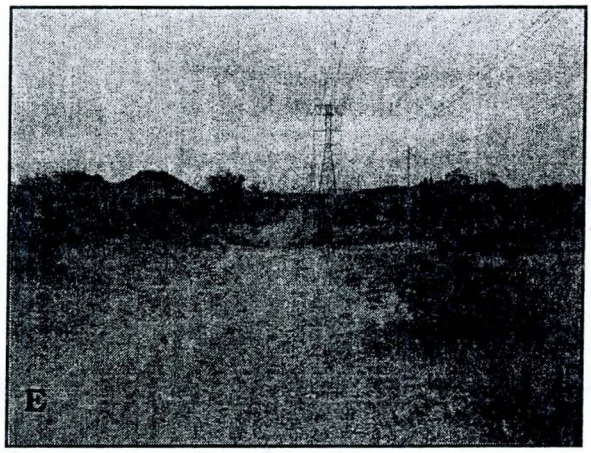
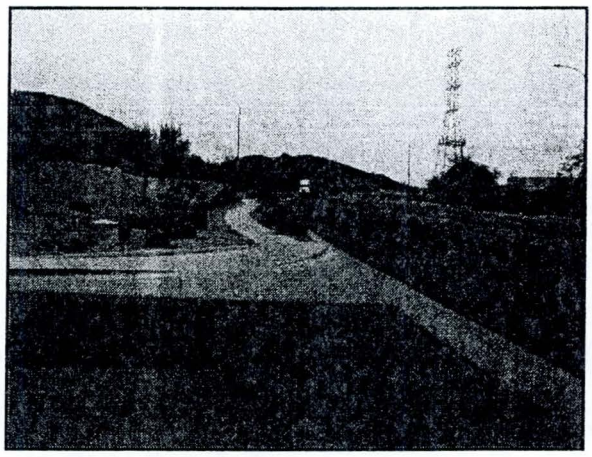
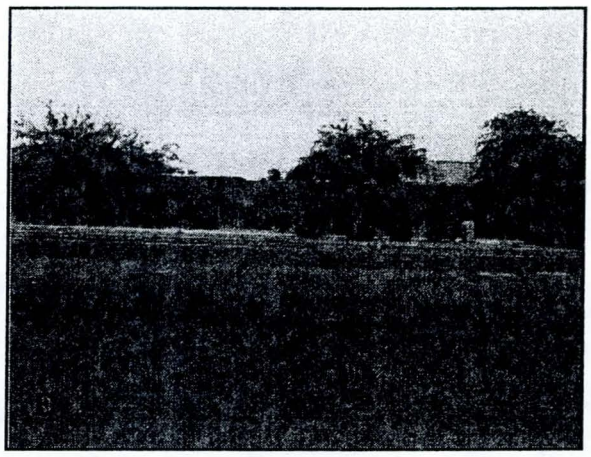


Photo location 12, taken within the APS easement north of future 'Peoria 60' subdivision.





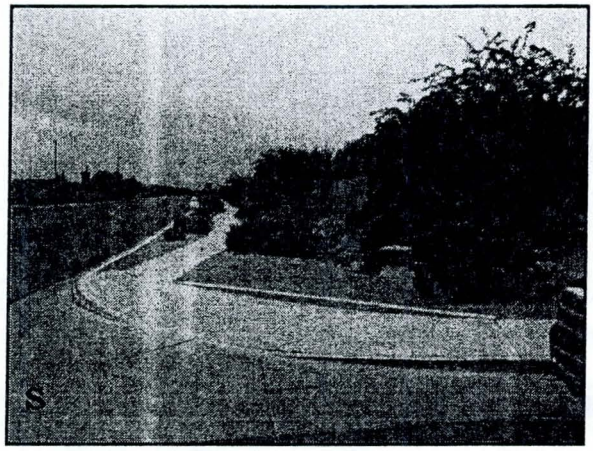
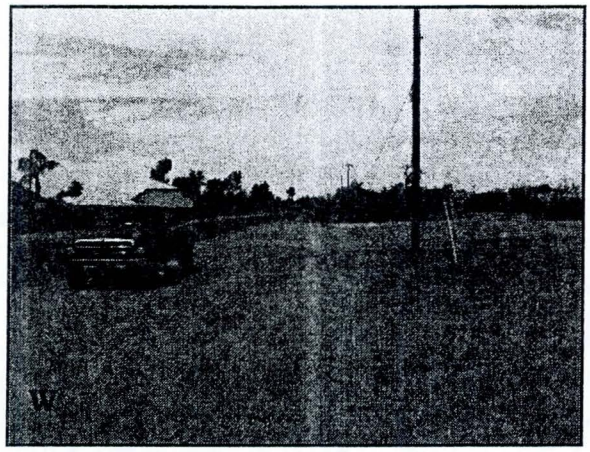
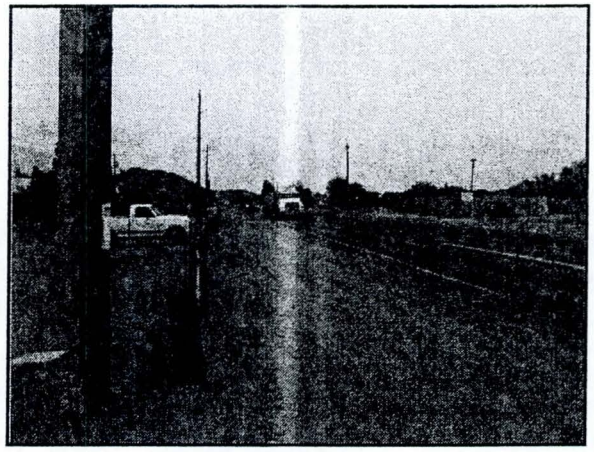
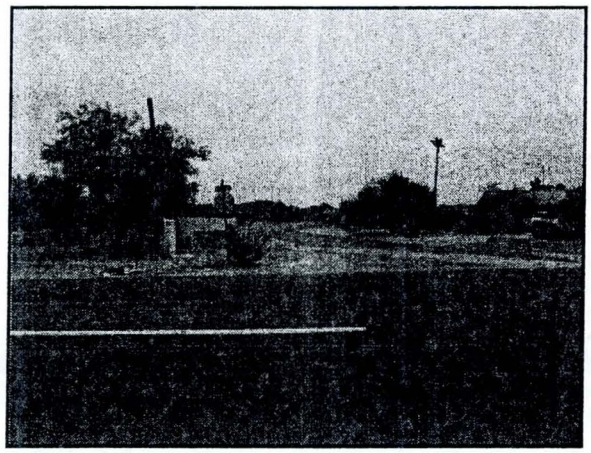


Photo location 13, taken at the corner of 83rd Avenue and La Caille.







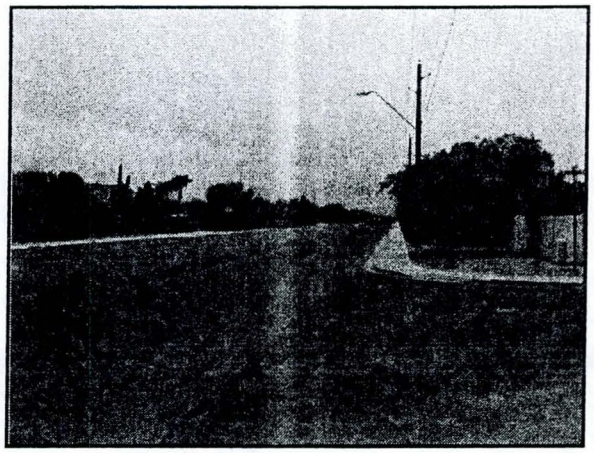
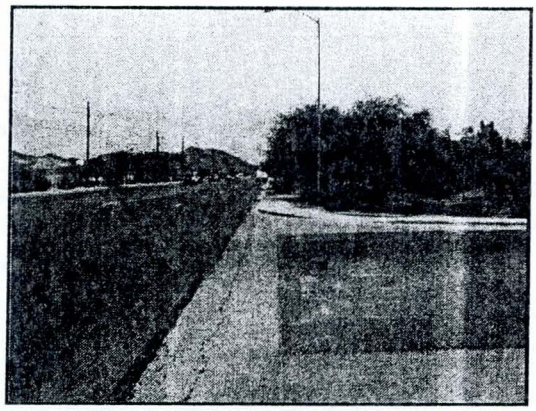


Photo location 14, taken at the corner of 83rd Avenue and Williams Road.



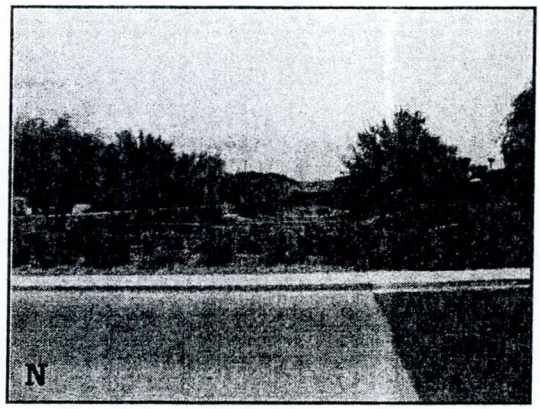
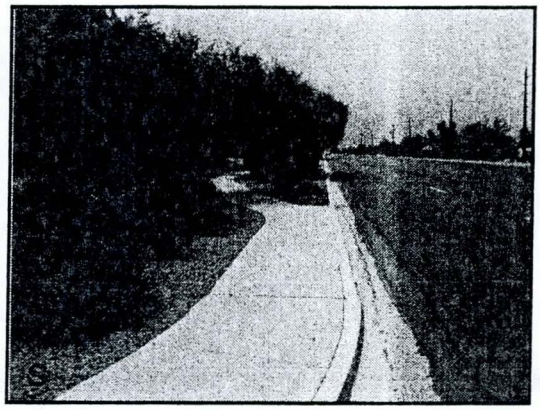
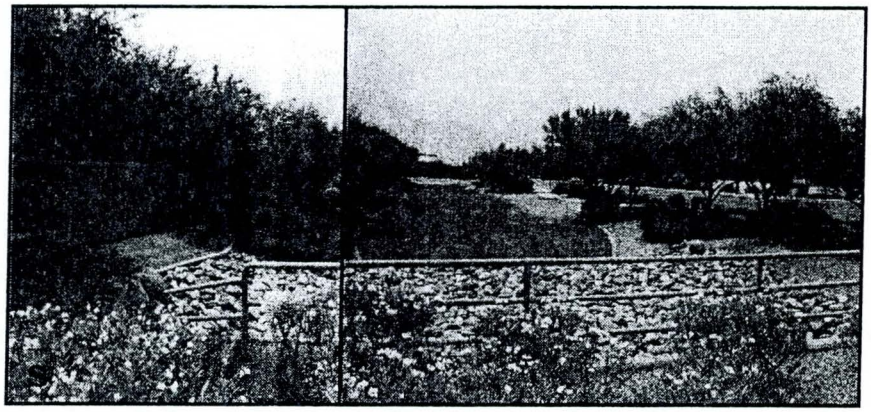


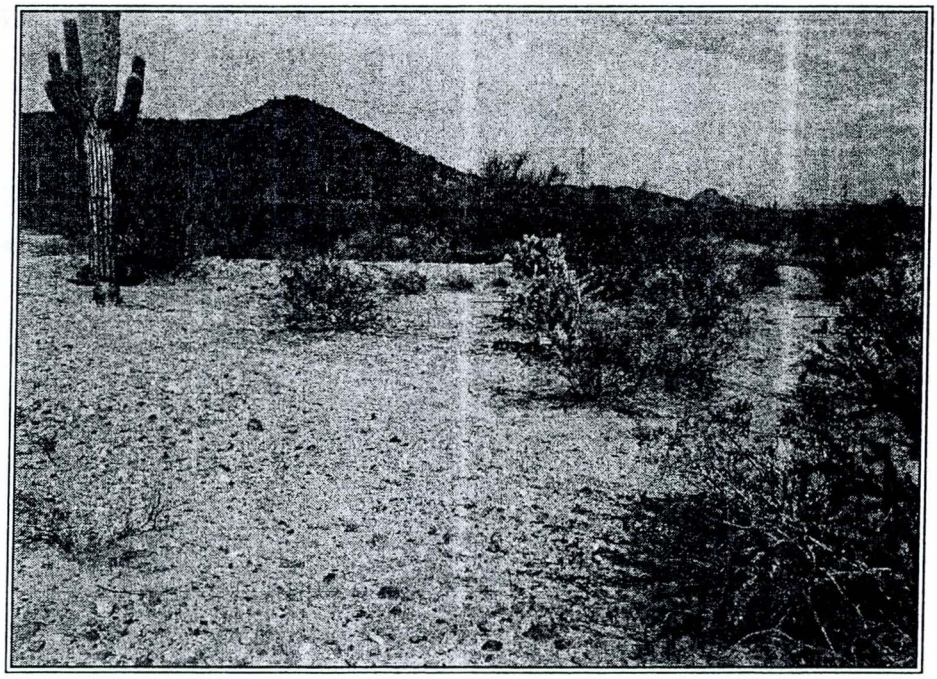
Photo location 15, taken at the corner of Foothill Road and 83rd Avenue, south of Williams Road.



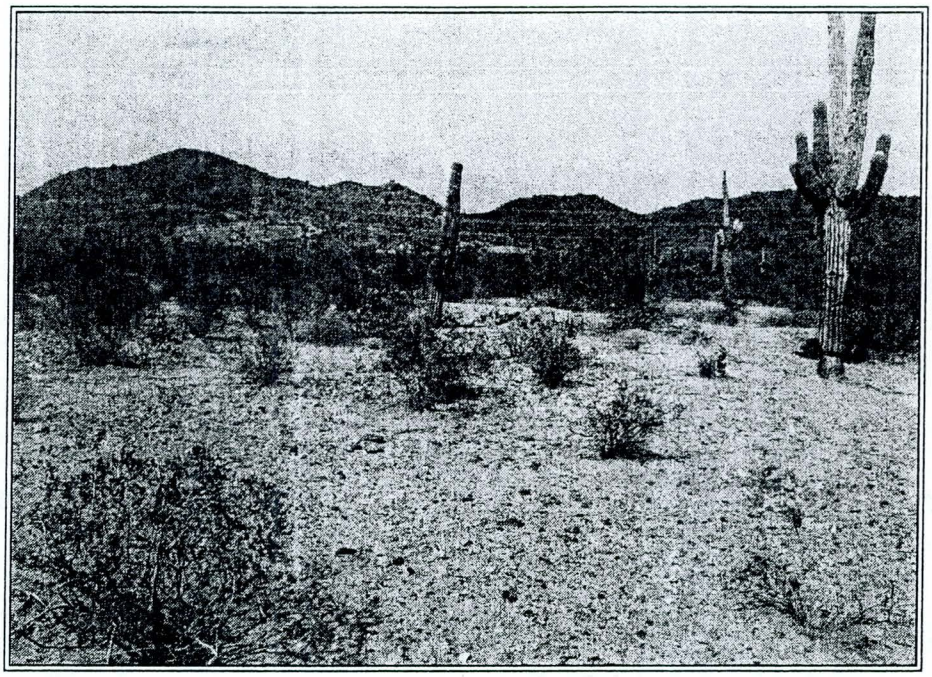


Drainage Photograph Inventory

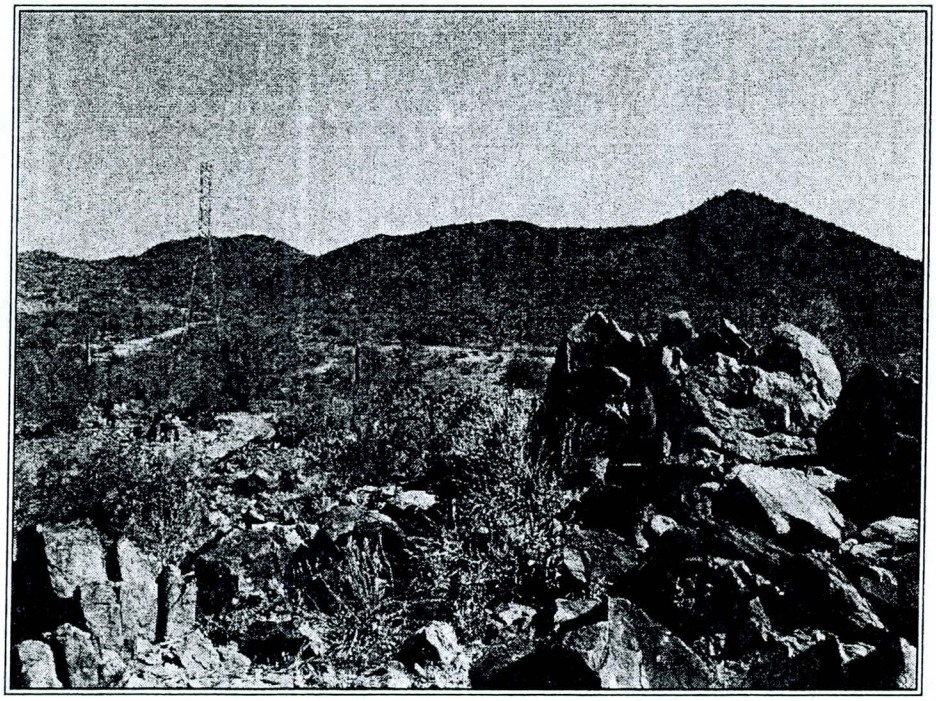
The east side of Sunrise Mountain is the top of the drainage area that flows to the project area.



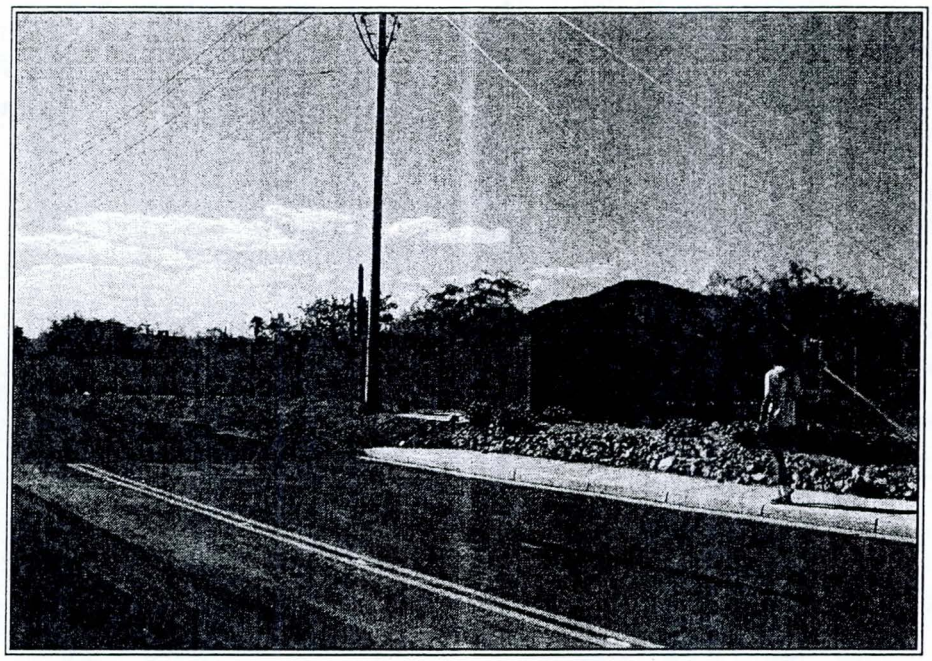
The site for the Calle Lejos detention basin contains saguaros to be relocated



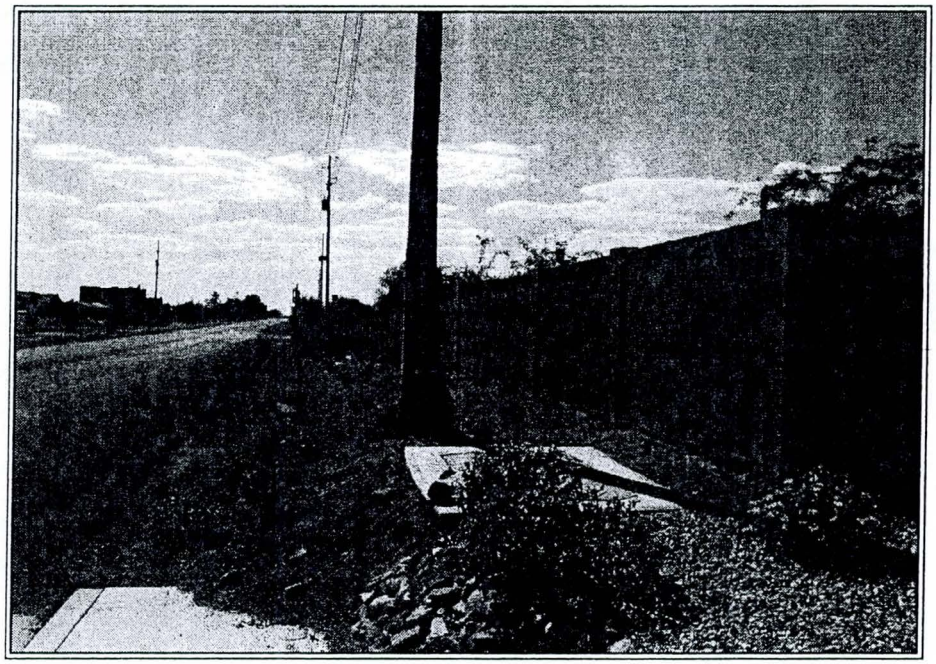
Calle Lejos detention basin site, view north (note transmission lines to north of parcel)



Looking from the knoll north of Calle Lejos, the SRP 240 KV power lines are visible. This is the State Lands/SRP Corridor Detention Alternative site.

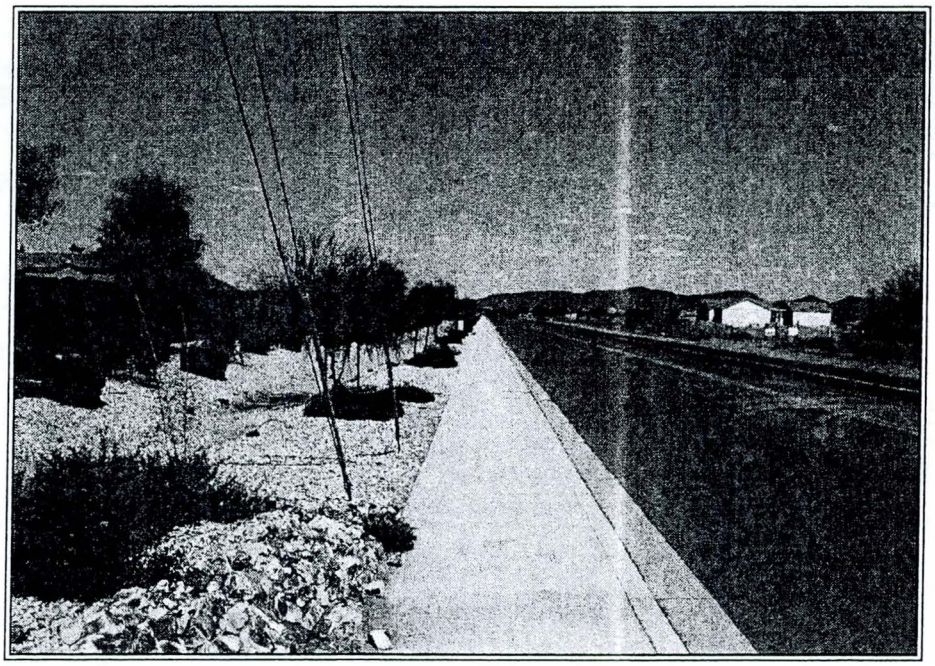


Calle Lejos near 85th Avenue looking northwest, note the power lines and riprap at the existing swale. This swale conveys runoff from the north and east to Calle Lejos.



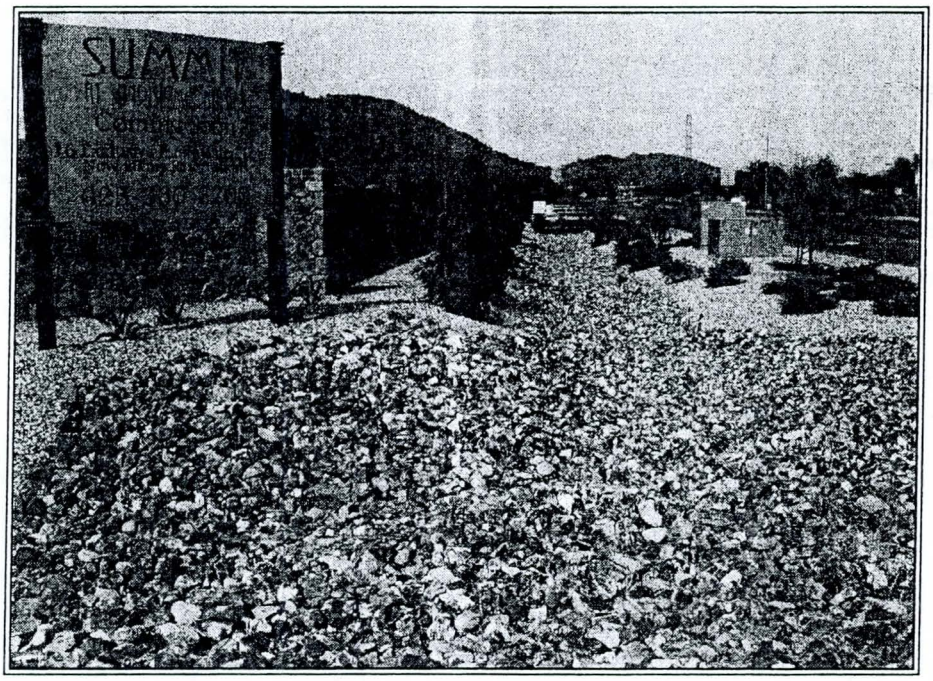
Looking west along Calle Lejos near 85th Avenue, note the location of power poles and the width of shoulder.

Looking north at the southwest corner of Summit at Sunrise. The offsite swale is visible.



Looking east along Calle Lejos, note the swale shown on the left side does not have adequate capacity to carry the existing flows. Flows breakout into the roadway and once the street capacity is exceeded, these flows continue southeast towards 83rd Avenue.

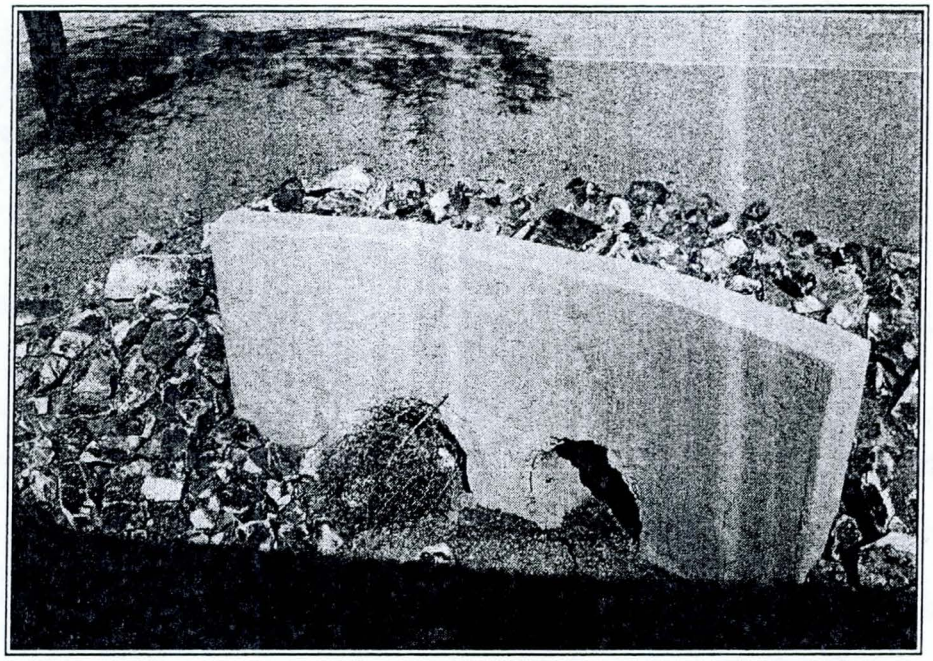
Looking southeast at the intersection of 83rd Avenue and Calle Lejos, 3-24" diameter concrete pipe culverts.



At 83rd Avenue and Calle Lejos, the view north shows existing landscaping that will be emulated on the proposed 83rd Avenue channel.

Note the skew angle of the headwall at the northwest corner of 83rd Avenue and Calle Lejos.

Headwall at the northwest corner of 83rd Avenue and Calle Lejos looking southeast toward the detention basin at Eagle Canyon.



The swale located along the west side of 83rd Avenue north of Calle Lejos includes 2-18" diameter concrete pipe culverts at Park View. These culverts cross 83rd Avenue to pass flows to the east side of 83rd Avenue then continuing to Calle Lejos. Figure 2-12 shows the overall drainage scheme along 83rd Avenue north of Calle Lejos. The schematic was taken from the Summit at Sunrise Mountain development drainage report.

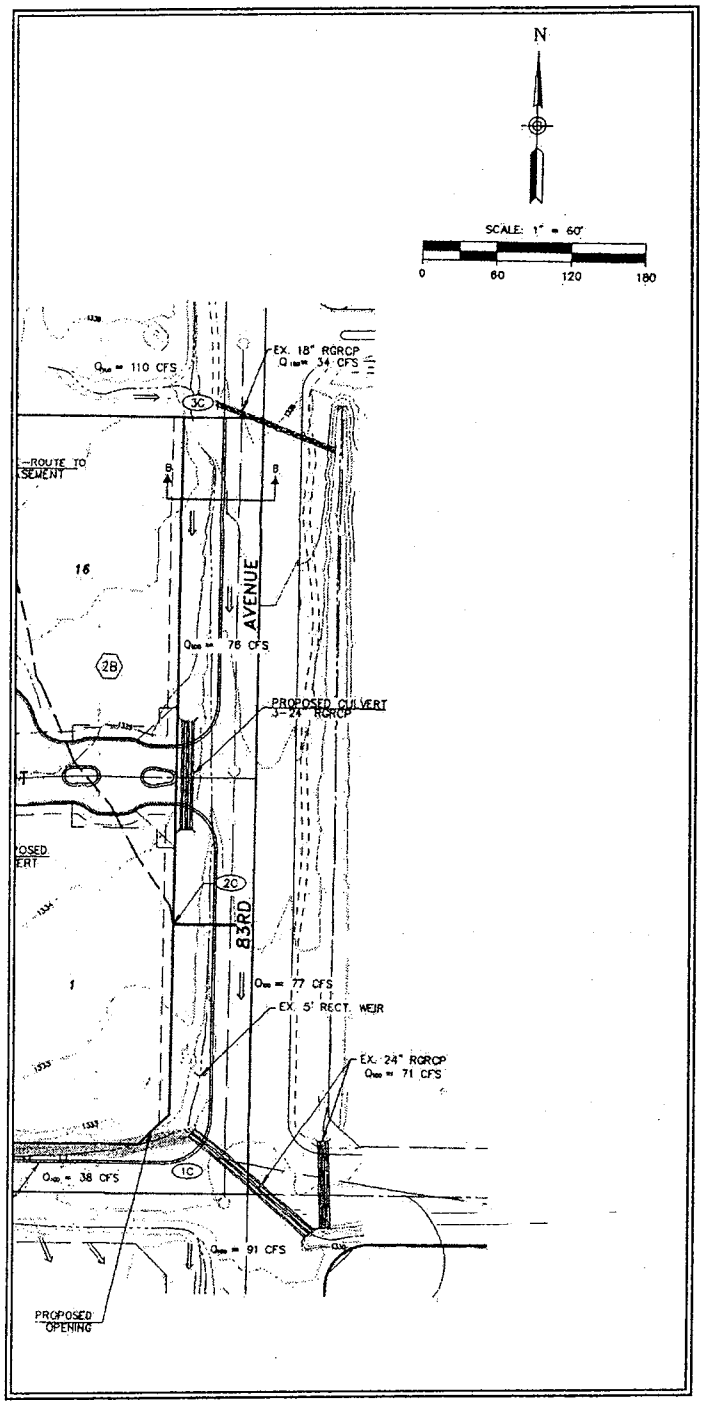
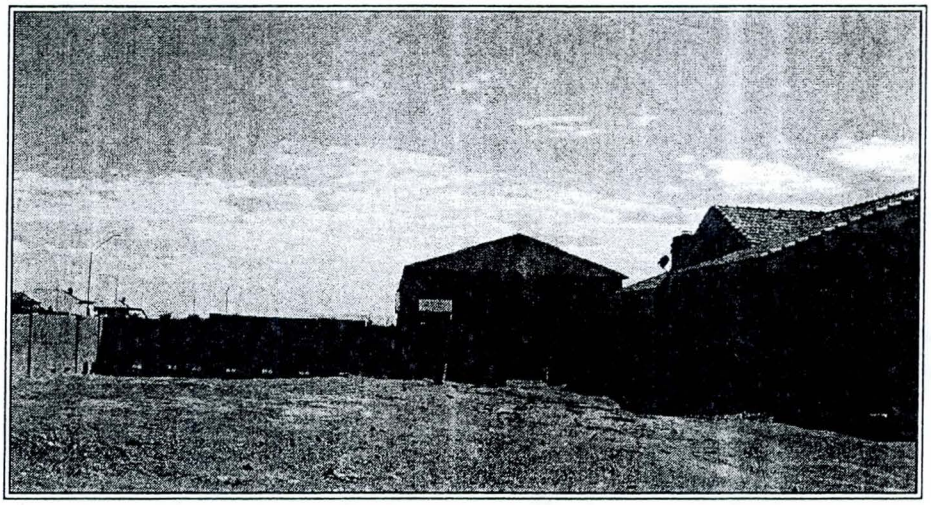
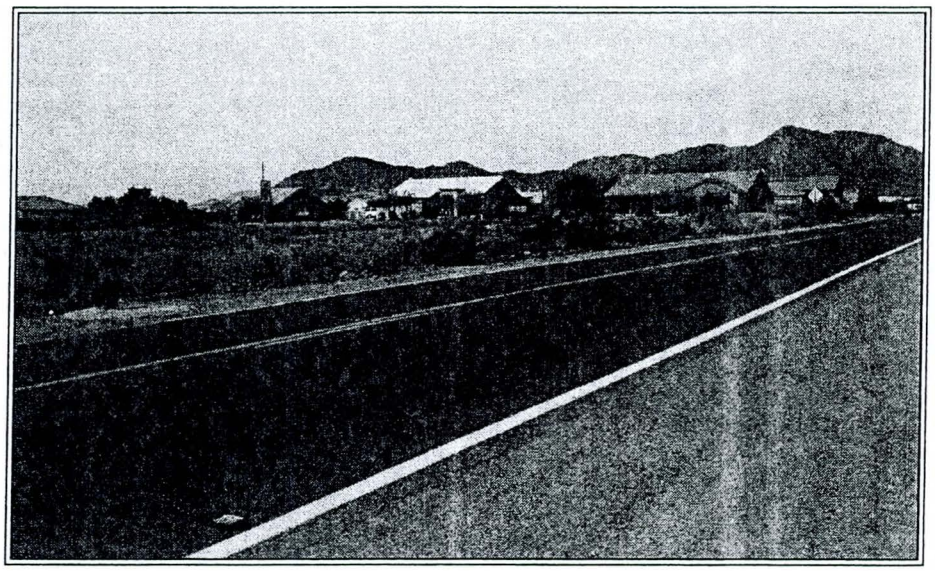


Figure 2-12
83rd Avenue and Calle Lejos Existing Conditions

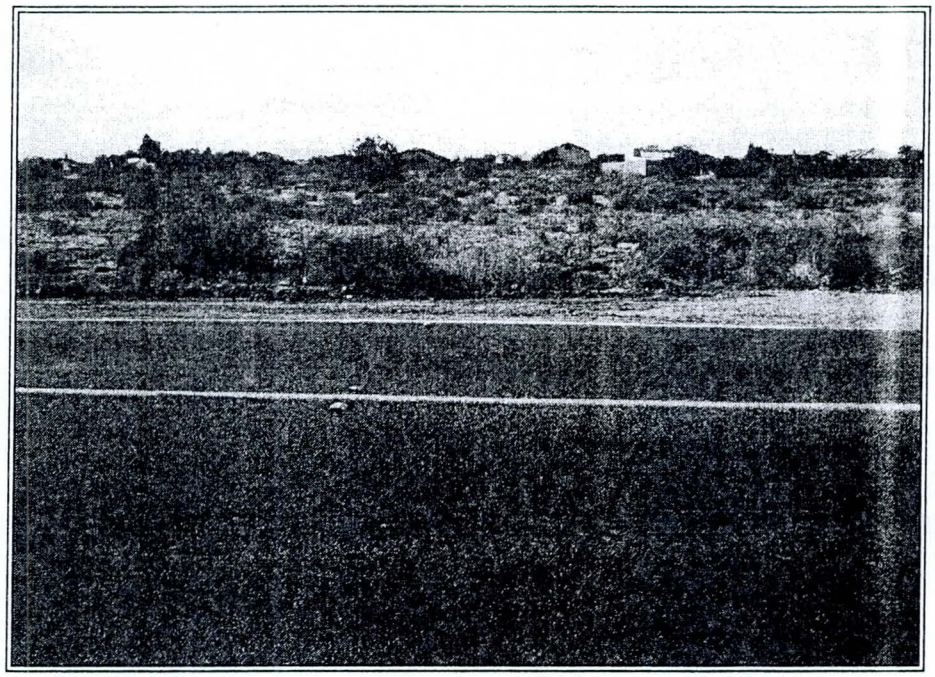
Sheet flow is the predominant drainage pattern between Calle Lejos and Pinnacle Peak Road. The land use in this area is residential. A readily identifiable drainage problem is located on the southwest corner of Avenida del Sol and 83rd Avenue. Sheet flows from the northwest concentrate at this intersection. The runoff flows south across Avenida del Sol and impacts the block wall on the east side of the corner property. Storm water has undercut the corner of the wall causing a structural failure. An approximately one foot high berm has been constructed on the north side of Avenida del Sol in an attempt to divert flows easterly to 83rd Avenue.



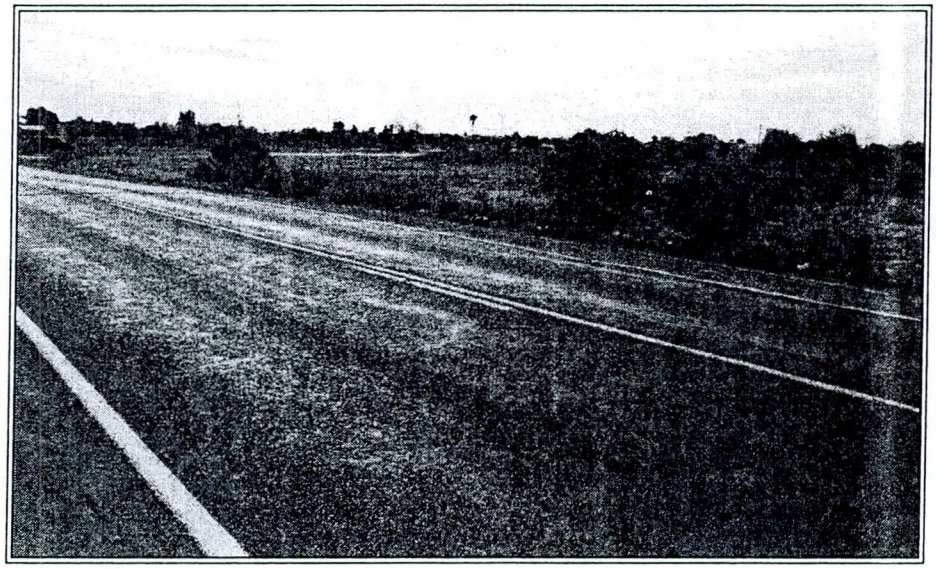
The damaged property is located at the southwest corner of Avenida del Sol and 83rd Avenue.



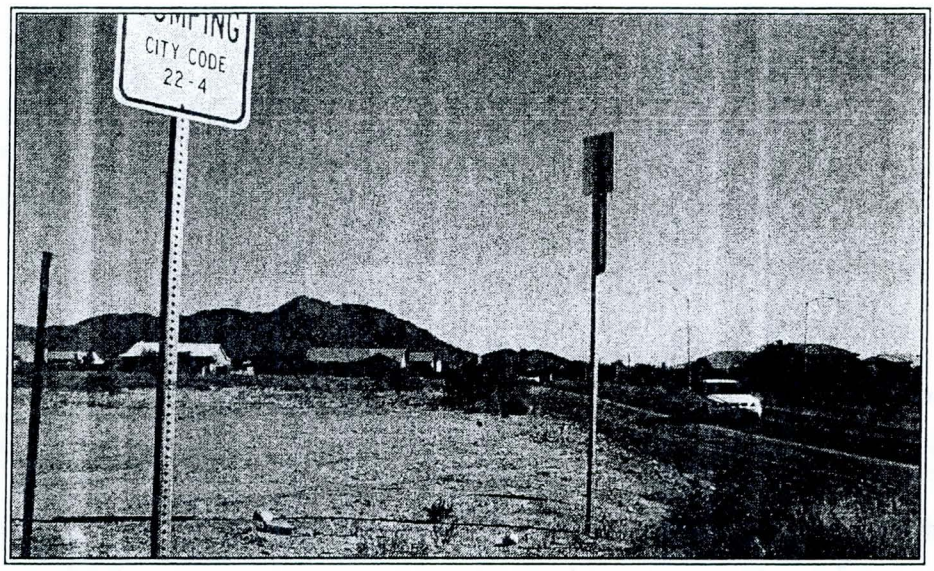
Looking northwest along 83rd Avenue north of Pinnacle Peak Road, the predominant flow pattern is sheet flow to the southeast.



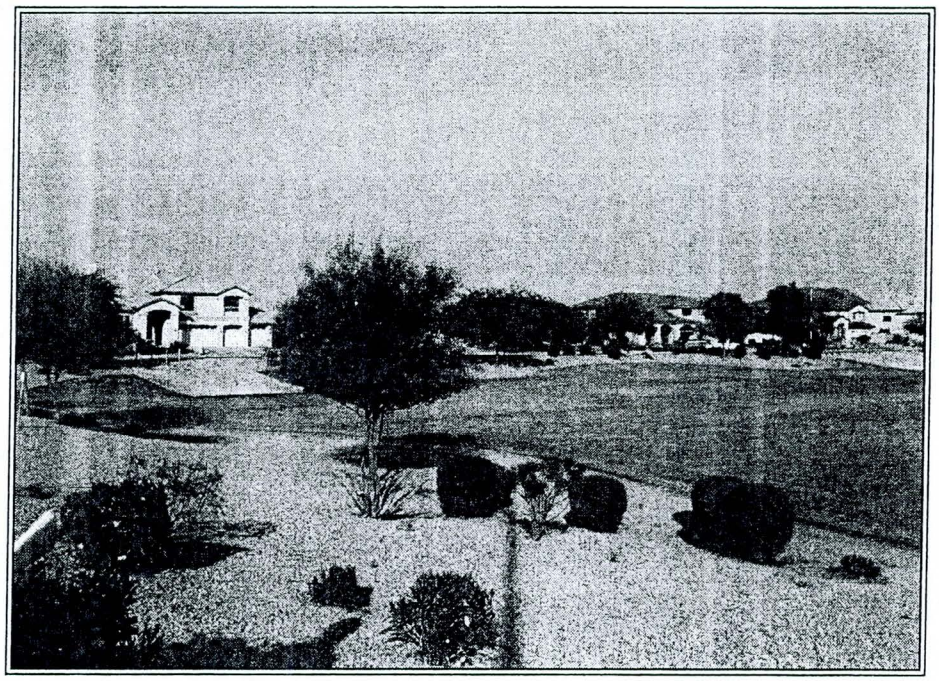
The Pinnacle Peak Detention Basin site viewed west from 83rd Avenue just north of Pinnacle Peak Road.



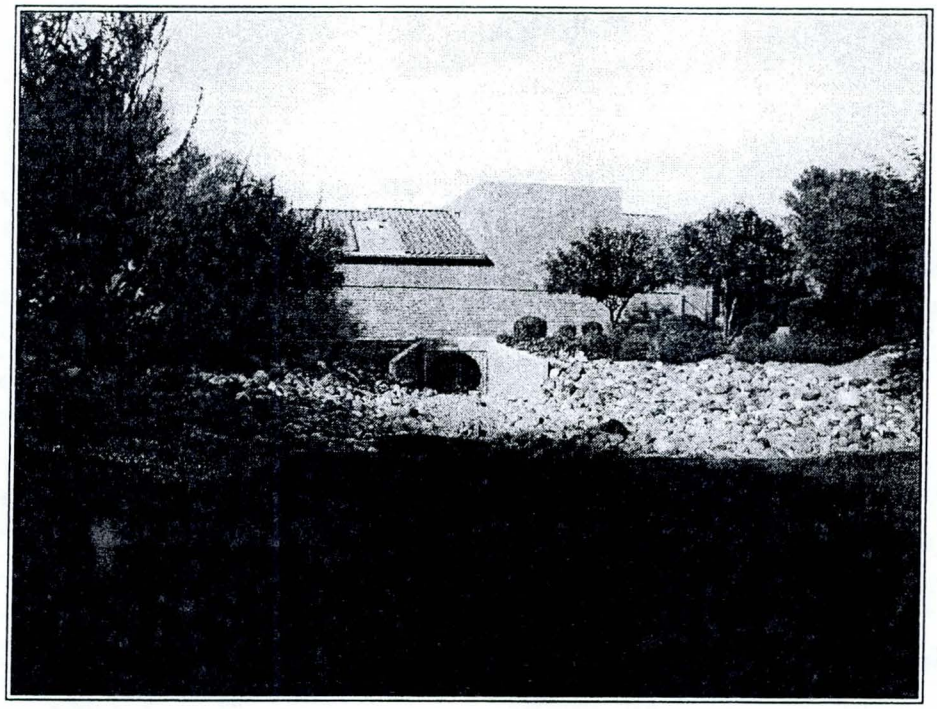
Along 83rd Avenue just north of Pinnacle Peak Road, the Pinnacle Peak Detention Basin site viewed to the southwest.



The Pinnacle Peak Detention Basin site viewed to the north along 83rd Avenue. Note the roadside swale on the west side of 83rd Avenue.



The Clear View Estates retention basin is a 6.2 acre-ft turfed facility. It has been designed to drain within 36 hours by percolation through the basin floor. It has the capacity to hold the onsite 100 year 2 hour storm volume in addition to the half street flows from Pinnacle Peak Road adjacent to the development.



The existing corrugated metal pipe arch located at the 83rd Avenue channel at Deer Valley Estates. This culvert is in the vicinity of the outfall point of the 83rd Avenue/Pinnacle Peak Road Drainage Improvements Project. This view is looking north.