Del Webb's
Sun City Grand™

SUN CITY GRAND PROJECT
REEMS ROAD FLOODPLAIN
REQUEST FOR LETTER OF MAP REVISION

Prepared for:

DEL E. WEBB DEVELOPMENT CO. LT.,
a Delaware Limited Partnership,
Developer

DEL WEBB HOME CONSTRUCTION, INC.
an Arizona Corporation,
Owner

March 1998
Revised April 1998
per FCDMC comments

Prepared by:
STANLEY CONSULTANTS
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
(602) 912-6500

SCI PROJECT # 13688

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Registered Professional Engineer (Civil)
CERTIFICATE NO. 26837
G. SCOTT BUCHANAN
Date Signed 5-4-98
ARIZONA, U.S.A.

SCI PROJECT # 13688

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INTRODUCTION

This document represents the hydrologic study for the Reems Road Floodplain in the City of Surprise, Arizona. The purpose of this document is to support a request to the Federal Emergency Management Agency (FEMA) for a Letter of Map Revision (LOMR) to remove the Reems Road Floodplain and associated Zone A designation from Beardsley Road to Bell Road. This request is being made by Stanley Consultants, Inc. on behalf of Del Webb, the developer of the Sun City Grand Project which is impacted by the Reems Road Floodplain.

Although the Sun City Grand project is located within the City of Surprise, Arizona, floodplain management responsibilities are performed by the Flood Control District of Maricopa County (FCDMC) for the City through inter-governmental agreement between the two entities. The floodplain to be removed is located in Township 4 North, Range 1 West, G&SRB&M within the incorporated limits of the City of Surprise, Arizona along the east border of Sections 30 and 31 and west border of Sections 29 and 32. Refer to Figures 1 and 2 for the location and vicinity of the project area.

Currently, Reems Road from Beardsley Road to Bell Road is designated as Zone A on the Flood Insurance Rate Map (FIRM), Number 04013C1145F, dated September 30, 1995. Zone A is defined as "special flood hazard areas inundated by 100-year flood", and with "no base flood elevations determined." Appendix A includes a copy of the FIRM with the marked floodplain to be removed under this request.

The 100-year discharge rates on which the current Zone A is based are from the White Tanks/Agua Fria Area Drainage Master Study (ADMS) prepared by The WLB Group for the FCDMC in 1992. The hydraulic analysis for the Reems Road Floodplain Zone A is also from the ADMS and is based on approximate methods.

Sun City Grand is primarily a residential development with large golf course, open space and recreation tracts. The basis for this LOMR request is a changed condition in the contributing watershed (specifically, development with stormwater retention) and its impact on hydrology. The existing Del Webb Sun City Grand project comprises a major portion of the contributing watershed to the Reems Road Floodplain being requested for deletion.

Phase 1 of the project is nearly all built out. Phase 2 mass grading including the golf course is complete. Many of the Phase 2 infrastructure roadway, drainage, water and sewer improvements have been constructed but home building in Phase 2 has essentially just begun. Phases 3 and 4 of Sun City Grand will be constructed in the near future. These future phases will be designed with stormwater retention facilities similar to Phases 1 and 2.

The retention facilities in Phases 1 and 2 of Sun City Grand have been constructed in substantial conformance to what was designed. They retain, at a minimum, the runoff from a 100-year, 2-hour storm event within the project. In many cases, these retention basins have been constructed with much greater than the 100-year, 2-hour volume. All retention basins are permanent, below-ground facilities.

Although not all the homes have been constructed in Phases 1 and 2 of the development, the ultimate developed condition for areas that have been graded to date will be considered for purposes of this LOMR request. It is on this "future condition" basis that the stormwater retention facilities have been designed and built. All of the drainage and stormwater retention facilities associated with Phases 1 and 2 are in place and operational.

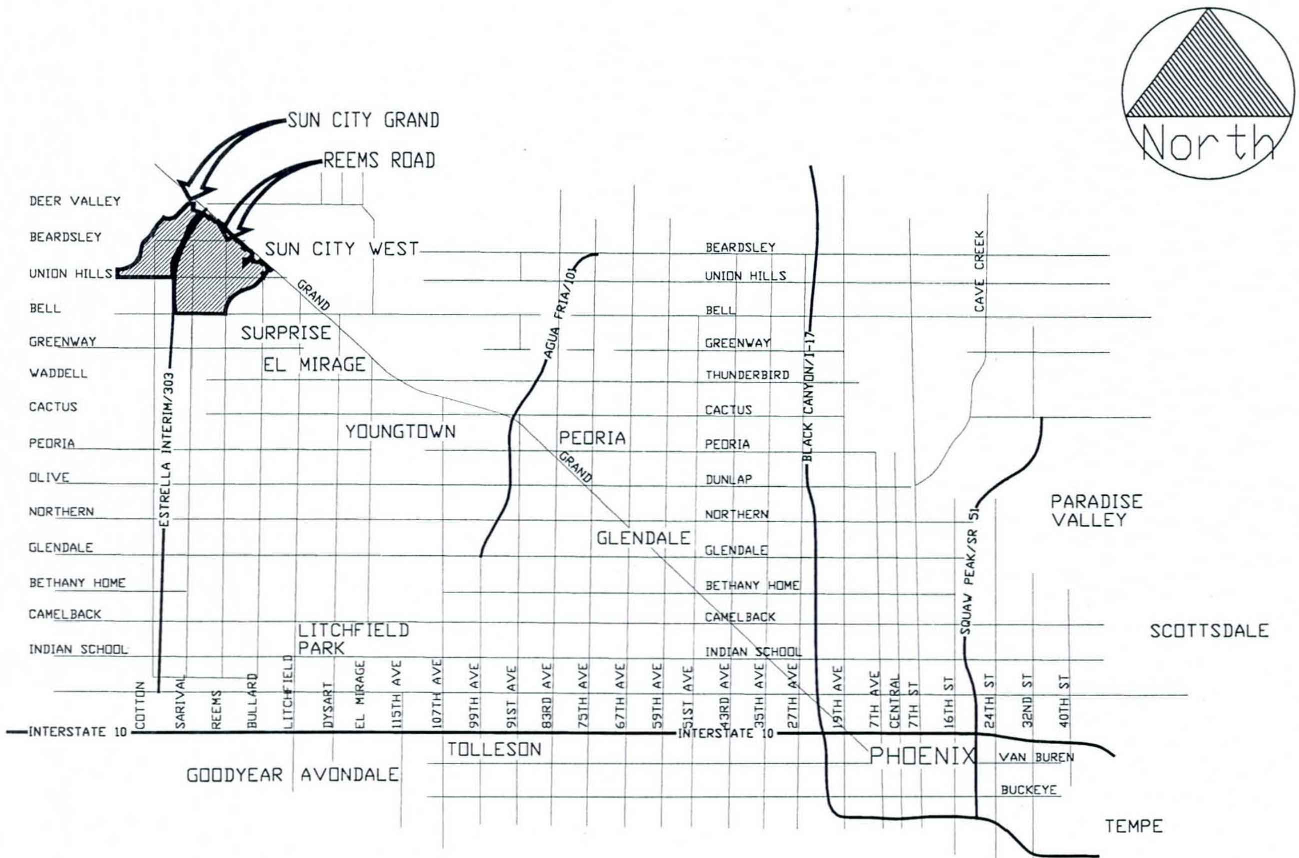

FIGURE 1

LOCATION MAP

NTS

STANLEY CONSULTANTS

INTERNATIONAL CONSULTANTS IN ENGINEERING, ARCHITECTURE, PLANNING, AND MANAGEMENT

FILE: C:\AUTOCAD\13688\LOCATION.DWG

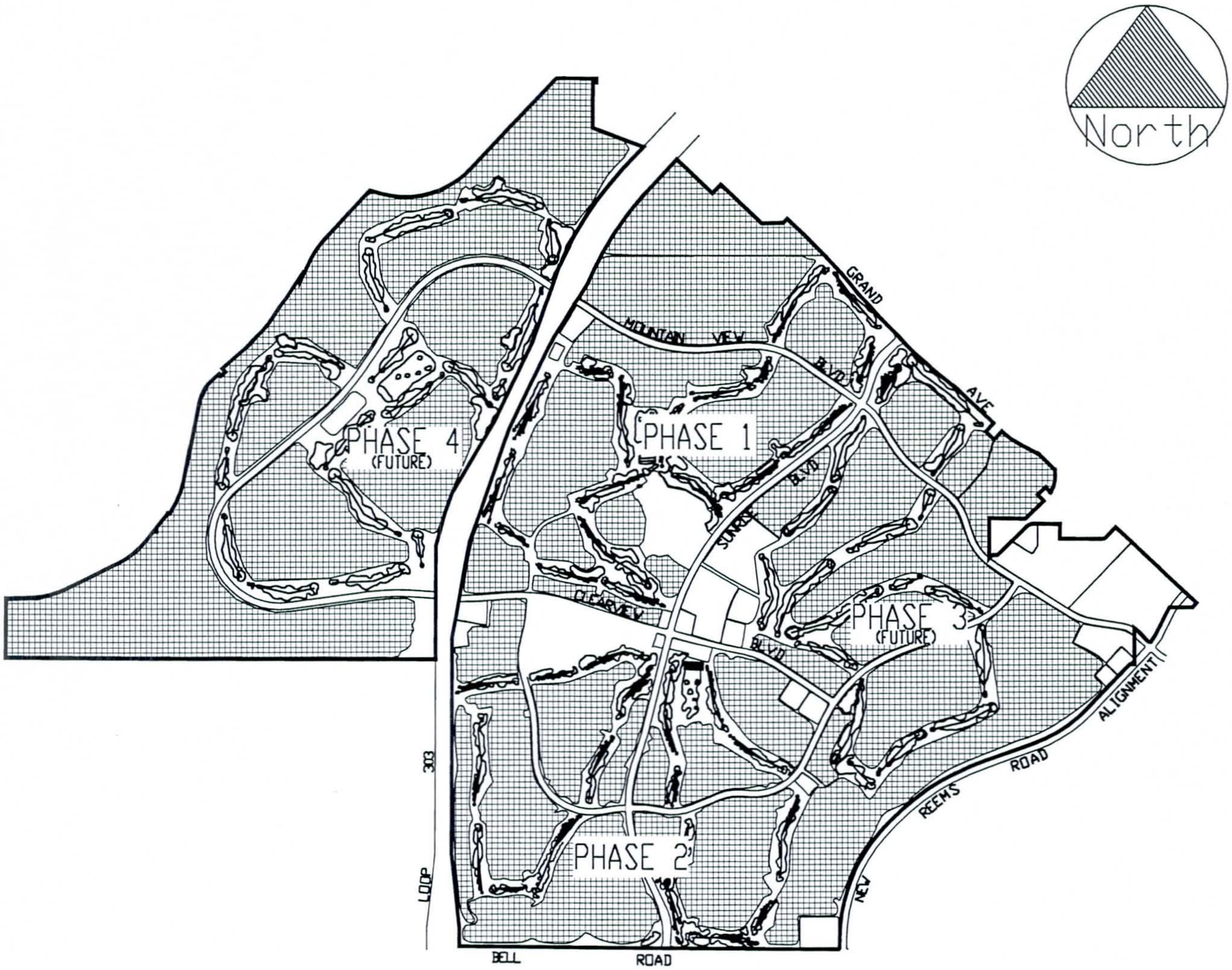

FIGURE 2

VICINITY MAP

NTS

STANLEY CONSULTANTS

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FILE: C:\AUTOCAD\13688\VICINITY.DWG

PREVIOUS HYDROLOGY

The original Reems Road floodplain study was included in the White Tanks / Agua Fria ADMS completed in 1992 by The WLB Group, Inc. of Phoenix, Arizona. The June 1, 1988 version of HEC-1 was used to model the hydrographs. SCS Type II rainfall distribution pattern, Green & Apmt loss rates and Phoenix Valley S-graphs were used in the HEC-1 model.

A portion of the WLB HEC-1 model that affects the Reems Road Floodplain upstream from Greenway Road was extracted by Stanley Consultants for purposes of this LOMR request to reduce the size and output of the original model. The extracted model file name is 13688H1C. No changes or corrections have been made to this model from the original WLB model. An output printout from this model is included in Appendix C. A copy of the main body of the original White Tanks/Agua Fria ADMS report is also included in Appendix C along with some of the White Tanks/Agua Fria ADMS supporting technical documentation. The original HEC-1 schematic and the floodplain delineation done by The WLB Group are included in Appendix A.

Construction of Sun City Grand began after completion of the White Tanks/Agua Fria ADMS. Therefore, at the time it was not reflected in the hydrology.

LOMR HYDROLOGY

A new HEC-1 model (file name: 13688LMR) has been created to reflect the developed conditions in Sun City Grand Phases 1 and 2. The output of this model can found in Appendix D. Golf courses that retain stormwater have been constructed within Phases 1 and 2. Phase 1 construction has essentially been completed. Phase 2 has been completely mass graded except parcels adjacent to Reems Road and one parcel at the northwest corner of Phase 2. The new "LMR" model uses the 13688H1C pre-developed condition model as its basis and includes modifications to reflect the development. Although the 13688H1C HEC-1 model was run using the September 1990 HEC-1 Version 4.0, it produces the same discharge rates as the original White Tanks/Agua Fria ADMS model. The changes made to the ADMS pre-developed condition model include the following:

1. Sub-basin rainfall loss and hydrograph data was revised to reflect post-development conditions. Phase 1 and the graded portion of Phase 2 were considered completely developed. The ungraded portions in Phase 2 remain the same as the original White Tanks/Agua Fria ADMS model. A summary table for the rainfall loss and S-Graph parameters is included in Appendix D. Maricopa County Flood Control District's MCUHP2 program was used to generate the revised unit hydrographs. An output from MCUHP2 is included in Appendix D.

2. Retention basin steps in contributing sub-areas 103, 107, 108, 113, 114 and 115 were added to the model. They represent the summed stormwater retention volume found in each of those contributing sub-areas. The storage volume for each individual retention basin was extracted from the Phase 1 and 2 HEC-1 models (File names 13688H1A and H1B). This data was assembled in data files PH1RET and PH2RET. Tables D2 and D3 in Appendix D summarize the retention basin data. Only the dead storage volume of each retention basin was used. Surcharge volume above the spill-over elevation associated with each retention basin was disregarded. Each retention basin was then assigned to the specific contributing sub-area in which it is located. The dead storage volume of all retention basins was then summed for each contributing sub-area. This summed volume was then inserted as a volume-divert hydrograph step in the "LMR" HEC-1 model.

3. Revised diversion operations occur along Bell Road at SR303L, Sarival Avenue and one half mile west of Reems Road. The revisions were based on more detailed topography and hydraulic analysis than the White Tanks/Agua Fria ADMS model and are from the Master Drainage Report for Sun City Grand Property prepared by Stanley Consultants in 1994. See Appendix D for the complete detailed calculations for the diversion operations.

4. Onsite flows from Sun City Grand Phase 2 which concentrate along Bell Road were separated from the offsite flows along Bell Road because they physically no longer join.

5. Revised channel routings occur within the Phase 1 and the graded portion of Phase 2 to more correctly model routing within the development. Channel geometry, slopes and lengths for reach routing steps within the development were modified. Also, routing steps (NSTPS) were revised for reaches affected by the development of the Sun City Grand project. The new NSTPS values used in the "LMR" HEC-1 model were calculated using the definition presented in the HEC-1 User's Manual, page A-69 as follows:

   NSTPS = Reach Length / Average Velocity / Time Interval (NMIN)

   This is the same method used in the original White Tanks/Agua Fria ADMS prepared by the WLB Group, Inc. (See Section 3.2.2.2, page 193 in Part A: Flood Study Technical Data Notebook.) The detailed calculations for the new NSTPS data can be found in Appendix D. All other NSTPS values in the "LMR" HEC-1 model except R102 and R106 remain the same as the original White Tanks/Agua Fria ADMS model.

6. Apparent errors in data associated with reach routing steps R102 and R106 from the original White Tanks/Agua Fria ADMS hydrograph operations were corrected.

Please refer to the "ID" notes in the 13688LMR output in Appendix D for a more detailed explanation of what the model does and summary of approach and methods.

The results from the White Tanks/Agua Fria ADMS and the LOMR HEC-1 models are shown in the HEC-1 schematic (Figure 4) in Appendix A. The peak discharges along Reems Road were essentially reduced to zero at Beardsley Road and at Union Hills Drive. The discharge in Reems Road to the south of Bell Road has been reduced from about 2700 cfs to less than 600 cfs.

FLOODPLAIN APPLICATIONS AND CONCLUSIONS

The flood discharge used in the original White Tanks/Agua Fria ADMS to delineate the upper-most one mile reach of Reems Road floodplain from Beardsley Road to Union Hills Drive was the average of the two HEC-1 discharges estimated at CP108 and R103. This discharge was 712 cfs. The discharge used originally to delineate each of the one mile segments of the Reems Road floodplain downstream from Union Hills Drive was the reach routed HEC-1 discharge from the upstream end of each respective reach. Therefore, the White Tanks/Agua Fria ADMS discharge from Union Hills Drive to Bell Road was 1123 cfs and from Bell Road to Greenway Road was 2541 cfs.

Using the same approach with the revised discharges from the 13688LMR model, the delineation discharges for the two one mile reaches from Beardsley Road to Union Hills Drive and from Union Hills Drive to Bell Road are zero cfs (or essentially zero). Therefore, there is essentially no floodplain along Reems Road from Beardsley Road to Bell Road. In addition, the Reems Road discharge from Bell Road to Greenway Road downstream from the Sun City Grand project has been reduced from 2541 cfs to 515 cfs.

Likewise, a reduction in flow rate would occur at each concentration point downstream from the 13688LMR model to the benefit of downstream property owners. However, the amount of reduction would become less and less apparent farther away from Sun City Grand due to additional local contributing areas. It should also be pointed out that discharges in the southern direction at all the flow divert hydrograph steps along Bell Road adjacent to Sun City Grand have been reduced because of the development, thus providing additional benefit to downstream properties.

In conclusion, we request that FEMA remove the Reems Road Zone A 100-year special flood hazard area from Bell Road to Beardsley Road. It is our view that this area now falls more appropriately under the Zone X definition, similar to the surrounding area.

SUN CITY GRAND PROJECT
REEMS ROAD FLOODPLAIN
REQUEST FOR LETTER OF MAP REVISION

COMPUTER FILE NAMES AND DESCRIPTION

FILENAME	DESCRIPTION
13688H1A	Stanley Hydrograph Model for Phase 1
13688H1A.OP	Output for 13688H1A
PH1RET	Retention Basin Data for Phase 1
13688H1B	Stanley Hydrograph Model for Phase 2
13688H1B.OP	Output for 13688H1B
PH2RET	Retention Basin Data for Phase 2
WTADMS.24	Original HEC-1 Model by WLB Group
13688H1C	Unmodified HEC-1 extracted from WTADMS.24
13688H1C.OP	Output for 13688H1C
LMR.MCU	Output from MCUHP2 for HEC-1 Parameters
13688LMR	HEC-1 Model for LOMR Application
13688LMR.OP	Output for 13688LMR


DRAINAGE AREA MAP
WHITE TANKS/AGUA FRIA
AREA DRAINAGE MASTER STUDY
LEGEND
DRAINAGE AREA BOUNDARY
SUBBASIN BOUNDARY
SUBBASIN INDENTIFICATION
CONCENTRATION POINT
FLOW PATH
RETAINED AREA
DIVERSION
R3W
R2W
R1W
T4N
T3N
T2N
T1N
T1S
DEER VALLEY ROAD
BEARDSLEY ROAD
UNION HILLS DRIVE
DRAINAGE AREA BOUNDARY
BELL ROAD
GRAND AVENUE (U.S. 60 & U.S. 89)
ATCHISON TOPEKA & SANTA FE RAILROAD
MCMICKEN DAM
BEARDSLEY CANAL
SURPRISE
EL MIRAGE
LUKE AUXILIARY FIELD NO. 3
WHITE TANK MOUNTAINS
PEORIA AVENUE
OLIVE AVENUE
NORTHERN AVENUE
GLENDALE AVENUE
BETHANY HOME ROAD
CAMELBACK ROAD
INDIAN SCHOOL ROAD
THOMAS ROAD
McDOWELL ROAD
VAN BUREN STREET
YUMA ROAD
LOWER BUCKEYE ROAD
BROADWAY ROAD
SOUTHERN AVENUE
BASELINE
GILA AND SALT RIVER MERIDIAN
LUKE AIR FORCE BASE
LITCHFIELD PARK
LITCHFIELD PARK DAM
AGUA FRIA RIVER
INTERSTATE 10
ROOSEVELT CANAL
GOODYEAR
AVONDALE
PHOENIX GOODYEAR MUNICIPAL AIRPORT
SOUTHERN PACIFIC RAILROAD
STATE ROUTE 85
BUCKEYE
GILA RIVER
DRAINAGE AREA BOUNDARY
CEMETERY ROAD
WATSON ROAD
RAINBOW ROAD
BELOAT ROAD
DEAN ROAD
AIRPORT ROAD
TUTHILL ROAD
JACKRABBIT TRAIL
PERRYVILLE ROAD
CITRUS ROAD
COTTON LANE
REEMS ROAD
BULLARD AVENUE
LITCHFIELD ROAD
DYSART ROAD
EL MIRAGE ROAD
115TH AVENUE
SIERRA ESTRELLA MOUNTAINS
EXHIBIT 3
WLB

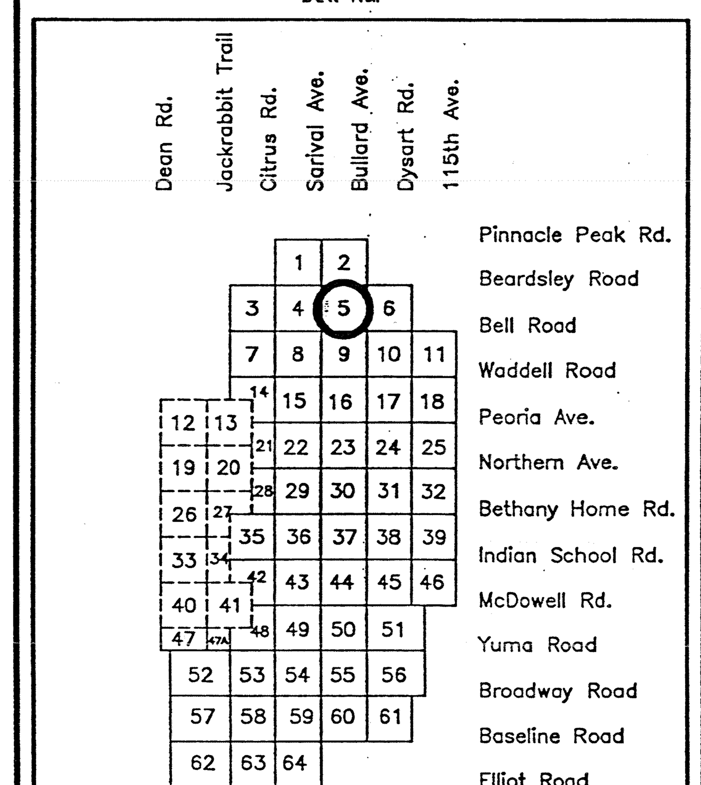
WHITE TANKS/AGUA FRIA

AREA DRAINAGE MASTER STUDY

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

REFERENCE MARKS (RM'S)

NO.	ELEVATION	DESCRIPTION
8	1305.27	5/8" Rebar on Fence Line Along North Side of Beardsley Rd. on Line with Power Line along Sarival Ave. Extended
10	1288.86	Brass Cap in Hand Hole Centerline Intersection Reems Rd. and Beardsley Rd.
13	1260.32	Railroad Spike Flush with Pavement, at Intersection of Grand Ave. and Beardsley Rd.
18	1289.02	PK Nail in Top Concrete Headwall at Northeast Corner of Intersection of Sarival Ave. and Union Hills Dr.
19	1264.34	Brass Cap in Hand Hole Centerline Intersection Reems Rd. and Union Hills Dr.
28	1263.58	Brass Cap in Hand Hole, Centerline Intersection Sarival Ave. and Bell Rd.
30	1246.20	Brass Cap in Hand Hole, Centerline Intersection Reems Rd. and Bell Rd.
31	1225.01	Brass Cap in Hand Hole, Centerline Intersection of Bullard Ave. and Bell Rd.



INDEX MAP

N

400 200 0 400 800 1200

BASE MAP: WHITE TANKS/AGUA FRIA A.D.M.S. TOPOGRAPHIC MAPS
CONTOUR INTERVAL = 2'

LEGEND

Symbol	Meaning
1.452	CROSS SECTION NUMBER
FP=1158.9	FLOODPLAIN WATER SURFACE ELEVATION = 1158.9
FW=1159.8	FLOODWAY WATER SURFACE ELEVATION = 1159.8
Q100=764cFs	100-YEAR PEAK DISCHARGE = 764 CUBIC FEET PER SEC.
1157	BASE FLOOD ELEVATION
	STREAM CENTERLINE
	FLOODWAY BOUNDARY
	FLOODPLAIN BOUNDARY
RM NO. 100	ELEVATION REFERENCE MARK
ZONE AE	FLOOD INSURANCE RATE ZONE

SHEET TITLE: **FLOODPLAIN MAP**

STUDY CONSULTANT: **The WLB Group** INC.

MAPPING COMPANY: Cooper Aerial of Phoenix, Inc.

SHEET 5 OF 64 | DATE FLOWN 12/22/89

EXHIBIT 5
MASTER DRAINAGE PLAN
PHASE I DEVELOPED CONDITION
HEC-1 WATERSHED MAP

For

Del Webb's
Grand Avenue Property

Surprise, Arizona

North

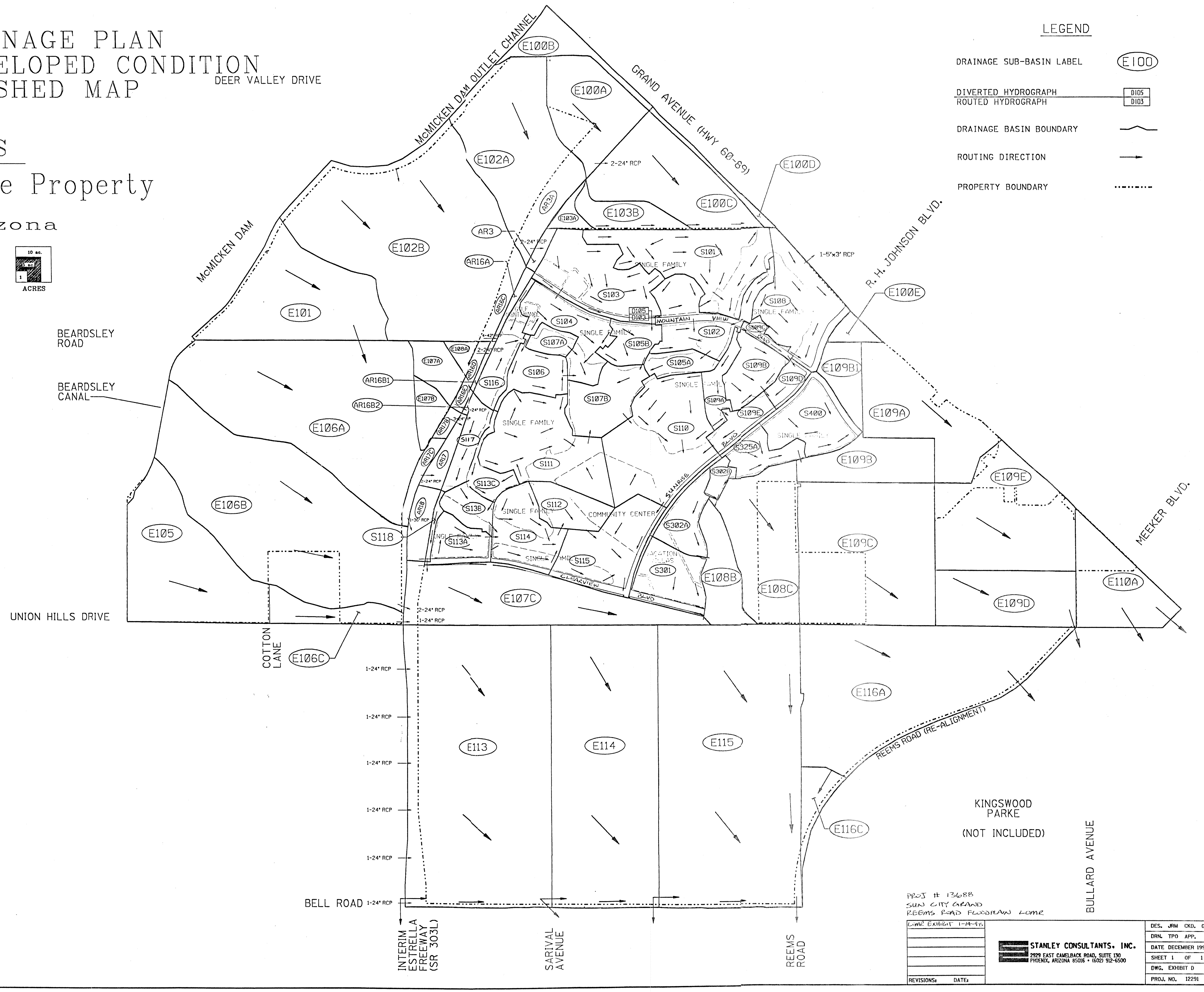
0 400 800 1600
Scale: 1" = 800'

10 ac.
ACRES

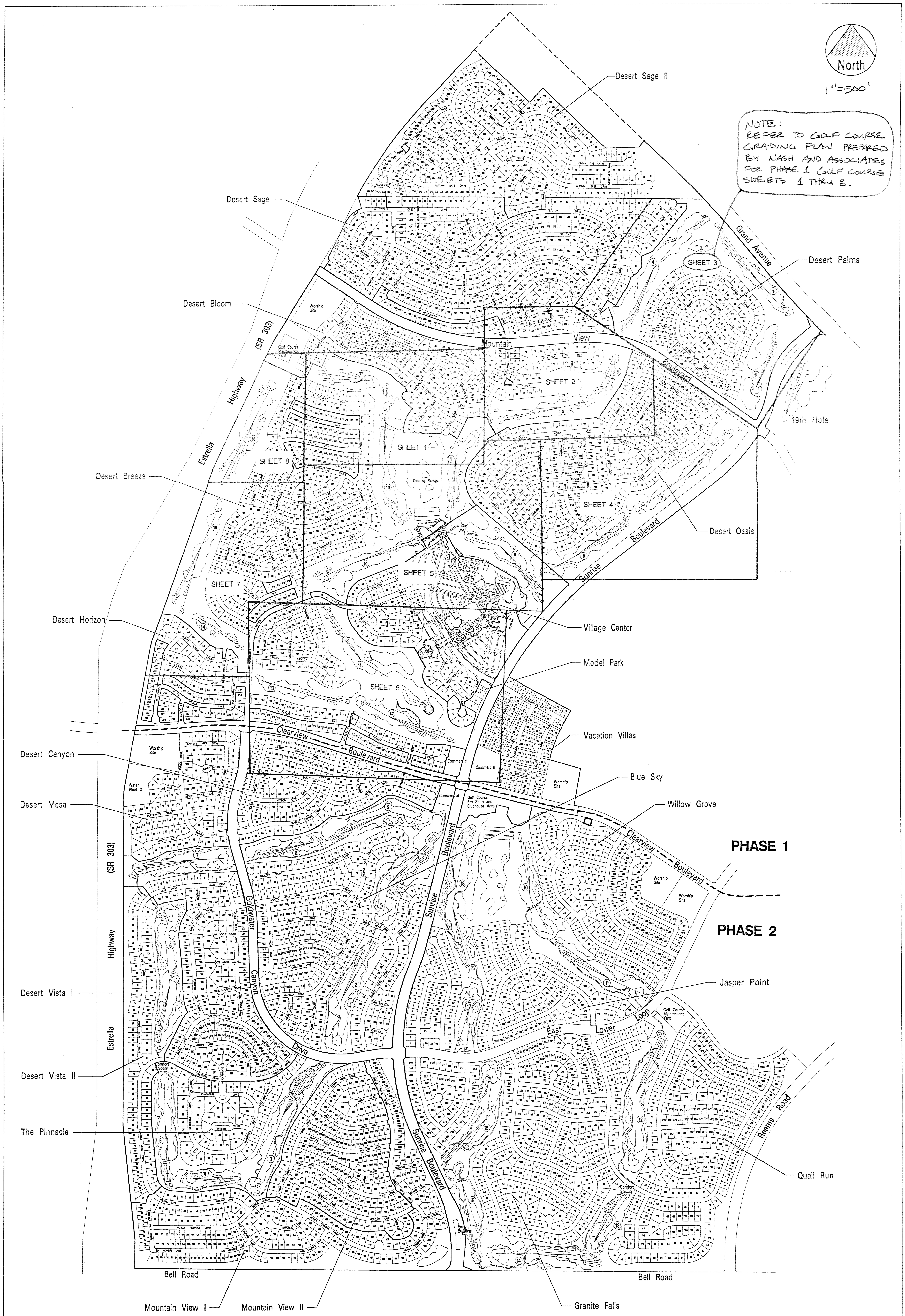
December 1994

NOTES:

OFF-SITE CONTRIBUTING SUB-BASINS ARE FROM THE WHITE TANKS ADMS DEVELOPED BY THE WLB GROUP.



SCGRAND1



Del Webb's Sun City Grand

STANLEY CONSULTANTS

INTERNATIONAL CONSULTANTS IN ENGINEERING, ARCHITECTURE, PLANNING, AND MANAGEMENT

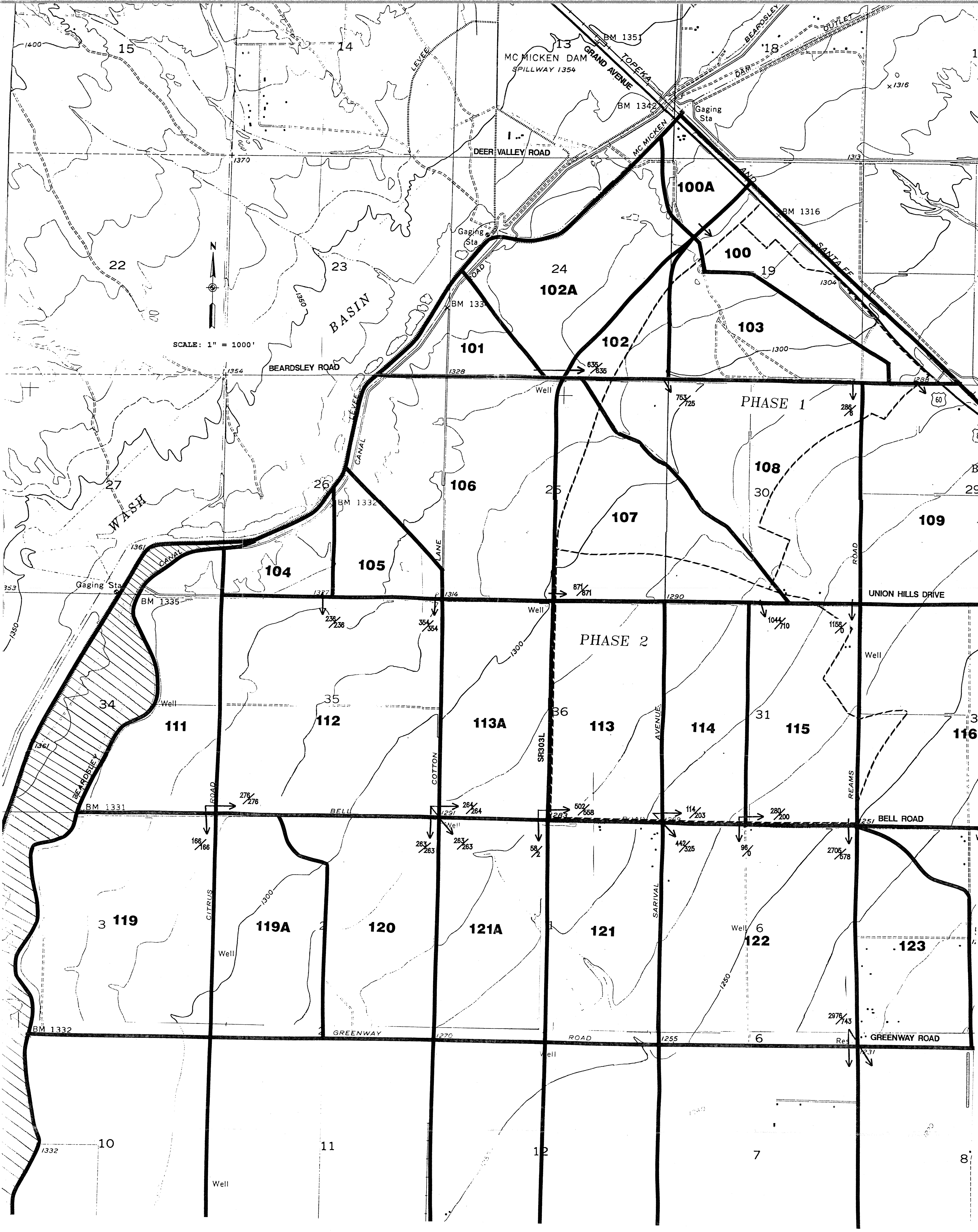
G:\GAP EXH \Z28E03 .SCG DATE: NOV 25 97

EXHIBIT 5

Phase I and II Composite Map (November 1997)

REEMS ROAD FLOODPLAIN LOMR

JAN 98



SUN CITY GRAND PROJECT
REEMS ROAD FLOODPLAIN
PRELIMINARY HYDROLOGY
FOR LETTER OF MAP REVISION

LEGEND
(100-YEAR 24-HOUR PEAK FLOW IN CFS)

ADMS (13688H1C) 280/200 LOMR (13688LMR)

- - - - PHASE LINE

EXHIBIT 4

LOMR DRAINAGE MAP

STANLEY CONSULTANTS
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
(602) 912-6500


MASTER DRAINAGE PLAN
PHASE 2
LEGEND
DRAINAGE SUB-BASIN LABEL (S202)
DRAINAGE BASIN BOUNDARY
FLOW DIRECTION
NORTH
SCALE 1"=200'
CLEARVIEW BLVD
SUNRISE BLVD
SR303L
BELL ROAD
REEMS ROAD
(FUTURE ONSITE RETENTION)
S201
S202A
S202B
S203A
S203B
S204
S205A
S205B
S206
S207
S208
S209A
S209B
S210
S211
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S239B
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S246A
S246B
S246C
S247A
S247B
S249A
S249B
S250A
S250B
JANUARY 1998
REEMS ROAD FLOODPLAIN LOMR
Del Webb's Sun City Grand
STANLEY CONSULTANTS
INTERNATIONAL CONSULTANTS IN ENGINEERING, ARCHITECTURE, PLANNING, AND MANAGEMENT

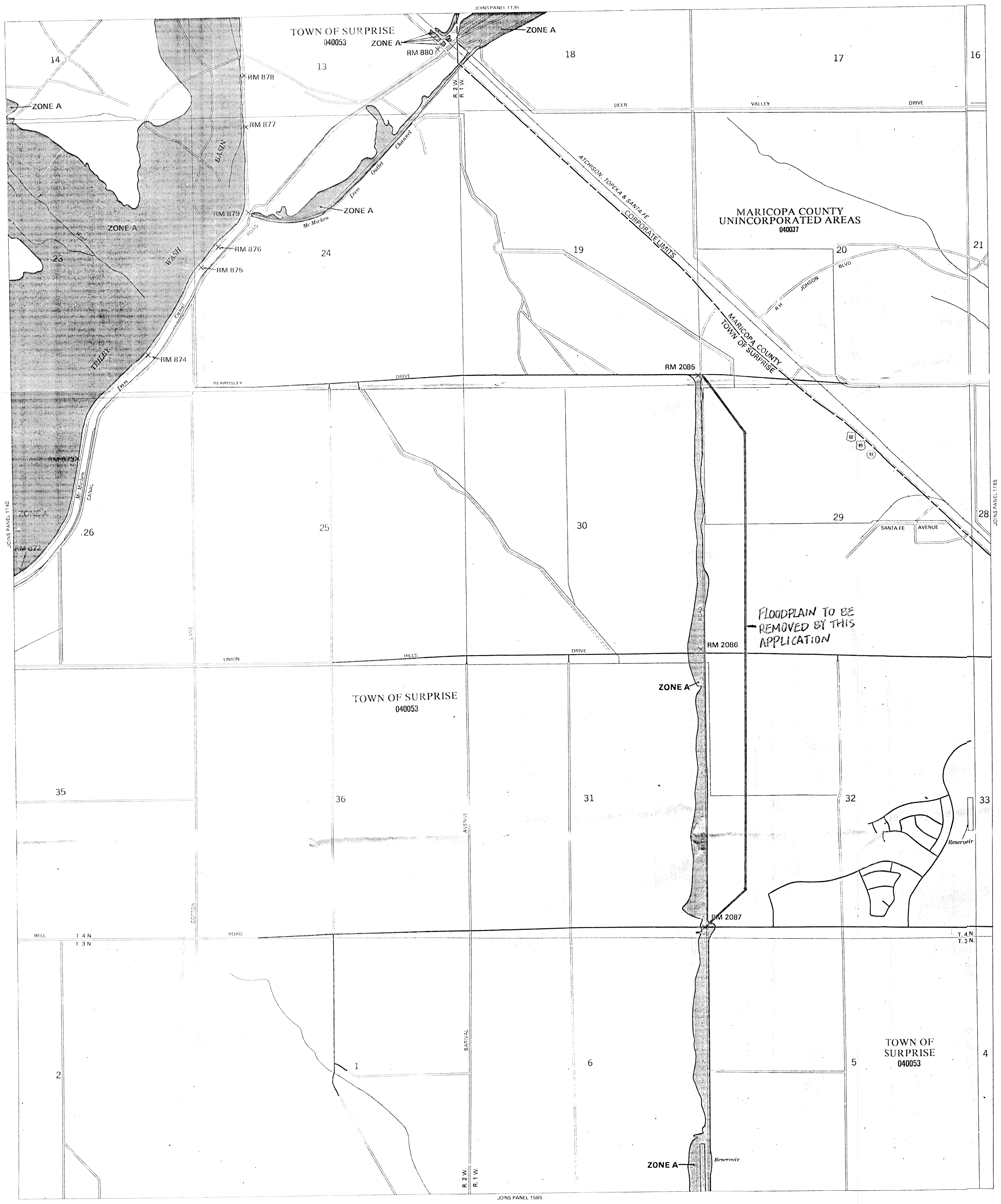


EXHIBIT 1

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM872	1,360.83	Brass cap in concrete on top of McMicken Dam stamped 390
RM873	1,361.16	Brass cap in concrete on top of McMicken Dam stamped 415
RM874	1,361.57	Brass cap in concrete on top of McMicken Dam stamped 44[illegible]
RM875	1,334.41	5/8" copper-coated rod encased in a 5" [illegible] Beardsley Canal at Cotton Lane stamped [illegible]
RM876	1,361.25	Brass cap in concrete on top of McMicken Dam stamped 465
RM877	1,361.21	Brass cap in concrete on top of McMicken Dam stamped 490
RM878	1,361.45	Brass cap in concrete on top of McMicken Dam stamped 500
RM879	1,339.78	Brass cap set in the top of the east end of the south wall of the concrete spillway at the McMicken Dam outlet structure stamped [illegible]
RM880	1,338.96	About 7.0 miles northwest along U.S. Highways [illegible] and 89 and State Highway 93 from the post office at El Mirage [illegible] yards west of the center of the intersection [illegible] 89, State Highway 93 and Canal Road [illegible] feet southwest of the centerline of the highways [illegible] feet west of the northwest end of the southwest concrete headwall of a culvert under the highways [illegible] southeast of a power pole that is braced by a [illegible] of a metal witness post [illegible] 1.5 feet below the [illegible] and on the top of a [illegible] copper-coated rod that is driven to a depth of [illegible] feet and is encased in [illegible] pipe that projects 8 inches
RM 2085	1288.86	Brass Cap in Hand Hole Centerline Intersection Reems Rd. and Beardsley Rd. Southeast Corner Section 19, Township 4 North, Range 1 West
RM 2086	1264.34	Brass Cap in Hand Hole Centerline Intersection Reems Rd. and Union Hills Dr. Southeast Corner Section 30, Township 4 North, Range 1 West
RM 2087	1246.20	Brass Cap in Hand Hole Centerline Intersection Reems Rd. and Bell Rd. Southeast Corner Section 31 Township 4 North, Range 1 West

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- ZONE A — No base flood elevations determined.
- ZONE AE — Base flood elevations determined.
- ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE A0 — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE A99 — To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- ZONE V — Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE — Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- ZONE X — Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- ZONE X — Areas determined to be outside 500-year flood plain.
- ZONE D — Areas in which flood hazards are undetermined.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet*

(D)—(D) Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone*

RM7 x Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Areas of special flood hazard (100-year flood) include Zones A, A1-30, AE, AH, AO, A99, V, V1-30 AND VE

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of the shoreline.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of the map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP:
APRIL 15, 1988

EFFECTIVE DATE (S) OF REVISION (S) TO THIS PANEL:
SEPTEMBER 4, 1991

Map revised SEPTEMBER 30, 1995 to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to change zone designations, to add and update roads and road names, to reflect updated topographic information, to incorporate previously issued letters of map revision, and to incorporate previously issued letters of map amendment.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET
1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1145 OF 4350

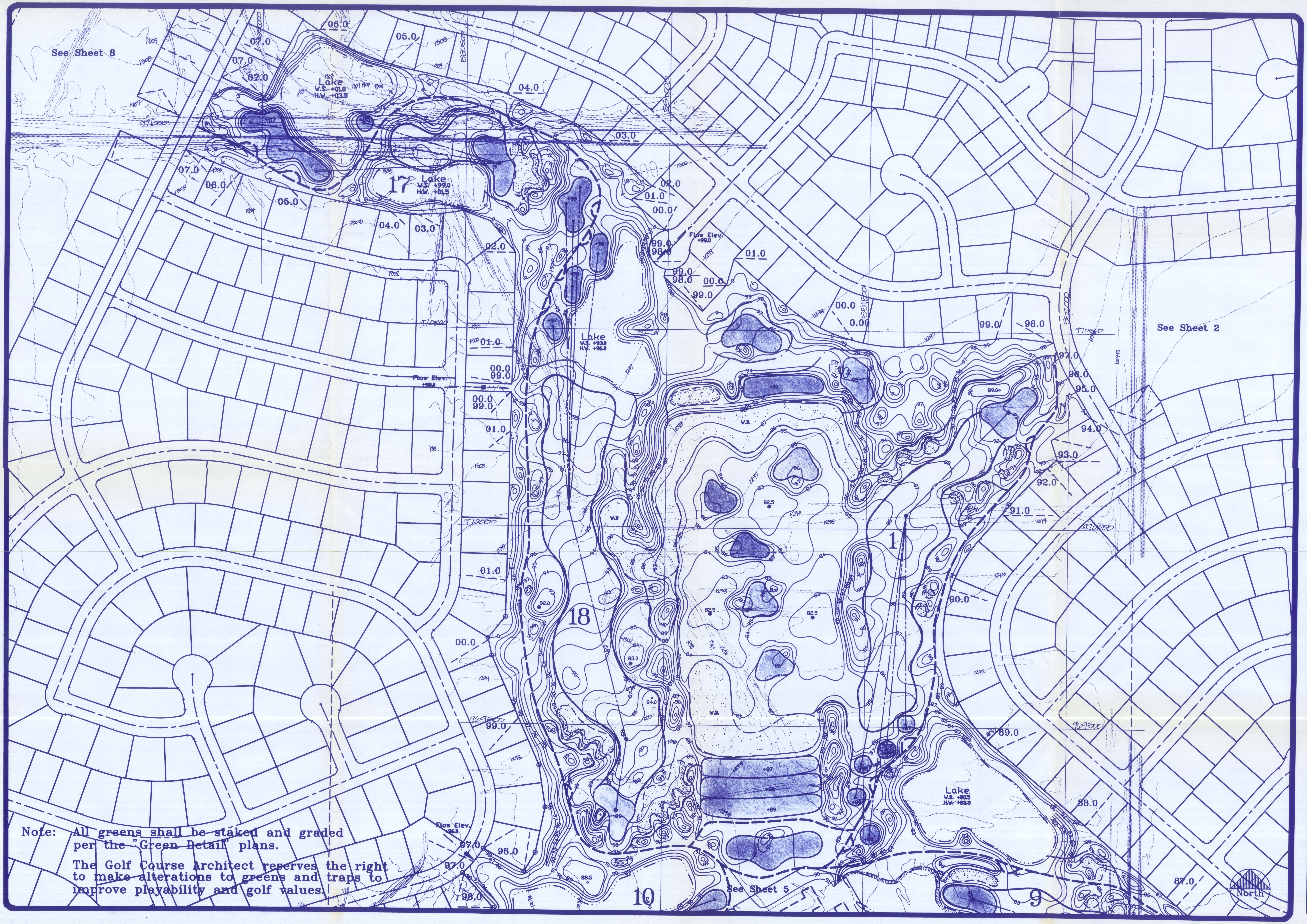
CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	1145	F
SURPRISE, TOWN OF	040053	1145	F

MAP NUMBER
04013C1145 F

MAP REVISED:
SEPTEMBER 30, 1995

Federal Emergency Management Agency



REVISIONS	BY
12.05.94	GN

CASPER
ASCA
11022 N. 28th Drive
Suite 290
Phoenix, Arizona 85029
Office: 602.993.5651
Fax: 602.993.6619
NASH & ASSOCIATES
The Golf Planning & Design Group

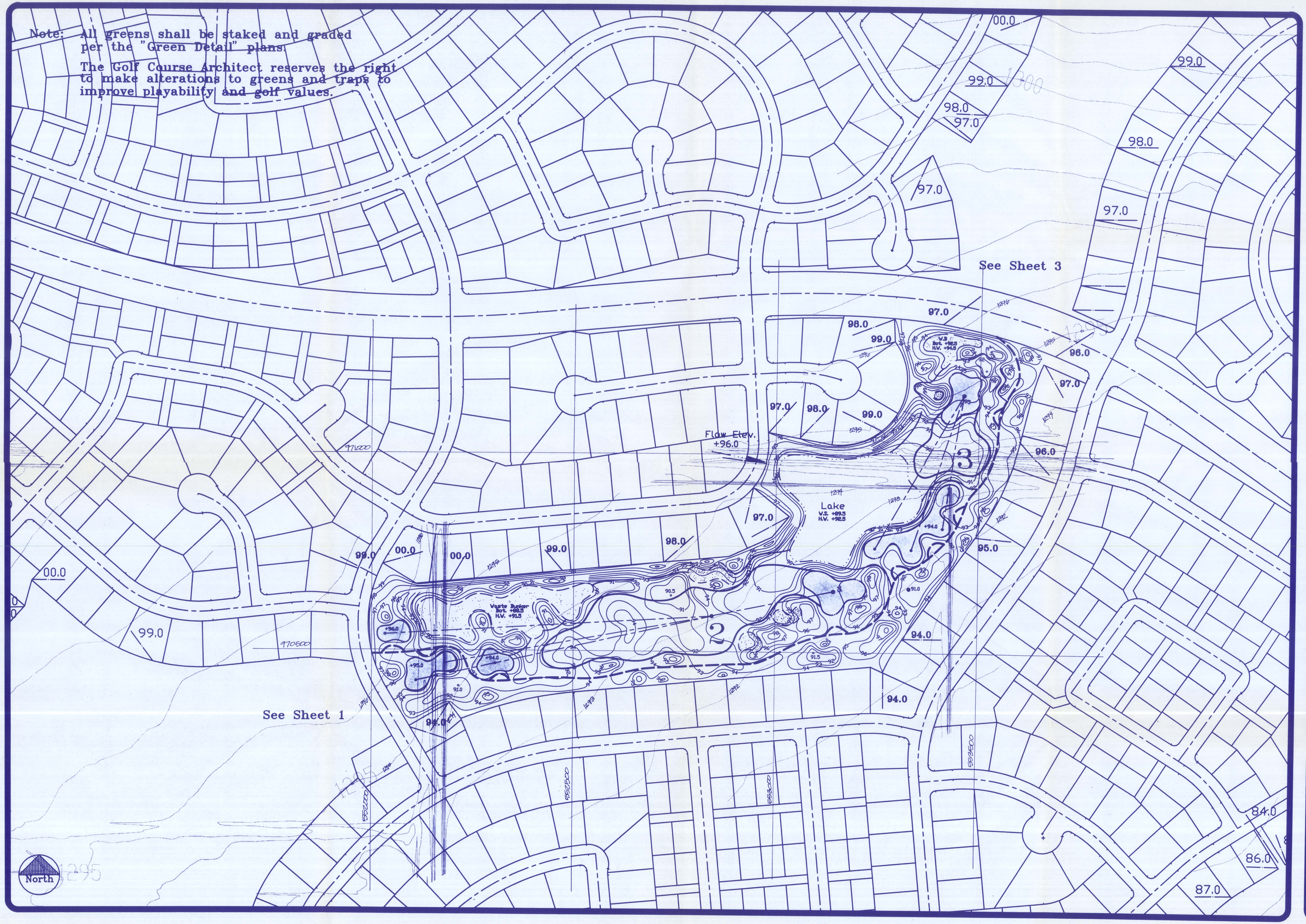
Sun City Grand Avenue G.C.
Final Grading Plans
PHASE 1

CHECKED

DATE
11.13.94

SCALE
1"=100'

SHEET
1



REVISIONS	BY
12.08.94	GN

CASPER NASH & ASSOCIATES
The Golf Planning & Design Group
ASGCA
11022 N. 28th Drive
Suite 290
Phoenix, Arizona 85029
Office: 602.993.5851
Fax: 602.993.6619

Sun City Grand Avenue G.C.

Final Grading Plans

PHASE 1

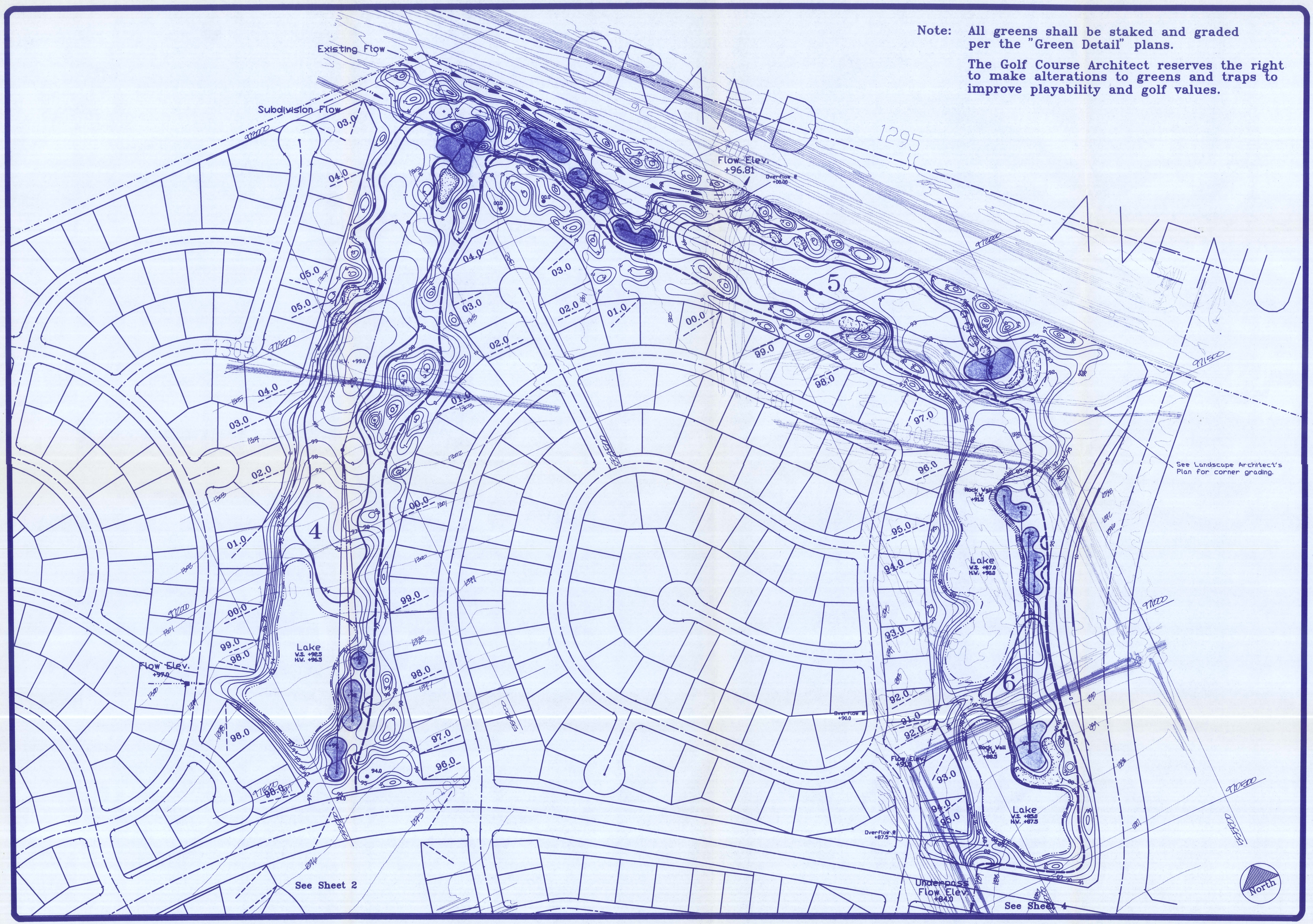
CHECKED

DATE 11.13.94

SCALE 1"=100'

SHEET

2



REVISIONS	BY
12.05.94	GN
02.09.95	GN

ASGCA
11022 N. 28th Drive
Suite 290
Phoenix, Arizona 85029
Office: 602.993.5861
Fax: 602.993.5619
CASPER NASH & ASSOCIATES
The Golf Planning & Design Group

Sun City Grand Avenue G.C.

Final Grading Plans

PHASE 1

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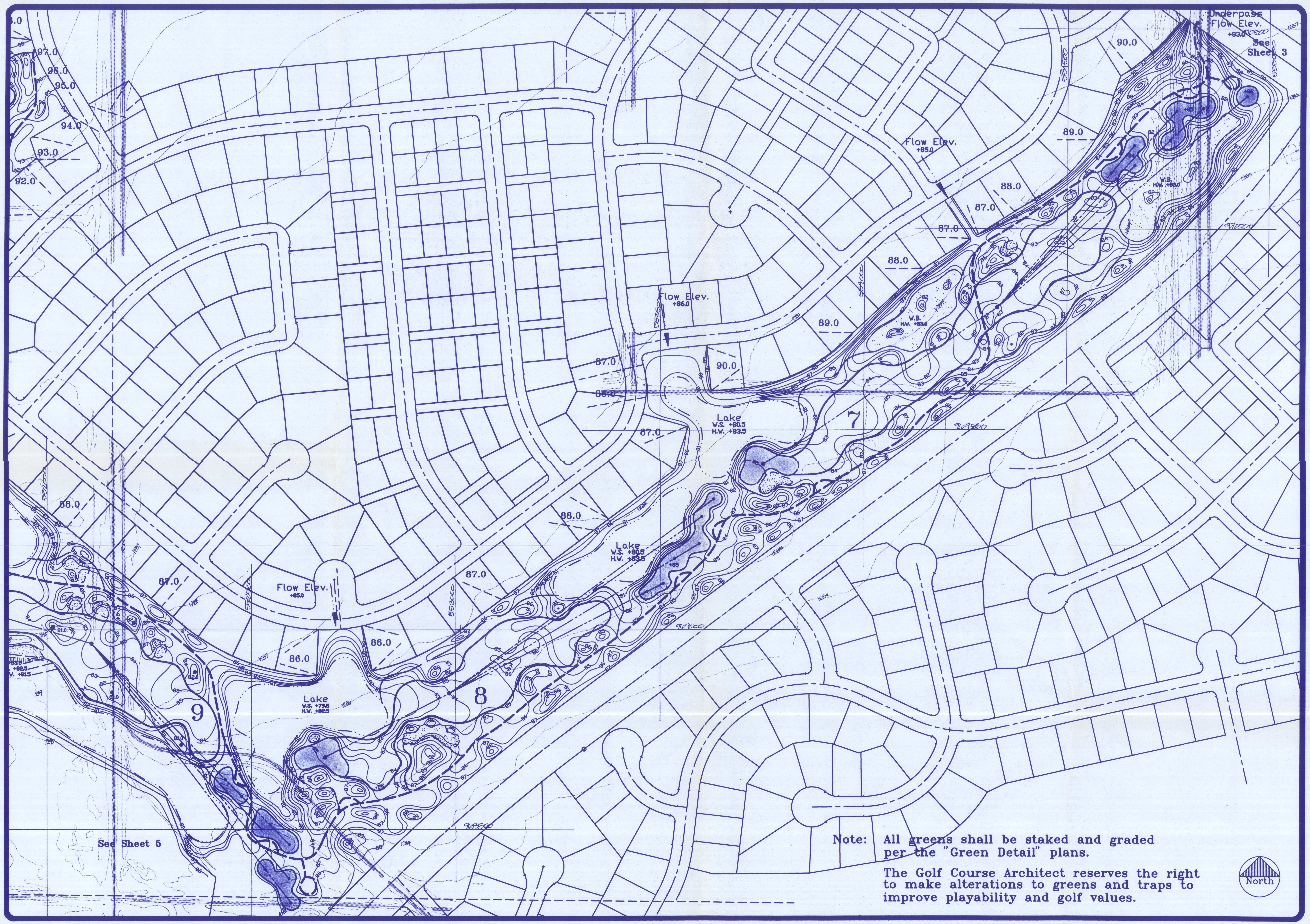
SCALE
1"=100'

SHEET
3



Note: All greens shall be staked and graded per the "Green Detail" plans.

The Golf Course Architect reserves the right to make alterations to greens and traps to improve playability and golf values.

REVISIONS	BY
12.05.94	GN

ASGCA
11022 N. 28th Drive
Suite 290
Phoenix, Arizona 85029
Office: 602.993.5851
Fax: 602.993.6619

CASPER NASH & ASSOCIATES
The Golf Planning & Design Group

Sun City Grand Avenue G.C.

Final Grading Plans

PHASE 1

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SCALE
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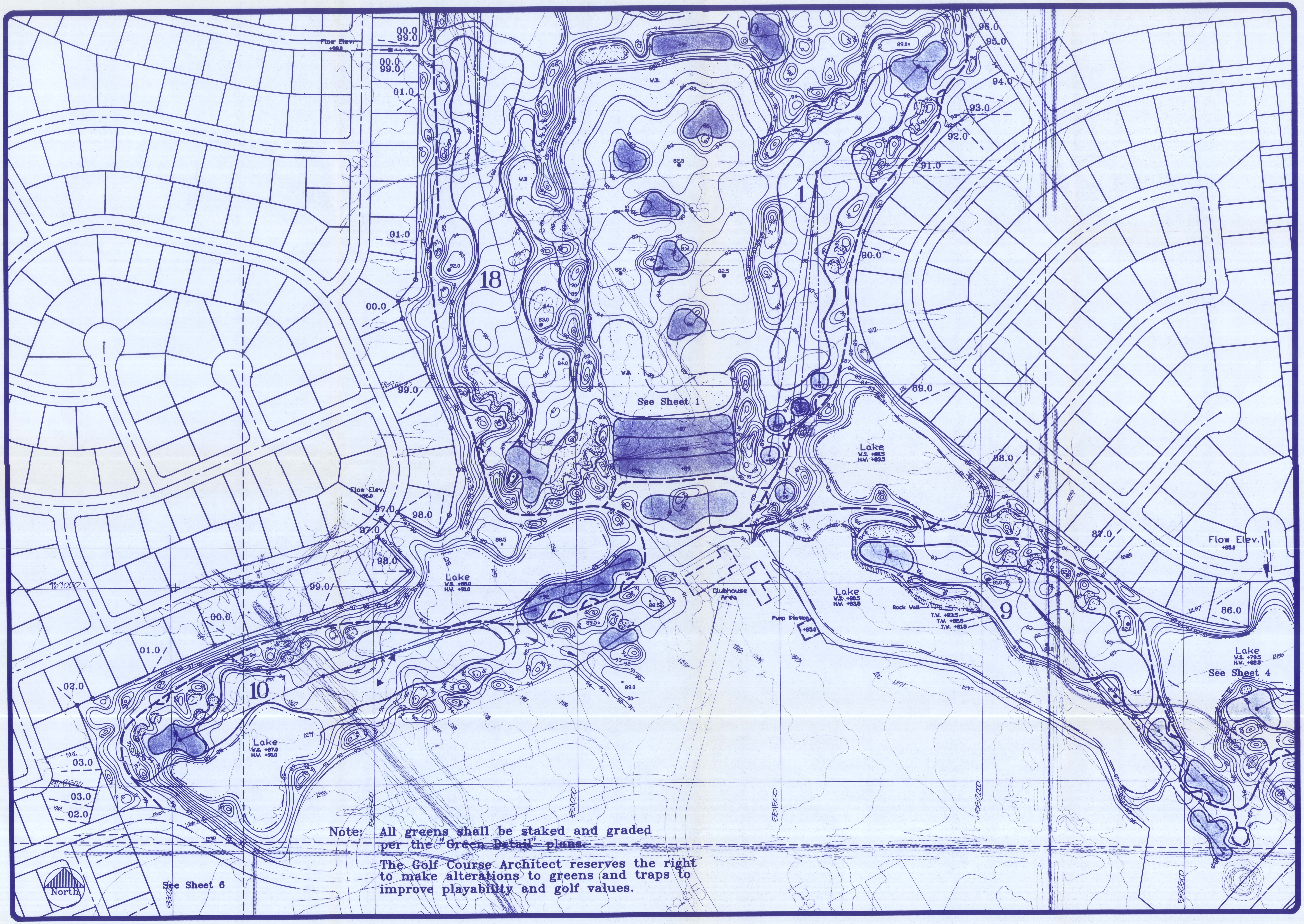
SHEET
4



REVISIONS	BY
12.05.94	GN

ASGCA
11022 N. 28th Drive
Suite 290
Phoenix, Arizona 85029
Office: 602.993.5851
Fax: 602.993.6619

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The Golf Planning & Design Group

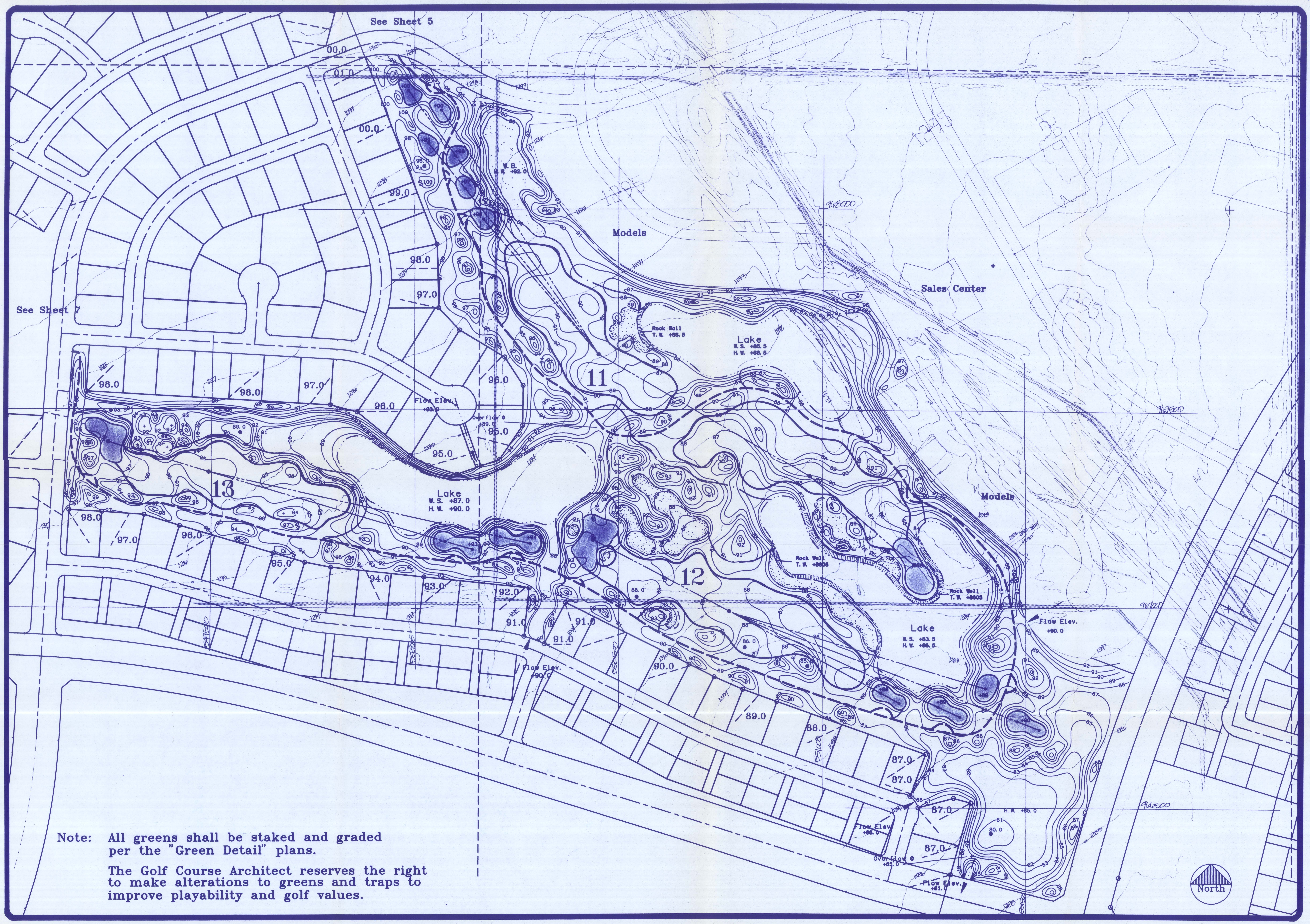
Sun City Grand Avenue G.C.
Final Grading Plans
PHASE 1

CHECKED

DATE
11.13.94

SCALE
1"=100'

SHEET
5



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REVISIONS	BY
12.08.94	GN

CASPER NASH & ASSOCIATES
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Fax: 602.993.6619

Sun City Grand Avenue G.C.

Final Grading Plans

PHASE 1

CHECKED

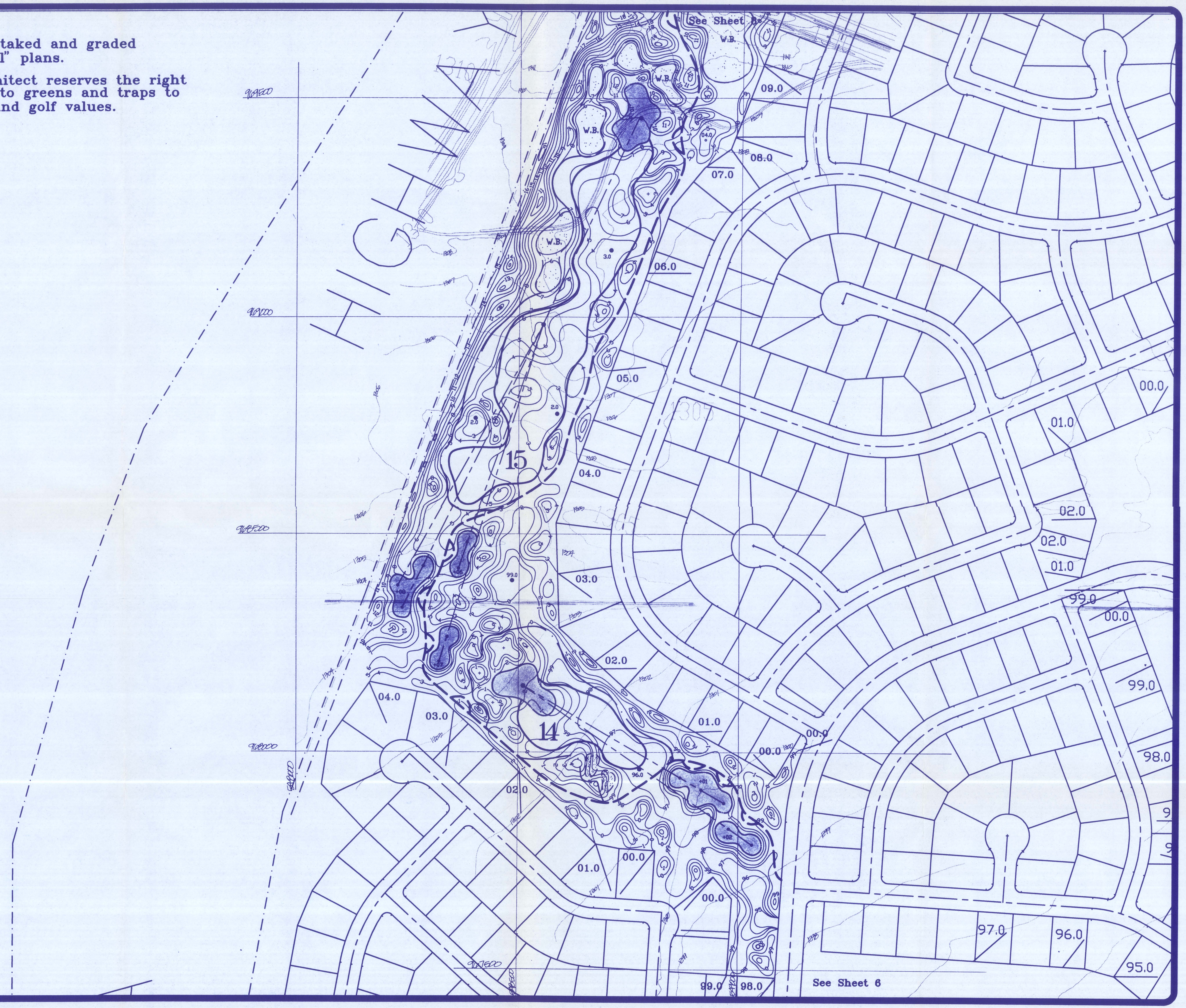
DATE
11.13.94

SCALE
1"=100'

SHEET
6

Note: All greens shall be staked and graded per the "Green Detail" plans.

The Golf Course Architect reserves the right to make alterations to greens and traps to improve playability and golf values.



REVISIONS	BY
12.08.94	GN

CASPER NASH & ASSOCIATES
The Golf Planning & Design Group
ASGCA
11022 N. 28th Drive
Suite 290
Phoenix, Arizona 85029
Office: 602.993.5651
Fax: 602.993.6619

Sun City Grand Avenue G.C.

Final Grading Plans

PHASE 1

CHECKED

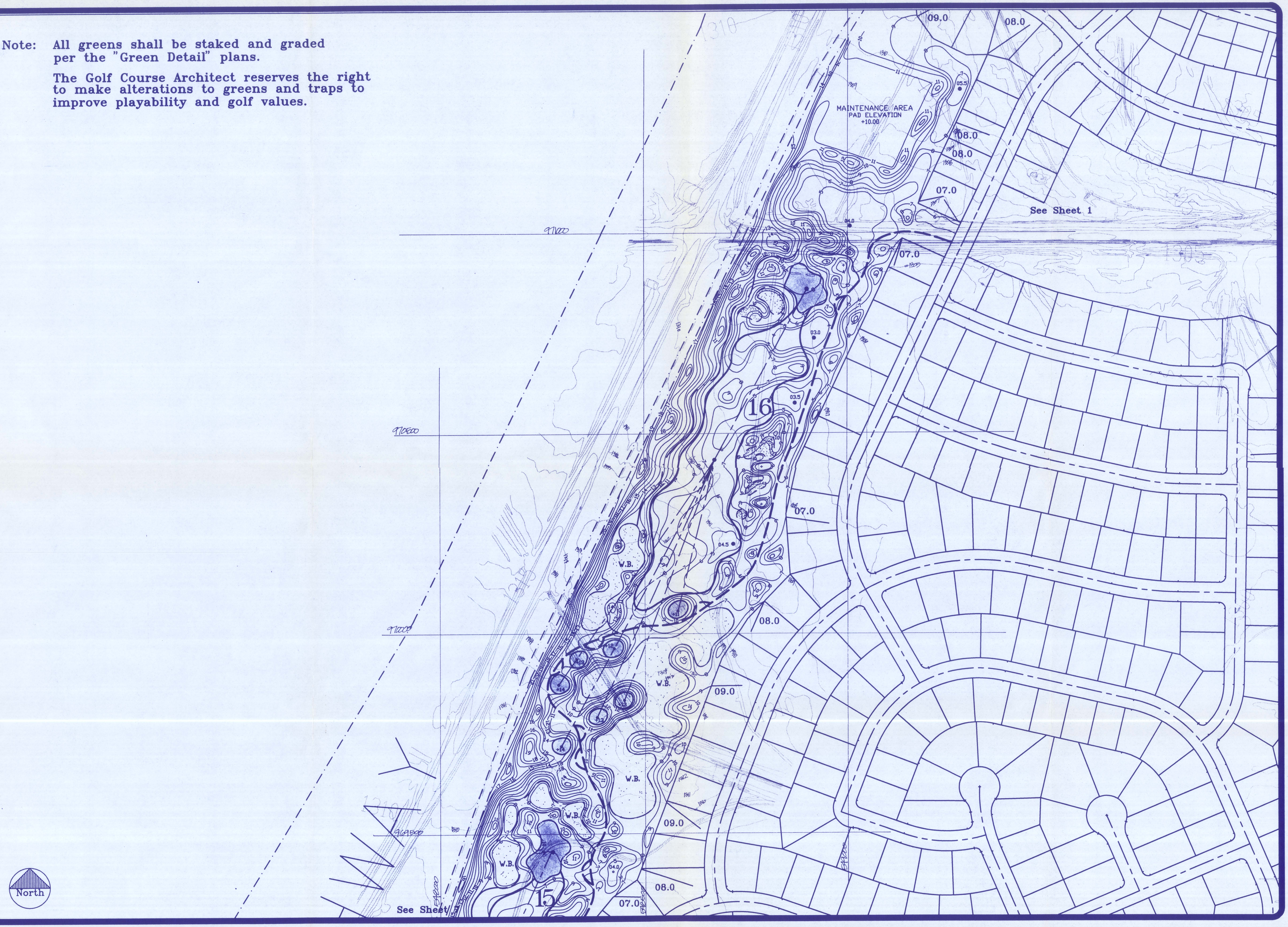
DATE 11.13.94

SCALE 1"=100'

SHEET 7

Note: All greens shall be staked and graded per the "Green Detail" plans.

The Golf Course Architect reserves the right to make alterations to greens and traps to improve playability and golf values.



REVISIONS	BY
12.08.94	GN

Casper Nash & Associates
The Golf Planning & Design Group
ASGCA
11022 N. 28th Drive
Suite 290
Phoenix, Arizona 85029
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Fax: 602.993.6619

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PHASE 1

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DATE
11.13.94

SCALE
1"=100'

SHEET
8

APPENDIX B: APPLICATION FORMS

1. Acknowledgment Letter from FCDMC
2. Local Floodplain Administration Forms (To be completed and approved by FCDMC upon approval by FEMA)
3. FEMA Letter of Map Revision Forms

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009-6399
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5897

April 28, 1998

Shirley Berg, Community Development Director
City of Surprise
12425 W. Bell Road, Suite D100
Surprise, Arizona 85375

Re: FA98-034,Reemes Road LOMR
Del Webb, Sun City Grand

Dear ~~Ms. Berg:~~ Shirley

We have reviewed the Letter of Map Revision (LOMR) application prepared by Stanley Consultants, Inc., on behalf of Del Webb Corporation to remove a portion of the official Reems Road Floodplain from the FIRM maps.

The information being submitted is adequate for FEMA to begin their review. We recommend that the appropriate City of Surprise official sign the acknowledgment form (MT-2 Form 1, Page 4) and forward the application to FEMA.

Upon federal approval, the District will recognize the revised floodplain per Article VIII of the Floodplain Regulation for Maricopa County which we administer and enforce on behalf of the City.

If you have any questions or if we can be of further assistance, please let me know.

Sincerely,

Ron Nevitt

Ron Nevitt,
Floodplain Management

Copy to: Scott Buchanan, P.E.
Stanley Consultants, Inc.

FLOOD CONTROL DISTRICT

of

Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

WARNING AND DISCLAIMER OF LIABILITY

The Floodplain Regulation for Maricopa County, Arizona was adopted on August 4, 1986 and amended March 23, 1987, April 06, 1988, September 18, 1989, September 03, 1991 and December 15, 1993. Its intent is to prevent the dangerous and expensive misuse of floodplains in Maricopa County.

A Floodplain as defined in the Regulations is the areas adjoining the channel of a watercourse including areas where drainage is or may be restricted by man-made structures which have been or may be covered partially or wholly by floodwater from the 100-year flood.

Depending on the location of your property it could possibly be inundated by greater frequency flood events (those occurring more often). A flood greater in magnitude than the 100-year flood could also occur.

The review your use has undergone is solely for the purpose of determining if your application conforms with the written requirements of the Floodplain Regulation for Maricopa County. It is not to be taken as a warranty. Compliance with this Regulation does not insure complete protection from flooding. The Floodplain Regulation meets established standards for floodplain management, but neither this review nor the Regulation take into account such flood related problems as natural erosion, streambed meander or man-made obstructions and diversions all of which may have an adverse affect in the event of a flood. You are advised to consult your own engineer or other expert regarding these considerations.

I have read and understand the above **WARNING AND DISCLAIMER OF LIABILITY.**

FA	G. Scott Buchanan	3-30-98
Permit No.	Owner or Agent	Date

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 W. Durango Street, Phoenix, Arizona 85009
Telephone (602)506-1501 ; Fax (602)506-4601

APPLICATION TO FLOODPLAIN ADMINISTRATOR

(Completed by Applicant or Agent)

Applicant: Stanley Consultants, Inc. on behalf of Del Webb Development Co.

Mailing Address: 2929 East Camelback Road, Suite 130

City: Phoenix State AZ Zip 85027

Phone Number: 912-6500 Business Phone Number (if applicable): 912-6500

Property Address: Reems Road from Beardsley Road to Bell Road

Assessor Book Number: ____ Map Number: ____ Parcel Number: numerous

1/4 Section: ____ Section: 29-32 Township: 4 N Range: 1 W

Consultant: Scott Buchanan, Stanley Consultants Phone No.: 912-6500

Purpose of Application: To remove Reems Road floodplain from Beardsley Road to Bell Road.

Applicant Statement (justification or hardship if variance; grounds for appeal):

____

____

APPLICANT SIGNATURE: G. Scott Buchanan Date: 3-30-98

(Completed by Flood Control District)

FA ____ ( )Use Permit ( )Variance ( )Appeal Supvr. Dist.: ____ ~~Fee~~: WAIVED

Floodplain: ____ Flood Map: ____ FIRM: ____ Zone: ____

Map Date: ____ BFE ____ Regulatory Flood Elevation: ____

Additional Documentation: ( )Elevation/Floodproofing Certification ( )404 ( )ADEQ

( )Warning/Disclaimer ( )Other ____ ( )Coordination ____
Agency

FLOODPLAIN ADMINISTRATOR

APPROVED subject to attached stipulations ____ Date ____ Floodplain Administration

BOARD OF REVIEW

ACTION TAKEN: Approved ____ Date Denied ____ Date Continuance ____ Date

BOARD ACTION CONFIRMED: ____ Floodplain Administration Date ____

FCDMC 8-94

FEDERAL EMERGENCY MANAGEMENT AGENCY **REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	***FEMA USE ONLY***

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. OVERVIEW

1. The basis for this revision request is (are): *(check all that apply)*
   - [X] Physical change
     - [X] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [X] Improved data
   - [ ] Floodway revision
   - [ ] Other ______

   Explain ______
2. Flooding Source: Rainfall runoff
3. Project Name/Identifier: Sun City Grand Project Reems Road Floodplain LOMR
4. FEMA zone designations affected: A
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-30, VE, B, C, D, X)
5. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	County	State	Map No.	Panel No.	Effective Date
EX: 480301	Katy,City	Harris, Fort Bend	TX	480301	0005D	02/08/83
480287	Harris County	Harris	TX	48201C	0220G	09/28/90
040053	Surprise Town	Maricopa	AZ	04013C	1145F	4/15/88
040037	Maricopa County	Maricopa	AZ	04013C	1145F	4/15/88

6. The area of revision encompasses the following types of flooding, structures, and associated disciplines: *(check all that apply)*

Types of Flooding	Structures	Disciplines*
[X] Riverine	[ ] Channelization	[X] Water Resources
[ ] Coastal	[ ] Levee/Floodwall	[X] Hydrology
[ ] Alluvial Fan	[ ] Bridge/Culvert	[ ] Hydraulics
[ ] Shallow Flooding *(e.g. Zones AO and AH)*	[ ] Dam	[ ] Sediment Transport
[ ] Lakes	[ ] Coastal	[ ] Interior Drainage
	[X] Fill	[ ] Structural
Affected by wind/wave action	[ ] Pump Station	[ ] Geotechnical
	[ ] None	[ ] Land Surveying
[ ] Yes	[ ] Channel Relocation	[ ] Other *(describe)*
[ ] No	[X] Excavation	
	[ ] Other *(describe)*	

[ ] Other(describe)______ ______ ______

* **Attach completed "Certification by Registered Professional Engineer and/or Land Surveyor" Form for each discipline checked. (Form 2)**

2. FLOODWAY INFORMATION

7. Does the affected flooding source have a floodway designated on the effective FIRM or FBFM? [ ] Yes [X] No
8. Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM [ ] Yes [ ] No

   If yes, give reason: N/A

Attach copy of either a public notice distributed by the community stating the community's intent to revise the floodway or a statement by the community that it has notified all affected property owners and affected adjacent jurisdictions.

9. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP?
☐ Yes ☒ No

If yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

3. PROPOSED ENCROACHMENTS

10. With floodways: N/A

1A. Does the revision request involve fill, new construction, substantial improvement, or other development in the floodway? ☐ Yes ☐ No

1B. If yes, does the development cause the 100-year water surface elevation to increase at any location by more than 0.000 feet? ☐ Yes ☐ No

11. Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☒ Yes ☐ No

2B. If yes, does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the 100-year water surface elevation to increase at any location by more than one foot (*or other surcharge limit if community or state has adopted more stringent criteria*)? ☐ Yes ☒ No

If the answer to either Items 1B or 2B is yes, please provide documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

4. REVISION REQUESTOR ACKNOWLEDGMENT

12. Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

5. COMMUNITY OFFICIAL ACKNOWLEDGMENT

13. Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No

14. Does this revision request have the endorsement of the community? ☒ Yes ☐ No (see attached letter from FCDMC)

If no to either of the above questions, please explain: ______________________________

Please note that community acknowledgment and /or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

6. OPERATION AND MAINTENANCE

15. Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ No

If yes, please provide the following information for each of the new flood control structures:

A. Inspection of the flood control project will be conducted periodically by ______________________________
entity

______________ with a maximum interval of ____________ months between inspections.

B. Based on the results of scheduled periodic inspections, appropriate maintenance of the flood control facilities will be conducted by ______________________________
(entity)

to ensure the integrity and degree of flood protection of the structure.

C. A formal plan of operation, including documentation of the flood warning system, specific actions and assignments of responsibility by individual name or title, and provisions for testing the plan at intervals not less than one year, ☐ has ☐ has not been prepared for the flood control structure.

D. The community is willing to assume responsibility for ☐ performing ☐ overseeing compliance with the maintenance and operation plans of the ______________________________ *(Name)*

flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

Attach operation and maintenance plans

7. REQUESTED RESPONSE FROM FEMA

16. After examining the pertinent NFIP regulations and reviewing the document entitled "Appeals, Revisions, and Amendments to Flood Insurance Maps: A guide for Community Officials," dated January 1990, this request is for a:

____a.	CLOMR	A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision *(LOMR or PMR)*, or proposed hydrology changes *(see 44 CFR Ch. I, Parts 60, 65, and 72)*.
__X__b.	LOMR	A letter from FEMA officially revising the current NFIP map to show changes to floodplains, floodways, or flood elevations. LOMRs typically depict decreased flood hazards. *(See 44 CFR Ch. I Parts 60 and 65.)*
____c.	PMR	A reprinted NFIP map incorporating changes to floodplains, floodways, or flood elevations. Because of the time and cost involved to change, reprint, and redistribute an NFIP map, a PMR is usually processed when a revision reflects increased flood hazards or large-scope changes. *(See 44 CFR Ch. I, Parts 60 and 65.)*
____d.	Other:	Describe______________________________

8. FORMS INCLUDED

17. Form 2 entitled, "Certification By Registered Professional Engineer and/or Land Surveyor" must be submitted.

The following forms should be included with this request if (check the included forms):

• Hydrologic analysis for flooding source differs from that used to develop FIRM	☒ Hydrologic Analysis Form (Form 3)
• Hydraulic analysis for riverine flooding differs from that used to develop FIRM	☐ Riverine Hydraulic Analysis Form (Form 4)
• The request is based on updated topographic information or a revised floodplain or floodway delineation is requested	☐ Riverine /Coastal Mapping Form (Form 5)
• The request involves any type of channel modification	☐ Channelization Form (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	☐ Bridge/Culvert Form (Form 7)
• The request involves a new revised levee/floodwall system	☐ Levee/Floodwall System Analysis Form (Form 8)
• The request involves analysis of coastal flooding	☐ Coastal Analysis Form (Form 9)
• The request involves coastal structures credited as providing protection from the 100-year flood	☐ Coastal Structures (Form 10)
• The request involves an existing, proposed, or modified dam	☐ Dam Form (Form 11)
• The request involves structures credited as providing protection from the 100-year flood on an alluvial fan	☐ Alluvial Fan Flooding Form (Form 12)

9. INITIAL REVIEW FEE

18. The minimum initial review fee for the appropriate request category has been included. ☒ Yes ☐ No

Initial fee amount: $ 4,300.00 flat review fee

Check or money order only. Make check or money order payable to : **National Flood Insurance Program.** If paying by Visa or Mastercard please refer to the credit card information form which follows this form.

or

19. This request is for a project that is for public benefit and is primarily intended for flood loss reduction to insurable structures in identified flood hazard areas which were in existence prior to the commencement of construction of the flood control project. ☐ Yes ☒ No

or

20. This request is to correct map errors, to include the effects of natural changes within the areas of special flood hazard, or solely to provide more detailed data. ☐ Yes ☒ No

Note: I understand that my signature indicates that all information submitted in support of this request is correct.

Signature of Revision Requester

Scott Buchanan, Principal Hydrologist

Printed Name and Title of Revision Requester

Stanley Consultants, Inc.

Company Name

(602) 912-6500

Telephone No. Date

Note: Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.

Signature of Community Official

Printed Name and Title of Community Official

City of Surprise, AZ
Maricopa County, AZ

Community Name

Date

Does this request impact any other communities? ☐ Yes ☒ No

If yes, attach letters from all affected jurisdictions acknowledging revision request and approving changes to floodway, if applicable.

Note: Although a photograph of physical changes is not required, it may be helpful for FEMA's review.

FEDERAL EMERGENCY MANAGEMENT AGENCY

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR FORM

O.M.B. Burden No. 3067-0148
Expires July 31, 1997

FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average . 23 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067- 0148), Washington, DC 20503.

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2
2. I am licensed with an expertise in Civil Engineering (hydrology, hydraulics)
[example: water resources *(hydrology, hydraulics, sediment transport, interior drainage)** structural, geotechnical, land surveying.]
3. I have 23 years experience in the expertise listed above.
4. I have ☒ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.
5. I ☒ have ☐ have not visited and physically viewed the project.
6. In my opinion, the following analyses and /or designs, is/are being certified: hydrologic analysis reflecting changes in watershed conditions, i.e., land development with stormwater retention.
7. Base upon the following review, the modifications in place have been constructed in general accordance with plans and specifications.

   Basis for above statement: (check all that apply)

   a. ☐ Viewed all phases of actual construction.
   b. ☐ Compared plans and specifications with as-built survey information.
   c. ☒ Examined plans and specifications and compared with completed projects.
   d. ☐ Other ______
8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: George Scott Buchanan, P.E.
(please print or type)

Title: Principal Hydrologist
(please print or type)

Registration No. 26837 Expiration Date: 3-31-99

State Arizona

Type of License Civil Engineer

G Scott Buchanan
Signature

4-28-98
Date

Registered Professional Engineer (Civil) CERTIFICATE NO. 26837 G. SCOTT BUCHANAN Date Signed 4-28-98 ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

Note: Insert not applicable (N/A) when statement does not apply.

FEDERAL EMERGENCY MANAGEMENT AGENCY

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR FORM

O.M.B. Burden No. 3067-0148
Expires July 31, 1997

FEMA USE ONLY

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1. This certification is in accordance with 44 CFR Ch. I, Section 65.2
2. I am licensed with an expertise in Civil Engineering
   [example: water resources *(hydrology, hydraulics, sediment transport, interior drainage)** structural, geotechnical, land surveying.]
3. I have 20 years experience in the expertise listed above.
4. I have ☐ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.
5. I ☒ have ☐ have not visited and physically viewed the project.
6. In my opinion, the following analyses and /or designs, is/are being certified: The stormwater retention facilities in SCG Phase 1 & 2 have been constructed in substantial conformance with the plans and specifications.
7. Base upon the following review, the modifications in place have been constructed in general accordance with plans and specifications.

   Basis for above statement: (check all that apply)

   a. ☐ Viewed all phases of actual construction.
   b. ☐ Compared plans and specifications with as-built survey information.
   c. ☒ Examined plans and specifications and compared with completed projects.
   d. ☐ Other

8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Richard B. Hoppe
(please print or type)

Title: Project Manager
(please print or type)

Registration No. 14393 Expiration Date:

State Arizona

Type of License Civil Engineer

Signature

Date

Registered Professional Engineer (Civil) Certificate No. 14393 RICHARD B. HOPPE Date Signed 4.2... ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

Note: Insert not applicable (N/A) when statement does not apply.

FEDERAL EMERGENCY MANAGEMENT AGENCY **HYDROLOGIC ANALYSIS FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	***FEMA USE ONLY***

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.67 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: City of Surprise, Maricopa County

Flooding Source: Rainfall Runoff to Reems Road
(One form for each flooding source)

Project Name /Identifier: Sun City Grand Project Reems Road Floodplain LOMR

1. HYDROLOGIC ANALYSIS IN FIS

☒ Approximate study stream (Zone A)
☐ Detailed study stream (briefly explain methodology)

2. REASON FOR NEW HYDROLOGIC ANALYSIS

☐ No existing analysis
☒ Improved data *(see data revision on page 3)*
☒ Changed physical conditions of watershed *(explain)* Recently constructed stormwater retention basins in Sun City Grand Project reduce or eliminate runoff discharge to Reems Road.
☐ Alternative methodology *(justify why the revised model is better than model used in the effective FIS)*

☐ Evaluation of proposed conditions (CLOMRs only) (explain)

☐ Other

If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the 10-, 50-, 100 - and 500-year recurrence intervals. N/A (see below)

Only the 100-year recurrence interval need be included for SFHAs designated as Zone A.

3. APPROVAL OF ANALYSIS

☒ Approval of hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Flood Control District of Maricopa County)
Attach evidence of approval.
☐ Approval of the hydrologic analysis is not required by any local, State, or Federal Agency.

Stream: Reems Road Floodplain

Comparison of 100-year Discharges

Location:	Drainage area (Sq mi.)	FIS (cfs):	Revised (cfs):
Beardsley Road	0.37	286	6
Union Hills Drive	1.93	1158	0
Bell Road	7.00	2705	578

Note: When revised discharges are not significantly different than FIS discharges, FEMA may require a confidence limits analysis on attachment D at a later date to complete the review.

As is often the case with revision requests, only a portion of a stream may actually be revised or be affected by a revision. Therefore, transition to the unrevised portion is important to maintain the continuity of the study. NFIP regulations stipulate that such a transition must be assured. What is the transition from the proposed discharges to the effective discharges? Please explain how the transition was made *(attach separate sheet if necessary)*

ATTACH A COMPLETED REVIEW OF RESULTS PAGE FOR EACH FLOODING SOURCE.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS *(i.e. no changed hydraulic conditions)*? ☒ Yes ☐ No

If yes, does the 100-year water surface elevation change by 1.0 foot or more? ☒ Yes ☐ No

FEMA does not normally revise NFIP maps solely due to insignificant flow changes where changes in 100-year water surface elevation are less than 1.0 foot.

5. HISTORICAL FLOODING INFORMATION

Is historical data available for the flooding source? ☐ Yes ☒ No

If yes, provide the following:

Location along flooding source: ____________

Maximum peak discharge: ____________ cfs

Second highest peak discharge: ____________ cfs

Source of information: ____________

6. GAGE RECORD INFORMATION

Location of nearest gage to project site *(along flooding source or similar watershed; specify)*

N/A

Gaging Station: ____________

Drainage area at gage: ____________ mi^2

Number of years of data: ____________

7. DATA REVISION

Please use the following table to list all the data and/or parameters affected by this request and identify them as new data (*New*) or as revising existing data (*Revised*). *(If necessary, attach a separate sheet.)*

Data Parameter	New	Revised	Data Source
rainfall - runoff	☐	☒	Stanley plans
unit hydrograph	☐	☒	Stanley plans
retention of runoff	☒	☐	Stanley plans
reach routing	☐	☒	Stanley plans
flow split (diversion)	☐	☒	Stanley plans

- Data source can be from a Federal, State, or local government agency, or from a private source. Some State and local governments may have less strict data requirements than Federal agencies, in which case the hydrologic data may not be accepted by FEMA unless it is demonstrated that the data give a better estimate of the flood discharge.
- Attach documentation corroborating each data source *(i.e., certified statement, report, bibliographical reference to a published document)*. In the case of a published document or a government report, providing copies of the cover and pertinent pages may be helpful.

8. METHODOLOGY FOR NEW ANALYSIS

☐ Statistical Analysis of Gage Records (*use Attachment A*)

☐ Regional Regression Equations *(use Attachment B)*

☒ Precipitation/Runoff Model *(use Attachment C)*

☐ Other *(specify; attach backup computations and supporting data)* ____________

ATTACHMENT A: STATISTICAL ANALYSIS OF GAGE RECORDS

Gaging Station: ____________________

Gage Location (latitude and longitude): ____________________

N/A

	FIS:		Revised:	
1. Number of years of data	______		______	
Systematic	______		______	
Historical	______		______	
2. Homogeneous data	☐ Yes	☐ No	☐ Yes	☐ No
3. Data adjustments	☐ Yes	☐ No	☐ Yes	☐ No
4. Number of high outliers	______		______	
Low outliers	______		______	
Zero events	______		______	
5. Generalized skew	______		______	
6. Station skew	______		______	
7. Adopted skew	______		______	
8. Probability distribution used (justify if log-Pearson III was not used)	______		______	
9. Transfer equations to ungaged sites			☐ Yes	☐ No

If yes, specify method

____

____

____

10. Expected probability*	☐ Yes	☐ No
11. Comparison of results with other analyses	☐ Yes	☐ No

If yes, describe comparison

____

____

____

***FEMA** does not accept expected probability analyses for the purpose of reflecting flood hazard information in a FIS.

If any data is not available, indicate by N/A.

Attach analysis including plot of flood frequency curve.

1. Bibliographical Reference: N/A

____

____

____

(Attach a copy of title page, table of contents, and pertinent pages including equations.)

2. Gaged or ungaged stream: ______________________________

3. Hydrologic region(s): ______________________________
   Attach backup map.

4. Provide parameters, values, and source of data used to define parameters.

____

____

____

		FIS:		Revised:	
5.	Urbanized conditions calculations	☐ Yes	☐ No	☐ Yes	☐ No
6	Percent of watershed urbanization	______		______	
7.	Is the watershed controlled?	☐ Yes	☐ No	☐ Yes	☐ No
8.	Comparison with other analyses	☐ Yes	☐ No	☐ Yes	☐ No

If the answer to 5, 7, or 8 is yes, explain methodology in Comments.

If data is not available, indicate by N/A.

Comments

____

____

____

____

Attach computation and supporting maps, delineating the watershed boundary and drainage area divides.

		FIS:		Revised	
1.	Method or model used:	HEC-1		HEC-1	
	Version:	3.0		4.0	
	Date:	June 1, 1988		Sept. 1990	
2.	Source of rainfall depth:	NOAA Atlas 2		NOAA Atlas 2	
3.	Source of rainfall distribution:	SCS Type II		SCS Type II	
4.	Rainfall duration:	24 hour		24 hour	
5.	Areal adjustment to precipitation (%):	99.3%@7 sq. mi.		99.3%@7 sq. mi.	
6.	Maximum overland flow length	N/A		N/A	
7.	Hydrograph development method:	Phoenix Valley S-Graph		Phoenix Valley S-Graph	
8.	Loss rate method:	Green - Ampt		Green - Ampt	
	Source of soils information:	SCS Soil Survey		SCS Soil Survey	
	Source of land use information	Field Survey		Field Survey &Projection	
9.	Channel routing method:	Normal Depth		Normal Depth	
10.	Reservoir routing:	☐ Yes	☒ No	☒ Yes	☐ No
11.	Baseflow considerations:	☐ Yes	☒ No	☐ Yes	☒ No

If yes, explain how baseflow was determined:

12.	Snowmelt considerations:	☐ Yes	☒ No	☐ Yes	☒ No
13.	Model calibration:	☐ Yes	☒ No	☐ Yes	☒ No

If yes, explain how calibration was performed

14. Future land use condition: ☒ Yes ☐ No

If yes, explain why

Stormwater retention facilities are designed assuming contributing area is completely developed.

NOTE: FEMA policy is to base flooding on existing conditions.
If data is not available, indicate by N/A.

Attach precipitation/runoff model, hydrologic model schematic, curve number calculations, time of concentration calculations, and supporting maps, delineating the watershed boundary and drainage area divides.

Stream: ______________________

N/A

Select one location for Confidence Limits Evaluation (*describe location*): ______________________

____

Discharges for selected location:

Exceedance Probability		FIS	Revised
10%	(10-year)	______ cfs	______ cfs
2%	(50-year)	______ cfs	______ cfs
1%	(100-year)	______ cfs	______ cfs
0.2%	(500-year)	______ cfs	______ cfs

1% (100-year) Flood Confidence Intervals

90% Confidence Interval:	5% limit	______	cfs
	95% limit	______	cfs
50% Confidence Interval:	25% limit	______	cfs
	75% limit	______	cfs

If the value of the 100-year frequency flood in the FIS is beyond the 50% confidence interval but within the 90% confidence interval, does the 100-year water surface elevation change by 1.0 foot or more? ☐ Yes ☐ No

An example of confidence limits analysis can be found in Appendix 9 of Bulletin 17B.

Attach Confidence Limits Analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE HYDRAULIC ANALYSIS FORM

O.M.B. Burden No. 3067-0148
Expires July 31, 1997

FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: City of Surprise, Maricopa County

Flooding Source: Rainfall Runoff to Reems Road
(One form for each flooding source)

Project Name/Identifier: Sun City Grand Project Reems Road Floodplain LOMR

1. REACH TO BE REVISED

Downstream limit: Bell Road

Upstream limit: Beardsley Road

2. EFFECTIVE FIS

☐ Not studied

☒ Studied by approximate methods

Downstream limit of study Olive Avenue

Upstream limit of study Beardsley Road

☐ Studied by detailed methods

Downstream limit of study ______

Upstream limit of study ______

☐ Floodway delineated

Downstream limit of Floodway ______

Upstream limit of Floodway ______

3. HYDRAULIC ANALYSIS

Why is the hydraulic analysis different from that used to develop the FIRM. *(Check all that apply)*

☐ Not studied in FIS

☒ Improved hydrologic data/analysis. Explain: Recently constructed stormwater retention basins in Sun City Grand Project reduce or eliminate runoff discharge to Reems Road.

☐ Improved hydraulic analysis. Explain: ______

☐ Flood control structure. Explain: ______

☒ Other. Explain: No revision of the FIS hydraulic analysis was made or was necessary because the revised runoff discharge rates are essentially zero.

For areas which have detailed flooding:

Full input and output listings along with files on diskette (if available) for each of the models listed below (items 1, 2, 3, 4, and 5) and summary of the source of input parameters used in the models must be provided. The summary must include a complete description of any changes made from model to model (e.g. duplicate effective model to corrected effective model) At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.

For areas which do not have detailed flooding:

Only the 100-year flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

If hydraulic models are not developed, hydraulic analyses for existing or pre-project conditions and revised or post-project conditions must be submitted. All calculations must be submitted for these analyses. (See item 6 below)

1. Duplicate Effective Model — Natural ☒ Floodway ☐

Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models *(10-, 50-, 100-, and 500-year multi-profile runs and the floodway run)* must be obtained and then reproduced on the requestor's equipment to produce the duplicate effective model. This is required to assure that the effective model input data has been transferred correctly to the requestor's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model — Natural ☐ Floodway ☐

The corrected effective model is the model that corrects any errors that occur in the duplicate effective model, adds any additional cross sections to the duplicate effective model, or incorporates more detailed topographic information than that used in the currently effective model. The corrected effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model — Natural ☐ Floodway ☐

The duplicate effective or corrected model is modified to produce the existing or pre-project conditions model to reflect any modifications that have occurred within the floodplain since the date of the effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the corrected effective or duplicate effective model.

4. Revised or Post-Project Conditions Model — Natural ☐ Floodway ☐

The existing or pre-project conditions model *(or duplicate effective or corrected effective model, as appropriate)* is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for proposed project this model should reflect proposed conditions.

5. Other: Please attach a sheet describing all other models submitted. — Natural ☐ Floodway ☐

6. Hydraulic Analyses (Only if Hydraulic Models are not developed)

Please attach all calculations for the existing or pre-project conditions and the revised or post-project conditions. Proceed to Form 5, "Riverine/Coastal Mapping Form".

4. MODEL PARAMETERS *(from model used to revise 100-year water surface elevation)*

N/A because revised runoff discharge is essentially zero.

1. Discharges:

	Upstream Limit	Downstream Limit
10-year		
50-year		
100-year		
500-year		

Attach diagram showing changes in 100-year discharge

2. Explain how the starting water surface elevations were determined ______

3. Give range of friction loss coefficients (*Manning's "N"*) Channel .... ______

Overbanks ...... ______

If friction loss coefficients are different anywhere along the revised reach from those used to develop the FIRM, give location, value used in the effective FIS, and revised values and an explanation as to how the revised values were determined.

Location	FIS	Revised

Explain: ______

4. Describe how the cross section geometry data were determined *(e.g., field survey, topographic map, taken from previous study)* and list cross sections that were added.

5. Were natural channel banks selected as the location of the left and right channel banks in the model?

☐ Yes ☐ No If no, explain why not: ______

6. Explain how reach lengths for channel and overbanks were determined:

____

____

____

____

5. RESULTS *(from model used to revise 100-year water surface elevations)*

1. Do the results indicate:

   N/A because revised runoff discharge is essentially zero.

   a. Water surface elevations higher than end points of cross sections? .... ☐ Yes ☐ No

   b. Supercritical depth? .... ☐ Yes ☐ No

   c. Critical depth? .... ☐ Yes ☐ No

   d. Other unique situations .... ☐ Yes ☐ No

   If yes to any of the above, attach an explanation that discusses the situation and how it is presented on the profiles, tables, and maps.

2. What is the maximum change in energy gradient between cross-sections? .... ______________

   Specify location .... ______________

3. What is the distance between the cross-sections in 2 above? .... ______________

4. What is the maximum distance between cross-sections? .... ______________

   Specify location .... ______________

5. Floodway determination

   a. What is the maximum surcharge allowed by the community or State? .... ______________ foot

   b. What is the maximum surcharge for the revised conditions? .... ______________ foot

   Specify location .... ______________

   c. What is the maximum velocity? .... ______________ fps

   Specify location .... ______________

   d. Are there any negative surcharge values at any cross-section? ☐ Yes ☐ No

   If yes, the floodway may need to be widened. If it is not widened, please explain and indicate the maximum negative surcharge.

Explain: ____

____

____

6. Is the discharge value used to determine the floodway anywhere different from that used to determine the natural 100-year flood elevations? .... ☐ Yes ☐ No

   If Yes, explain:

   ____

   ____

   ____

7. Do 100-year water surface elevations increase at any location? .... ☐ Yes ☐ No

   If yes, please attach a list of the locations where the increases occur, state whether or not the increases are located on the requestor's property, and provide an explanation of the reason for the increases. *(For example: State if the increase is due to fill placed within the floodway fringe or placed within the currently adopted floodway limits)*

   ____

   ____

   ____

Please attach a completed comparison table entitled: Water Surface Elevation Check (See page 6)

6. REVISED FIRM/FBFM AND FLOOD PROFILES

N/A because revised runoff discharge is essentially zero.

A. The revised water surface elevations tie into those computed by the effective FIS Model *(10-, 50-, 100-, and 500-year)*, downstream of the project at cross-section__________ within____________feet *(vertical)* and upstream of the project at cross section________________within______feet *(vertical)*.

B. The revised floodway elevations tie into those computed by the effective FIS model, dowstream of the project at cross section_________within_____________feet *(vertical)* and upstream of the project at cross section______ within______________feet *(vertical)*.

C. Attach profiles, at the same vertical and horizontal scale as the profiles in the effective FIS report, showing stream bed and profiles of all floods studied (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, corporate limits, and study limits. If channel distance has changed, the stationing should be revised for all profile sheets.

D. Attach a Floodway Data Table showing data for each cross section listed in the published Floodway Data Table in the FIS report.

Proceed to Riverine /Coastal Mapping Form

FEDERAL EMERGENCY MANAGMENT AGENCY

WATER SURFACE ELEVATION CHECK

COMMUNITY NAME	FLOODIND SOURCE	PROJECT NAME /IDENTIFIER

	EFFECTIVE			DUPLICATE EFFECTIVE			CORRECTED EFFECTIVE			EXISTING/PRE-PROJECT			REVISED/PROJECT		
SECNO	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]

COMMENTS:

N/A because revised runoff discharge is essentially zero.

1-100-year (natural) Water Surface Elevation   2-Encroachment (floodway) Water Surface Elevation   3-Surcharge Value

Include all cross sections in the models between tie-in points. Any interpolated values should be indicated in parentheses.

APPENDIX C: WHITE TANKS / AGUA FRIA ADMS

1. Part A: Flood Study Technical Data Notebook
2. Appendix E (Partial): S-Graph Parameters
3. Approximate Delineation of Reems Road Hydraulic Calculations
4. Stanley Consultants HEC-1 Model Output (13688H1C)

WHITE TANKS / AGUA FRIA
AREA DRAINAGE MASTER STUDY

Part A:
Flood Study Technical Data Notebook

Prepared For:
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 West Durango
Phoenix, Arizona 85009

October, 1992

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE NO.
15594
MARK T.
GAVAN
Date Signed 10-27-92
ARIZONA, U.S.A.

Prepared by:
THE WLB GROUP, INC.
333 East Osborn Road, Suite 380
Phoenix, Arizona 85012
(602) 279-1016

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Page No.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

LIST OF EXHIBITS

SECTION 3: HYDROLOGIC ANALYSIS

3.1 METHOD DESCRIPTION

The hydrologic methodology incorporated in the White Tanks/Agua Fria Area Drainage Master Study (ADMS) utilizes the new "Hydrologic Design Manual for Maricopa County, Arizona" dated April, 1990. This manual is a comprehensive compilation of technical procedures for the estimation of rainfall-runoff which is used for the purpose of designing and analyzing drainage facilities in Maricopa County.

Hydrologic parameters were calculated for each subbasin within the study area. The WLB Group, Inc. created a worksheet utilizing the Lotus 1-2-3 program in which subbasin parameters; such as flow length, slope, land use, soil type, vegetative cover, and soil moisture condition, were used to calculate average Green-Ampt loss rate parameters and lag time for each subbasin. These values were then input into a computer program supplied by the Flood Control District of Maricopa County (FCDMC) called MCUHP2 (Maricopa County Unit Hydrograph Procedure 2) dated October 2, 1990. This program calculates unit hydrographs based on the U.S. Army Corps of Engineers S-graphs that were developed for the Phoenix Area. The program also creates HEC-1 input files that can be utilized within the HEC-1 Flood Hydrograph Package computer program created by the U.S. Army Corps of Engineer's Hydrologic Engineering Center. The HEC-1 program used for this study was the June 1, 1988 version and was acquired directly from the U.S. Army Corps of Engineers Hydrologic Engineering Center.

3.2 PARAMETER ESTIMATION

Due to the large amount of base data generated by this Area Drainage Master Study, separate notebooks for each physical parameter calculated are supplied as appendices to this report and will be referred to when discussing each parameter calculated.

3.2.1 Drainage Area Boundaries

The drainage area for the White Tanks/Agua Fria ADMS is approximately 220 square miles with approximately 2/3 of the watershed draining to the Gila River and 1/3 of the watershed draining to the Agua Fria River. The drainage area is bounded on the north by McMicken Dam and Grand Avenue; on the east by the Agua Fria River; on the south by the Gila River; and on the west by Dean Road and the White Tank Mountains. Several incorporated communities are located within the study area including the Cities of Avondale, El Mirage, Goodyear, Litchfield Park, and Surprise; the Town of Buckeye; Luke Air Force Base; and strip annexed areas of the Cities of Glendale and Phoenix.

Prominent features located within the drainage area are the White Tank Mountains, White Tanks Flood Retarding Structures #3 and #4, Interstate 10, interim Estrella Freeway, Atchison Topeka and Santa Fe Railroad, Southern Pacific Railroad, Airline Canal, Buckeye Canal, Beardsley Canal, Roosevelt Irrigation District Canal, Litchfield Park Detention Facility, Dysart Drain, Tuthill Dike, Bullard Wash, Caterpillar Proving Grounds, Case Proving Grounds, White Tank Mountain Regional Park, Agua Fria River, and Gila River. (Refer to the attached 11" x 17" Study Area Map.)

Subbasins were delineated using 1" = 400', 2-foot contour interval topographic mapping developed for this study by Cooper Aerial and Western Air Maps. Also, aerial photographs were used and field reconnaissance trips were taken to determine subbasin boundaries that were not readily apparent on the maps. Points of concentration that were of particular interest were also used to define subbasin boundaries. Refer to the following 11" x 17" Drainage Area Map. A 1" = 4000' Drainage Area Map is also provided with the hardcopy of the HEC-1 model located in Appendix C under separate cover.

3.2.2 Physical Parameters

3.2.2.1 *Unit Hydrograph Calculation*: The Phoenix Valley S-graph was incorporated per instructions from the FCDMC to calculate unit hydrographs for use within the HEC-1 model. This, along with the use of Green-Ampt loss rate parameters, forms the basis for calculating runoff hydrographs for each subbasin throughout the watershed. The Phoenix Valley S-graph was selected based on the criteria of being applied to a large, mostly undeveloped watershed. The majority of the watershed is in agricultural uses with a lesser degree of desert and mountainous terrain and even fewer areas of urban development.

The Phoenix Valley S-graph was developed by the U.S. Army Corps of Engineers and can be found in "New River and Phoenix City Streams, Arizona, Design Memorandum No. 2, Hydrology, Part 1", U.S. Army Corps of Engineers, Los Angeles District, October, 1974.

The MCUHP2 program uses the Phoenix Valley S-graph to calculate unit hydrographs. Input requirements for MCUHP2 include basin area, basin lag, and Green-Ampt loss rates.

A number of variables are involved in calculating loss-rate parameters for the Green-Ampt method. The "Hydrologic Design Manual for Maricopa County" describes the steps involved in calculating these parameters and this manual is available from the Flood Control District of Maricopa County upon request. It would be repetitive and cumbersome to relate all of the details involved in this procedure and it is left up to the individual to acquaint themselves with this methodology and to refer to the manual during the following description of procedures if the reader is not familiar with them.

The WLB Group, Inc. created a Lotus 1-2-3 worksheet to help reduce the amount of hand calculations involved in developing the input parameters for MCUHP2. The FCDMC has recently updated this worksheet and now includes it with the new Hydrologic Design Manual for use by its consultants. The following steps were utilized within the worksheet to calculate basin lag time and average Green-Ampt loss rate parameters within each subbasin.

1. Measure flow path length and calculate elevation difference. This may be broken down into incremental elements representing areas of the same hydrologic properties and basin slopes.

2. The representative slope is then calculated according to the following formulas:

$$I = (Li^3 + Hi)^{.5}, \text{ where } i = 1, 2, 3, ...n$$

and

L_1, L_2, L_3, etc. Incremental Lengths Along the Longest Flow Path, Miles

H_1, H_2, H_3, etc. Incremental Elevation Differences for Each Length, Feet

and representative slope is then calculated from:

$$\text{Avg. } S = (L \div I)^2 \text{ ft/mi}$$

where

L = Total Length of the Longest Flow Path
I = Value From Previous Formula

This average slope formula will take into account differences within a watershed due to varying topographic situations and varying slopes. This formula was taken from the "Hydrology Manual for Engineering Design and Floodplain Management Within Pima County, Arizona". It should be noted that "I" and "S" are usually calculated in feet and feet/feet respectively. But for this study Li was computed in miles and, therefore, S is in feet/mile for use in the lag equation that follows.

3. The lag for each subbasin is then calculated based on a formula created by the U.S. Army Corps of Engineers (1974):

$$\text{Lag} = 1.2\,(L * L_{ca} \div S^{1/2})^{0.38}$$

where

L = Length of Longest Watercourse, miles
Lca = Length Along Longest Watercourse, Measured Upstream to a Point Opposite the Center of the Area, miles
S = Overall Average Slope of Longest Watercourse Between Headwater and Collection Point, ft/mile

Note: To obtain the Lag (in hours) for any area, multiply the lag obtained from the formula by $\bar{n}/.050$ or $20\bar{n}$.

$\bar{n}$ = Visually Estimated Mean of the N (Manning's Formula) Values of all the Channels Within an Area

4. The land use classification is then chosen along with an estimated percentage of vegetative cover and percentage of impervious areas. If the impervious areas are noncontiguous and undeveloped, only 50% of that impervious area is used for calculation purposes as directed by the Flood Control District of Maricopa County.

Aerial photographs were used along with zoning maps to help classify areas of differing land uses. (See the attached 11" x 17" Current Land Use and Zoning Map.) The aerial photographs also helped to define the percentage of vegetative cover in an area. Field investigation, along with numerous photographs, also help document this procedure. (See Appendix D for typical photographs of the area.)

The soil moisture condition for the calculation of DTHETA, and the surface retention loss, IA, are based upon the land use type. For instance, irrigated agricultural land is assumed to be in a saturated condition with a corresponding surface retention loss of 0.50 inches, residential land is assumed to be in a normal moisture condition with a corresponding surface retention loss of 0.12 inches, and desert land is assumed to be in a dry condition with a corresponding surface retention loss of 0.35 inches. These parameters were directed by the Flood Control District of Maricopa County. Refer to the "Hydrologic Design Manual for Maricopa County" for a more indepth discussion of DTHETA.

The rate of hydraulic conductivity to bare ground hydraulic conductivity, CK, is also a function of the percent of vegetative cover. This value was calculated as an average value for each subbasin. Refer to Fig. 4.10 in the "Hydrologic Design Manual for Maricopa County" and to Appendix E, Volume 6 of 15 for examples of the parameter averaging.

5. The next step was to planimeter areas of distinct soil classification within each subbasin and input the percentage of area for each soil group into the worksheet. This was accomplished by using Soil Conservation Service soil survey maps created for Maricopa County. Subbasins were transposed on these maps and distinct soil classification areas were then planimetered. Each soil group has distinct values associated with it for calculation of the Green-Ampt loss rate parameters. These parameters are then averaged based upon the percentage of different soil classifications within each subbasin. Refer to Appendix E, Volume 6 of 15, to see how parameter averaging is performed. The following 11" x 17" Hydrologic Soil Group Map shows locations of various types of hydrologic soil groups within the study area.

6. The average loss rate values, along with basin area and lag time, are then used as input into the FCDMC's computer program MCUHP2 to calculate a unit hydrograph for the HEC-1 model. This was done for each subbasin within the watershed; the corresponding S-graph Parameter sheets for each subbasin are included under separate cover in Appendix E. This appendix also includes a copy of the Soil Loss Rate Tables used in this study. A copy of the MCUHP2 input data as backup documentation to verify that the data was input correctly is located in Appendix F under separate cover.

3.2.2.2 *Channel Routing*: Channel routing throughout the watershed was accomplished by using the normal depth (modified Puls) routing procedure as outlined in HEC-1. This method utilizes an eight point typical cross section along with an average channel slope, channel length and typical Manning's n-values. The 1" = 400', 2-foot contour interval topographic mapping was incorporated to determine typical cross sections and channel geometry.

Two iterations of the HEC-1 model were run to calculate velocities in each routing reach. Initially, velocities were assumed for each routing reach within the watershed. After this initial model had been run, normal depth computations were performed to estimate velocity for each routing reach utilizing the computed discharges. The velocity estimates were based on a trapezoidal channel shape with an average Manning's n-value for the cross section. The resulting velocity estimates were then used to compute the number of steps for each channel routing reach. The number of steps was set equal to (reach length ÷ (average velocity x time interval)). The second iteration of the HEC-1 model was then run to produce the final discharges used in this study. Channel routing parameters are located in Appendix G and Velocity Calculations are located in Appendix H. Both of these appendices are under separate cover.

3.2.2.3 *Stage-Storage Discharge Parameters*: Stage-storage-discharge tables were created to model the numerous ponding areas located throughout the watershed. These areas are typically comprised of ponding behind structures such as dams, roadway embankments, railroad embankments or canal banks. Outfalls from these ponding areas include culverts, bridges, and weir flow over the top of the embankment. A list of existing drainage structures is located in Appendix I under separate cover and can also be found in the HEC-1 input documentation.

Ponding areas were identified using the 1" = 400' topographic mapping. The stage-storage data was computed by planimetering areas between adjacent contours and computing average volumes associated with that area and depth.

Bureau of Public Roads culvert charts were incorporated to calculate outflow from ponding areas where appropriate. The weir flow equation was used when flow overtopped an embankment or overtopped a particular impoundment. Stage-Storage Discharge tables can be found in Appendix I under separate cover.

3.2.2.4 *Diversions*: Numerous diversion tables were also incorporated throughout the watershed. This was due to the fact that a majority of the watershed is fairly flat with no well defined channels to contain the runoff. Consequently, flooding in the study area is characterized by wide, shallow flow paths which are easily diverted along man-made obstructions, such as railroads and irrigation canals.

Agriculture is the predominant practice throughout this area and fields are separated by major mile, half-mile, and farm access roadways. These roadways, along with irrigation canals, tend to pond water at the southeastern corner of the fields. From this point, flows break over the intersection of the two roads and will either continue east at the capacity of that particular road, flow overland to the southeast spreading out into another agricultural field, or flow south at the capacity of that road. It is not uncommon to have a three-way split at these locations.

These types of diversions were calculated by taking a cross section upstream along the centerline of each major road and computing weir flow as it applies to each diversion.

A second type of diversion, using the same cross section method along the centerline of the road, was to model the flow with a normal depth calculation. This was used when weir flow was not applicable at an intersection.

The third type of diversion usually involved a culvert analysis. If an embankment was present and the culvert capacity was exceeded, a diversion would take place above a certain limiting elevation. This diversion was calculated using either weir flow or normal depth methodology depending on the situation.

Finally, the fourth type of diversion would take place at a canal bank. Diversions were calculated by weir flow if the flow was to cross over the top of the canal bank and continue downstream or by normal depth methods if the flow was diverted along the upstream bank of the canal. Diversion tables can be found in Appendix I, under separate cover, and the Drainage Area Map identifies where diversions take place in the watershed. Each diversion is distinctly labeled except for the diverts associated with subbasins 43 and 43-1 through 43-8 - where space limitations on the Drainage Area Map required their exclusion. Refer to the exhibit on the following page for an enlargement of this area.

3.2.2.5 *Hydrograph Combinations*: The HEC-1 model for the White Tanks/Agua Fria ADMS was set up so that the area associated with each hydrograph combination was directly input into the model. The criteria to be followed, as directed by the FCDMC, was to hand calculate the total area that would be contributing to any given concentration point. Diversions were assumed to be contributing the whole area to the next concentration point, therefore, the corresponding area assigned to each concentration point would correspond to the total area of all subbasins that drain, either partially or fully to that point. The calculated areas were checked thoroughly by the FCDMC and concurrence was reached for the areas submitted on the HEC-1 model. This procedure was undertaken because the HEC-1 model assigns an area of zero to the diverts and carries that area to the next concentration point. Because rainfall depth decreases with increases in drainage area, the zero area associated with the diverts would, in some instances, result in overestimating peak discharges.

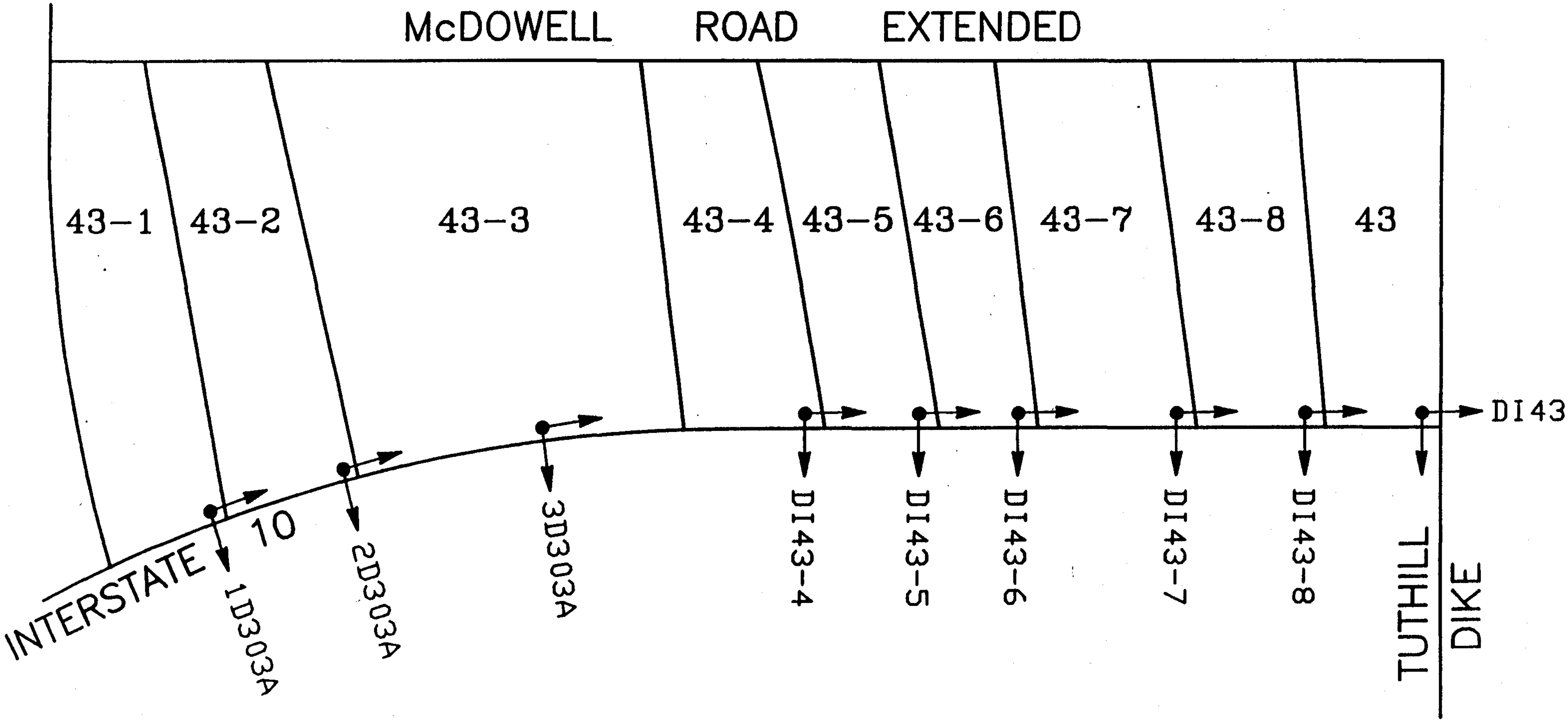
3.2.2.6 *Manning's N-Value Documentation*: Manning's n-value determinations for subbasins and routing reaches within the watershed were made based on field reconnaissance, aerial photographs, picture documentation, and sound engineering judgement. Typical "n" values were designated for agricultural areas, n = .12, and urban areas, n = .03, and these values were mutually agreed upon by The WLB Group and the FCDMC. Desert and mountainous areas have varying "n" values ranging from .03 to .20 and were incorporated based on the hydrologic conditions of that subbasin. Picture documentation of typical basin "n" values and channel and overbank "n" values are presented in Appendix D, under separate cover.

3.2.3 Statistical Parameters

No statistical analysis was performed with the White Tanks/Agua Fria ADMS as stream gage data is not available in this area.

It should be pointed out, however, that the Phoenix Valley S-graph used to compute the unit hydrographs is based on a statistical analysis of streamflow in and around Maricopa County (U.S. Army Corps of Engineer, 1974).

DIVERSIONS FOR SUBBASINS 43 - 43-8



WHITE TANKS / AGUA FRIA AREA DRAINAGE MASTER STUDY

N.T.S.

The WLB Group WLB

3.2.4 Precipitation

Precipitation data for the White Tanks/Agua Fria ADMS was developed from criteria as presented in the "Hydrologic Design Manual for Maricopa County". Initially, The WLB Group was instructed to use the 100-year, 6-hour storm to compute peak discharges. This, along with a new depth-area reduction curve designed for Maricopa County and 6-hour rainfall distribution patterns based upon drainage area, was incorporated into the 100-year model.

Sensitivity analyses were then run and tested against the 100-year, 24-hour storm. The 24-hour storm gave larger peak discharges as the area contributing to a watercourse increased. These discharges also increased uniformly downstream, whereas, the 6-hour storm did not.

The 6-hour storm produced larger peak flows for smaller watersheds (approximately .5 square miles or less), but, as the size of the area increased, the peak flows would, in some cases, decrease in a downstream direction. This was due to the sharp increase in rainfall intensity associated with the rainfall distribution patterns for small drainage areas. This discrepancy was the reason that the 100-year, 24-hour storm was chosen to model the watershed and to ultimately delineate the 100-year floodplains.

Precipitation amounts were developed for different return periods and frequency storms using the procedure stated in the "Precipitation-Frequency Atlas of the Western United States, Volume VIII - Arizona, NOAA Atlas 2," published by the National Weather Service's National Oceanic and Atmospheric Administration. This data is presented in Appendix A in the back of this report. Depth-area reduction of point rainfall was also taken from a graph in NOAA Atlas 2 since the 24-hour storm was used, and the Soil Conservation Service Type II rainfall distribution pattern was used to distribute the rainfall data accordingly.

3.2.5 Gage Data

No stream gages are located in the study area.

3.3 CALIBRATION

Due to the lack of stream gages or precipitation data in the study area, it is difficult to calibrate peak discharges computed in the HEC-1 model. However, a few previous studies have been performed on an isolated basis in different areas of the watershed. The new discharges were compared to the previous values to ascertain whether the results seemed reasonable. The reports and hydraulic analyses that WLB compared its results to are listed as follows:

1. "A Hydrologic Analysis of the White Tanks Flood Retarding Structures #3 and #4", by the Flood Control District of Maricopa County (FCD), October, 1989

INPUT PARAMETER COMPARISONS

Hydrologic Parameters	WLB	FCD
Storm Frequency and Duration	100-Year, 24-Hour	100-Year, 24-Hour
Rainfall Amount	4.03 In.	4.20 In.
Tabulation Interval	5-Minute	15-Minute
Loss Rate	Green-Ampt	SCS Curve Number
Distribution Pattern	SCS Type II	SCS Type II
Areal Distribution	NOAA Atlas II	None
Hydrograph Development	COE Phoenix Valley S-Graph	COE Phoenix Mountain S-Graph SCS Unit Hydrograph
Routing Method	Normal Depth	Normal Depth Kinematic Wave

COMPARISON OF DISCHARGES

Location	Discharges, CFS	
	WLB	FCD
Inflow to White Tanks F.R.S. #3	6649	7640
Inflow to White Tanks F.R.S. #4	6026	5830

These discharges are reasonably close and the differences may be attributed to FCD's rainfall amount of 4.20 inches versus WLB's amount of 4.0 inches. Also, FCD used the SCS Curve Number Loss Rate while WLB incorporated the FCD's new methodology which incorporates Green-Ampt loss rate parameters. Also, a 15 minute time interval was used in the FCD study while a 5 minute time interval was utilized in this study.

2. "Conceptual Drainage Report for Litchfield Park Detention Facility", by Coe and Van Loo, June, 1989.

3. "Flow Estimation to Camelback and Dysart Roads", by Boyle Engineering Corporation, April, 1988.

4. "Hydrologic Evaluation, Litchfield Park Dam, Maricopa County, Arizona", by Dames & Moore, January 1986.

INPUT PARAMETER COMPARISONS

Hydrologic Parameters	WLB	CVL	Boyle	D & M
Storm Frequency & Duration	100/24	100/24	100/24	100/24
Rainfall Amount	4.03 In.	3.75 In.	3.77 In.	3.90 In.
Tabulation Interval	5-Min.	10-Min.	15-Min.	N/A
Loss Rate	Green-Ampt	SCS Curve	SCS Curve	SCS Curve
Distribution Pattern	SCS Type II	SCS Type II	SCS Type II	SCS Type II
Aerial Distribution	NOAA At. II	None	None	N/A
Hydrograph Development	COE Phx. Valley S-Gr	SCS Unit Hydrograph	SCS Unit Hydrograph	N/A
Routing Method	Norm. Depth	Kinematic	Kinematic	N/A

COMPARISON OF PEAK DISCHARGES

Location	WLB	CVL	Boyle	D & M
At Litchfield Park Detention Facility	959	769	525	1031
At Camelback and Dysart Road	1049	953	717	960

Again, these differences can be attributed to modeling techniques and WLB performed a HEC-2 analysis on Dysart Drain to better approximate the actual capacity of this facility and the corresponding breakout flows. Also, WLB had 1" = 400', 2-foot contour interval mapping to better estimate diversions and to delineate the watershed with greater precision.

5. "Conceptual Master Drainage Report for Litchfield Park Development Master Plan", by Coe & Van Loo, September 1989.

6. "Arizona Department of Transportation Interstate 10 Plans, Ehrenberg - Phoenix, Maricopa County I-10-2(34)," September 19, 1985.

INPUT PARAMETER COMPARISONS

Hydrologic Parameters	WLB	CVL	ADOT
Storm Frequency and Duration	100/24	100/6	100/3
Rainfall Amount	4.03 In.	3.15 In.	2.92 In.
Tabulation Interval	5-Minute	10-Minute	N/A
Loss Rate	Green-Ampt	SCS Curve #	SCS Curve #
Distribution Pattern	SCS Type II	SCS Type II	N/A
Areal Distribution	NOAA Atlas II	None	None
Hydrograph Development	COE Phx. Valley S-Graph	SCS Unit Hydrograph	SCS: Part II
Routing Method	Normal Depth	Kinematic Wave	N/A

COMPARISON OF DISCHARGES

Location	CVL	WLB	ADOT
At Reems Road & Northern Ave.	1001	2347	---
Divert E. at Reems Rd. & Northern Ave.	300	812	---
Remainder Flow to the S. at Reems Road and Northern Ave.	701	1536	---
At Camelback Road and Bullard Wash	2941	4243	---
At RID Canal and Bullard Wash	3585	4703	---
At Bullard Wash and I-10	*	5319 Upstream 4450 Downstream	5000 Upstream
At RID Canal and I-10	1347	826	

* Not Computed

The differences here are attributed to different storm durations and associated rainfall amounts, different subbasin divisions, a more intense scrutiny of diversions throughout the watershed, a HEC-2 analysis of Dysart Drain, and use of 1" = 400', 2-foot contour interval mapping over the entire watershed.

A number of sensitivity analyses were also performed to test the assumptions of hydrologic moisture condition and vegetation cover in the agricultural areas. Models were developed assuming fallow field (not planted) with the three different soil moisture conditions - saturated, normal and dry. These three moisture conditions were also used with a fully vegetated condition model. After reviewing these analyses, the FCDMC directed us to use the fully vegetated field in a saturated condition for agricultural areas in the watershed. It was understood that some areas would be fallow in a dry condition, vegetated in a normal or dry condition, etc., but the directed assumption gives an average condition without being too conservative or too under-conservative.

Also, an analysis was performed to determine if the numerous small agricultural reservoirs in the study area should be incorporated in the model. A typical agricultural reservoir was modeled and the results convinced the FCDMC that the storage would be filled during the early part of the storm before the peak arrived, therefore, these reservoirs would not be modeled. Another factor in the decision to not include the reservoirs is that there is no guarantee that they would not be filled in by the farmer or filled with sediment during the storm.

3.4 SPECIAL PROBLEMS/SOLUTIONS

The very nature of the watershed in the White Tanks/Agua Fria ADMS, with vastly differing hydrologic elements, tends to lead to modeling problems.

Initially, the watershed was separated into the following four distinct regions.

1. Watershed draining to White Tanks Flood Retarding Structure #3.
2. Watershed draining to White Tanks Flood Retarding Structure #4.
3. Watershed north of Dysart Drain and Northern Avenue.
4. Watershed south of Dysart Drain and Northern Avenue.

This was done to facilitate the FCDMC's review process and to allow the WLB Group to work on different regions while one was in for review.

This worked reasonably well as volumes of base data were generated in this study. The model was then joined together to create one complete hydrologic model of the entire watershed.

Two future conditions were assumed to be in place for the existing condition model. These assumptions were that the interim Estrella Freeway and Camelback Channel would be in place by the time the study was finished. The interim Estrella Freeway was assumed to collect flows along the west side of the roadway and pass these flows through at either at grade crossings or under the road in culvert crossings. For ease of modeling these were assumed to take place at major mile intersections although some flows may cross over or under at various locations between the intersections. The reason this assumption was made was based on the fact that these flows would eventually collect at the next major mile intersection to the southeast as overland flows naturally collect there now. This assumption was also used along the railroad at Cotton Lane.

The Colter Street Channel will be built by the Maricopa County Department of Transportation along an alignment of Coter Street which is approximately 1/4 mile north of Camelback Road. A Camelback Road alignment was assumed for this HEC-1 analysis which results in slightly larger flows, but does not compromise the integrity of the model. Flows will be collected in the channel from Litchfield Road and along inflow points to the east and are then conveyed to the Agua Fria River.

The Dysart Drain (also known as the Luke Air Force Base Drainage Channel) is located north and east of Luke Air Force Base and was modeled by a HEC-2 split flow analysis. Subsequent breakout flows were then incorporated into the HEC-1 model. Many iterations were required for this analysis to compute final diversion tables for the HEC-1 model.

To make the HEC-1 model a complete unit, it was necessary to route flows around the edge of the watershed in the Agua Fria River and Gila River. Since these are both very wide rivers, the assumption was made to route flows in a 1000 foot wide trapezoidal channel with representative Manning's n-values. The calculated flows are insignificant in comparison to the 100-year flow on the Agua Fria River and the Gila River.

As mentioned previously in this report, numerous diversions and ponding areas were modeled in the White Tank/Agua Fria ADMS. The procedures for modeling these areas are described in section 3.2.2. Of special note are the diversions located at the intersections of Olive Avenue and Beardsley Canal and Northern Avenue and Beardsley Canal. These diversions were modeled previously by the FCDMC in a report entitled "A Hydrologic Analysis of The White Tanks F.R.s #3 & #4". This data was incorporated in the HEC-1 model and into the subsequent HEC-2 analysis.

3.5 FINAL RESULTS/COMPUTER MODEL

The final results of the HEC-1 model are presented in numerical order in the Runoff Summary on the following pages. This is the same Runoff Summary generated by the HEC-1 model but it has been rearranged into numerical order for ease of locating discharges. Final output for the HEC-1 model is located in Appendix C, under separate cover, and another copy of the numerical Runoff Summary is included as well.

Four operations are shown in the Runoff Summary. These are respectively:

A) Runoff hydrographs for each subbasin.
B) Intermediate and final concentration points for combined hydrographs.
C) Diversion hydrographs.
D) Storage routing routines through reservoirs or ponding areas.

Routed flow discharges and returned diversion flows are not shown in this table. The HEC-1 output should be referred to if these discharges are required.

A note about the naming sequence of different operations in the HEC-1 model. Runoff hydrographs are designated as a number, combinations of numbers, or combinations of numbers and letters, ie, 41, 41-1, 41A1.

Final concentration points have the designation CP followed by the watershed number where that particular concentration point is located. Intermediate concentration points are designated as I1CP or 1I, 2I, etc; again, followed by the subbasin number. Concentration points combined in the Agua Fria or Gila River are designated as RCP followed by the subbasin number. It should also be mentioned here that routings in the river reaches are designated as RR standing for river route.

Diversions are designated by D, DI, 1D, 2D, etc. Storage routing through ponding areas or reservoirs is designated by SR with the one exception being the storage routine behind WT#4 which was inadvertently called RS47. Otherwise, these naming schemes stay consistent throughout the model.

Due to the nature and differing hydrologic regions of the watershed, it is difficult to put the model together in a systematic order. The model, therefore, is very complex and difficult to follow. A HEC-1 Key Map was created that breaks out the order in which the model was created. Distinct groups of subbasins make up a hydrologic area that drains to a common concentration point. These areas are numbered and have a corresponding tab in the HEC-1 output hardcopy so that it is easier to identify certain areas within the model that are of particular interest. The key map is located in the front of Appendix C where the HEC-1 hardcopy is located.

WHITE TANKS / AGUA FRIA ADMS

Appendix E (Partial): S-Graph Parameters

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 100

S-GRAPH PARAMETERS

Area = 0.26 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
0.57	22.0	0.092

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 0.57 mi
Lca = 60.0 % of (L)= 0.34 mi

Av.Slope= 38.6 ft/mi

Av.slope =(SUM(Li)/I)^2

Lag = 46.37 min

Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) m:

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout-crops %
Va	35.0 %	Valencia	Sandy Loam	0.35	0.25	0.00	----	0.37	0.37	0.
Mp	29.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	0.
Es	16.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	0.
Mr	8.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	0.
TrA	6.0 %	Tremant	Sandy Clay Loam	0.26	0.16	0.00	----	0.09	0.17	0.
TrB	3.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.51	0.
Bs	3.0 %	Brios	Sandy Loam	0.35	0.25	0.00	----	0.46	0.46	0.
Weight.Av	100.0 %			----	----	0.00	4.58	0.22	0.28	0.

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
100	0.26	0.50	0.00	4.58	0.28	0.0	46.37

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 100A

S-GRAPH PARAMETERS

Area = 0.18 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
0.57	18.0	0.101

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 0.57 mi Av.Slope= 31.6 ft/mi Av.slope =(SUM(Li)/I)^2
Lca = 40.0 % of (L)= 0.23 mi

Lag = 41.30 min Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) mi

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout-crops %
Va	35.0 %	Valencia	Sandy Loam	0.35	0.25	0.00	----	0.37	0.37	0.0
Mo	29.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	0.[illegible]
Es	16.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	0.[illegible]
Mr	8.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	0.[illegible]
TrA	6.0 %	Tremant	Sandy Clay Loam	0.26	0.16	0.00	----	0.09	0.17	0.[illegible]
TrB	3.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.51	0.[illegible]
Bs	3.0 %	Brios	Sandy Loam	0.35	0.25	0.00	----	0.46	0.46	0.[illegible]
Weight.Av	100.0 %			----	----	0.00	4.58	0.22	0.28	0.0

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
100A	0.18	0.50	0.00	4.58	0.28	0.0	41.30

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 101

S-GRAPH PARAMETERS

Area = 0.16 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
0.74	16.0	0.159

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 0.74 mi
Lca = 50.0 % of (L)= 0.37 mi

Av.Slope= 21.6 ft/mi   Av.slope =(SUM(Li)/I)^2

Lag = 24.54 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit
DRL	100 %	Desert range, Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
Weight.Av	100 %		0.35	0.0	20.0	1.11	0.050	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockou crops '
GgA	34.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.28	0.
TrB	19.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.30	0.
Mp	16.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.06	0.
RbA	12.0 %	Rillito	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	0.
Bs	11.0 %	Brios	Sandy Loam	0.35	0.25	0.00	----	0.46	0.46	0.
TrA	5.0 %	Tremant	Sandy Clay Loam	0.26	0.16	0.00	----	0.09	0.10	0.
Mr	3.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.06	0.
Weight.Av	100.0 %			0.32	----	----	3.61	0.25	0.26	0.

Land type weighted DTHETA = 0.32

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
101	0.16	0.35	0.32	3.61	0.26	0.0	24.54

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 102A

S-GRAPH PARAMETERS

Area = 0.51 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.00	20.0	0.224

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.00 mi　　Av.Slope= 20.0 ft/mi　　Av.slope =(SUM(Li)/I)^2

Lca = 45.0 % of (L)= 0.45 mi

Lag = 42.72 min　　Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) m

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
DRL	70 %	Desert range,Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
AGR	30 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.40	0.0	41.0	1.34	0.071	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout crops %
Mo	53.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.07	0.
TrB	12.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.36	0.
PeB	6.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	0.
GgA	6.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.34	0.
Es	6.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.34	0.
Mr	5.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.07	0.
Lb	5.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.27	0.36	0.
PeA	3.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	0.
Ge	2.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.29	0.39	0.
Cb	2.0 %	Carrizo	Loamy Sand	0.35	0.30	0.00	----	1.12	1.51	0.
Weight.Av	100.0 %			0.29	----	0.00	6.05	0.17	0.21	0.

Land type weighted DTHETA = 0.20

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
102A	0.51	0.40	0.20	6.05	0.21	0.0	42.72

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 102

S-GRAPH PARAMETERS

Area = 0.1 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
0.42	9.0	0.091

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 0.42 mi   Av.Slope= 21.4 ft/mi   Av.slope =(SUM(Li)/I)^2

Lca = 35.0 % of (L)= 0.15 mi

Lag = 33.50 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) m

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout crops %
Mp	53.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	0.
TrB	12.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.51	0.
PeB	6.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	0.
GgA	6.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	0.
Es	6.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	0.
Mr	5.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	0.
Lb	5.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.27	0.51	0.
PeA	3.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	0.
Ge	2.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.29	0.55	0.
Cb	2.0 %	Carrizo	Loamy Sand	0.35	0.30	0.00	----	1.12	2.12	0.
Weight.Av	100.0 %			----	----	0.00	6.05	0.17	0.29	0.

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2) PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
102	0.10	0.50	0.00	6.05	0.29	0.0	33.50

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 103

S-GRAPH PARAMETERS

Area = 0.37 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.21	41.0	0.208

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.21 mi Av.Slope= 33.9 ft/mi Av.slope =(SUM(Li)/I)^2

Lca = 50.0 % of (L)= 0.61 mi

Lag = 64.84 min Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) m

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
AGR	70 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
DRL	30 %	Desert range,Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
Weight.Av	100 %		0.46	0.0	69.0	1.66	0.099	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout crops %
Es	24.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.41	0.
Mo	18.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.06	0.10	0.
Va	14.0 %	Valencia	Sandy Loam	0.35	0.25	0.00	----	0.37	0.37	0.
TrA	13.0 %	Tremant	Sandy Clay Loam	0.26	0.16	0.00	----	0.09	0.15	0.
AbA	13.0 %	Antho	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	0.
Mp	5.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.08	0.
Bs	5.0 %	Brios	Sandy Loam	0.35	0.25	0.00	----	0.46	0.46	0.
TrB	4.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.45	0.
Mr	4.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.08	0.
Weight.Av	100.0 %			0.31	----	0.00	4.33	0.22	0.29	0.

Land type weighted DTHETA = 0.09

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
103	0.37	0.46	0.09	4.33	0.29	0.0	64.84

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 104

S-GRAPH PARAMETERS

Area = 0.15 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
0.56	9.0	0.140

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 0.56 mi
Lca = 50.0 % of (L)= 0.28 mi

Av.Slope= 16.1 ft/mi

Av.slope =(SUM(Li)/I)^2

Lag = 21.01 min

Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) mi

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
DRL	100 %	Desert range,Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
Weight.Av	100 %		0.35	0.0	20.0	1.11	0.050	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout-crops %
GgA	46.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.28	0.[illegible]
TrB	26.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.30	0.[illegible]
TrA	12.0 %	Tremant	Sandy Clay Loam	0.26	0.16	0.00	----	0.09	0.10	0.[illegible]
Mp	12.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.06	0.[illegible]
Mr	4.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.06	0.[illegible]
Weight.Av	100.0 %			0.31	----	----	4.93	0.20	0.23	0.[illegible]

Land type weighted DTHETA = 0.31

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
104	0.15	0.35	0.31	4.93	0.23	0.0	21.01

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 105

S-GRAPH PARAMETERS

Area = 0.21 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
0.78	24.0	0.141

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 0.78 mi
Lca = 40.0 % of (L)= 0.31 mi

Av.Slope= 30.8 ft/mi Av.slope =(SUM(Li)/I)^2

Lag = 21.95 min Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) mi

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
DRL	100 %	Desert range,Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
Weight.Av	100 %		0.35	0.0	20.0	1.11	0.050	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout crops %
Mp	70.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.06	0.
Mr	15.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.06	0.
Bt	8.0 %	Brios	Sandy Loam	0.35	0.25	0.00	----	0.50	0.50	0.
TrA	4.0 %	Tremant	Sandy Clay Loam	0.26	0.16	0.00	----	0.09	0.10	0.
GgA	3.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.28	0.
Weight.Av	100.0 %			0.27	----	----	7.68	0.09	0.10	0.

Land type weighted DTHETA = 0.27

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
105	0.21	0.35	0.27	7.68	0.10	0.0	21.95

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 106

S-GRAPH PARAMETERS

Area = 0.77 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.27	35.0	0.242

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.27 mi
Lca = 60.0 % of (L)= 0.76 mi

Av.Slope= 27.6 ft/mi   Av.slope =(SUM(Li)/I)^2

Lag = 37.87 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) m:

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
DRL	100 %	Desert range,Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
Weight.Av	100 %		0.35	0.0	20.0	1.11	0.050	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout crops %
Mo	41.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.06	0.
GgA	25.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.28	0.
TrB	21.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.30	0.
Mr	8.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.06	0.
TrA	5.0 %	Tremant	Sandy Clay Loam	0.26	0.16	0.00	----	0.09	0.10	0.
Weight.Av	100.0 %			0.29	----	----	6.63	0.15	0.16	0.

Land type weighted DTHETA = 0.29

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
106	0.77	0.35	0.29	6.63	0.16	0.0	37.87

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 107

S-GRAPH PARAMETERS

Area = 0.60 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.55	43.0	0.294

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.55 mi   Av.Slope= 27.7 ft/mi   Av.slope =(SUM(Li)/I)^2

Lca = 40.0 % of (L)= 0.62 mi

Lag = 77.33 min   Lag = 20*Kn*(((1.27*(L*Lca/S^.5)^.38)*60) mi

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
AGR	75 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
DRL	25 %	Desert range,Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
Weignt.Av	100 %		0.46	0.0	72.5	1.70	0.103	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout crops %
Mo	41.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.08	0.
GgA	37.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.42	0.
TrB	12.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.46	0.
PeA	7.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	0.
Aa	3.0 %	Agualt	Loam	0.35	0.25	0.00	----	0.29	0.49	0.
Weight.Av	100.0 %			0.31	----	0.00	5.65	0.18	0.29	0.

Land type weignted DTHETA = 0.08

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
107	0.60	0.46	0.08	5.65	0.29	0.0	77.33

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 108

S-GRAPH PARAMETERS

Area = 0.79 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.85	51.0	0.352

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.85 mi
Lca = 50.0 % of (L)= 0.93 mi

Av.Slope= 27.6 ft/mi   Av.slope =(SUM(Li)/I)^2

Lag = 86.52 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) mi

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
AGR	60 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
DRL	40 %	Desert range,Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
Weight.Av	100 %		0.44	0.0	62.0	1.58	0.092	

RTIMP is taken 50% of Rockoutcrops
for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout-crops %
TrB	30.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.43	0.
Mr	25.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.08	0.
Mp	21.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.08	0.
AbA	16.0 %	Antho	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	0.
Es	7.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.39	0.
Weight.Av	100.0 %			0.29	----	0.00	5.53	0.18	0.25	0.(

Land type weighted DTHETA = 0.12

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
108	0.79	0.44	0.12	5.53	0.25	0.0	86.52

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 109

S-GRAPH PARAMETERS

Area = 0.85 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.42	44.0	0.255

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.42 mi Av.Slope= 31.0 ft/mi Av.slope =(SUM(Li)/I)^2

Lca = 50.0 % of (L)= 0.71 mi

Lag = 90.28 min Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) m

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout crops %
Lb	21.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.27	0.51	0.
Mr	18.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	0.
AbA	18.0 %	Antho	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	0.
Mo	13.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	0.
Es	12.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	0.
Mo	6.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.06	0.11	0.
LcA	5.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.47	0.
AdA	4.0 %	Antho	Sandy Loam	0.35	0.25	0.00	----	0.40	0.40	0.
GgA	3.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	0.
Weight.Av	100.0 %			----	----	0.00	4.68	0.21	0.32	0.

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
109	0.85	0.50	0.00	4.68	0.32	0.0	90.28

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 110

S-GRAPH PARAMETERS

Area = 0.31 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.09	33.0	0.198

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.09 mi
Lca = 50.0 % of (L)= 0.55 mi

Av.Slope= 30.3 ft/mi   Av.slope =(SUM(Li)/I)^2

Lag = 61.18 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) n

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
AGR	70 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
DRL	30 %	Desert range,Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
Weight.Av	100 %		0.46	0.0	69.0	1.66	0.099	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockou croos
Mr	47.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.08	(
LcA	26.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.41	(
Mp	24.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.08	(
RbA	3.0 %	Rillito	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	(
Weight.Av	100.0 %			0.28	----	0.00	7.29	0.11	0.18	(

Land type weighted DTHETA = 0.08

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
110	0.31	0.46	0.08	7.29	0.18	0.0	61.18

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 111

S-GRAPH PARAMETERS

Area = 0.50 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.21	23.0	0.278

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.21 mi   Av.Slope= 19.0 ft/mi   Av.slope =(SUM(Li)/I)^2

Lca = 50.0 % of (L)= 0.61 mi

Lag = 51.90 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHE cond
DRL	70 %	Desert range,Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
AGR	30 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satu
Weight.Av	100 %		0.40	0.0	41.0	1.34	0.071	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rock crop
Mp	29.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.07	
LcA	19.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.34	
Mr	14.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.07	
GgA	7.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.34	
Bs	7.0 %	Brios	Sandy Loam	0.35	0.25	0.00	----	0.46	0.46	
Ma	5.0 %	Maripo	Sandy Loam	0.35	0.25	0.00	----	0.40	0.40	
Aa	5.0 %	Agualt	Loam	0.35	0.25	0.00	----	0.29	0.39	
Ve	3.0 %	Vecont	Clay	0.18	0.08	0.00	----	0.04	0.05	
Mo	3.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.06	0.08	
CrB	3.0 %	Coolidge	Sandy loam	0.35	0.25	0.00	----	0.40	0.40	
TrB	2.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.36	
RbA	2.0 %	Rillito	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	
Lb	1.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.27	0.36	
Weight.Av	100.0 %			0.30	----	0.00	5.55	0.18	0.22	

Land type weighted DTHETA = 0.21

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
111	0.50	0.40	0.21	5.55	0.22	0.0	51.90

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 112

S-GRAPH PARAMETERS

Area = 0.97 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.42	37.0	0.278

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.42 mi
Lca = 50.0 % of (L)= 0.71 mi

Av.Slope= 26.1 ft/mi   Av.slope =(SUM(Li)/I)^2

Lag = 93.30 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcroos for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockou croos
Mr	18.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	0
Es	18.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	(
GgA	17.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	(
Mo	13.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	(
Aa	12.0 %	Agualt	Loam	0.35	0.25	0.00	----	0.29	0.55	(
Cb	10.0 %	Carrizo	Loamy Sand	0.35	0.30	0.00	----	1.12	2.12	(
Vf	3.0 %	Vecont	Clay	0.18	0.08	0.00	----	0.04	0.08	(
TrA	3.0 %	Tremant	Sandy Clay Loam	0.26	0.16	0.00	----	0.09	0.17	0
PeA	3.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	0
Bs	3.0 %	Brios	Sandy Loam	0.35	0.25	0.00	----	0.46	0.46	0
Weight.Av	100.0 %			----	----	0.00	3.65	0.28	0.50	(

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
112	0.97	0.50	0.00	3.65	0.50	0.0	93.30

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 113A

S-GRAPH PARAMETERS

Area = 0.50 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.12	29.0	0.220

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.12 mi
Lca = 50.0 % of (L)= 0.56 mi

Av.Slope= 25.9 ft/mi Av.slope =(SUM(Li)/I)^2

Lag = 77.99 min Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockou crops
Mp	60.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	[illegible]
Mr	15.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	[illegible]
Tg	10.0 %	Tremant	Sandy Clay Loam	0.25	0.15	0.00	----	0.07	0.13	[illegible]
GgA	9.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	[illegible]
Aa	3.0 %	Agualt	Loam	0.35	0.25	0.00	----	0.29	0.55	[illegible]
TrA	1.0 %	Tremant	Sandy Clay Loam	0.26	0.16	0.00	----	0.09	0.17	[illegible]
PeA	1.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	[illegible]
GxA	1.0 %	Gunsight	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	[illegible]
Weight.Av	100.0 %			----	----	0.00	7.93	0.08	0.15	[illegible]

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
113A	0.50	0.50	0.00	7.93	0.15	0.0	77.99

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 113

S-GRAPH PARAMETERS

Area = 0.50 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.12	34.0	0.203

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.12 mi   Av.Slope= 30.4 ft/mi   Av.slope =(SUM(Li)/I)^2

Lca = 50.0 % of (L)= 0.56 mi

Lag = 75.67 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rocko croos
Mp	50.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	
Mr	31.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	
TrA	17.0 %	Tremant	Sandy Clay Loam	0.26	0.16	0.00	----	0.09	0.17	
RbA	1.0 %	Rillito	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	
GgA	1.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	
Weight.Av	100.0 %			----	----	0.00	8.54	0.06	0.11	

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
113	0.50	0.50	0.00	8.54	0.11	0.0	75.67

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 114

S-GRAPH PARAMETERS

Area = 0.38 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.08	32.0	0.198

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.08 mi
Lca = 50.0 % of (L)= 0.54 mi

Av.Slope= 29.6 ft/mi Av.slope =(SUM(Li)/I)^2

Lag = 73.95 min Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHET condi
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rocko crops
Mr	64.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	
TrA	18.0 %	Tremant	Sandy Clay Loam	0.26	0.16	0.00	----	0.09	0.17	
Mo	12.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	
GgA	3.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	
Es	3.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	
Weight.Av	100.0 %			----	----	0.00	8.35	0.07	0.13	

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
114	0.38	0.50	0.00	8.35	0.13	0.0	73.95

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 115

S-GRAPH PARAMETERS

Area = 0.49 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.12	32.0	0.210

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.12 mi   Av.Slope= 28.6 ft/mi   Av.slope =(SUM(Li)/I)^2

Lca = 50.0 % of (L)= 0.56 mi

Lag = 76.55 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHET condit
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rocko crops
Mp	41.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	
Mr	24.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	
GgA	11.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	
TrB	10.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.51	
Aa	7.0 %	Agualt	Loam	0.35	0.25	0.00	----	0.29	0.55	
Es	4.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	
Lb	3.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.27	0.51	
Weight.Av	100.0 %			----	----	0.00	7.04	0.13	0.24	

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
115	0.49	0.50	0.00	7.04	0.24	0.0	76.55

WHITE TANKS/AGUA FRIA ADMS

UBBASIN # : 116

S-GRAPH PARAMETERS

A . = 1.02 sq.mi

low path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.63	46.0	0.307

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.63 mi
Lca = 50.0 % of (L)= 0.82 mi

Av.Slope= 28.2 ft/mi — Av.slope =(SUM(Li)/I)^2

Lag = 102.05 min — Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60) m

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit.
GR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout crops %
Mp	34.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	0.
GgA	29.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	0.
LcA	15.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.47	0.
Es	11.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	0.
AbA	6.0 %	Antho	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	0.
Mr	3.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	0.
Ma	2.0 %	Maripo	Sandy Loam	0.35	0.25	0.00	----	0.40	0.40	0.
Weight.Av	100.0 %			----	----	0.00	5.44	0.19	0.33	0.

Land type weighted DTHETA = 0.00

INPUT VALUES FOR < MCUHP 2 >PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
116	1.02	0.50	0.00	5.44	0.33	0.0	102.05

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 117A

S-GRAPH PARAMETERS

Area = 0.21 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
0.80	23.0	0.149

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 0.80 mi   Av.Slope= 28.8 ft/mi   Av.slope =(SUM(Li)/I)^2

Lca = 50.0 % of (L)= 0.40 mi

Lag = 59.21 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHET(condit
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockou crops
Mp	39.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	
LcA	29.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.47	
Mr	21.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	
Es	11.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	
Weight.Av	100.0 %			----	----	0.00	6.96	0.13	0.25	

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
117A	0.21	0.50	0.00	6.96	0.25	0.0	59.21

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 117

S-GRAPH PARAMETERS

Area = 0.41 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.42	40.0	0.268

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.42 mi
Lca = 40.0 % of (L)= 0.57 mi

Av.Slope= 28.2 ft/mi — Av.slope =(SUM(Li)/I)^2

Lag = 59.12 min — Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit
AGR	60 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
RES	40 %	Residential	0.12	20.0	50.0	1.45	0.03	Normal
Weight.Av	100 %		0.35	8.0	74.0	1.71	0.084	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockou crops
Es	35.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.43	0
LcA	20.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.43	0
GgA	15.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.43	0
Mo	9.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	0
Mr	8.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	0
RbA	5.0 %	Rillito	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	0
AbA	5.0 %	Antho	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	0
TrB	3.0 %	Tremant	Sandy Clay Loam	0.31	0.21	0.00	----	0.27	0.49	0
Weight.Av	100.0 %			----	0.23	0.00	4.12	0.23	0.37	0

Land type weighted DTHETA = 0.09

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
117	0.41	0.35	0.09	4.12	0.37	8.0	59.12

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 118

S-GRAPH PARAMETERS

Area = 0.15 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
0.81	20.0	0.163

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 0.81 mi
Lca = 50.0 % of (L)= 0.41 mi

Av.Slope= 24.7 ft/mi — Av.slope =(SUM(Li)/I)^2

Lag = 61.52 min — Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockou crops
LcA	62.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.47	[illegible]
Mo	26.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	[illegible]
Es	12.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	[illegible]
Weight.Av	100.0 %			----	----	0.00	5.11	0.20	0.37	[illegible]

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
118	0.15	0.50	0.00	5.11	0.37	0.0	61.52

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 119A

S-GRAPH PARAMETERS

Area = 0.47 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.12	22.0	0.253

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.12 mi   Av.Slope= 19.6 ft/mi   Av.slope =(SUM(Li)/I)^2

Lca = 50.0 % of (L)= 0.56 mi

Lag = 82.20 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHET condi
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rocko crops
Mp	51.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	
LcA	18.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.47	
Mr	17.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	
PeB	7.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	
PeA	6.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	
Pa	1.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	
Weight.Av	100.0 %			----	----	0.00	6.91	0.13	0.20	

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
119A	0.47	0.50	0.00	6.91	0.20	0.0	82.20

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 119

S-GRAPH PARAMETERS

Area = 0.86 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.23	38.0	0.221

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.23 mi   Av.Slope= 30.9 ft/mi   Av.slope =(SUM(Li)/I)^2

Lca = 50.0 % of (L)= 0.62 mi

Lag = 80.98 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHET condi
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockc crops
GgA	38.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	
Mp	27.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	
Mr	15.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	
LcA	11.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.47	
Bt	4.0 %	Brios	Sandy Loam	0.35	0.26	0.00	----	0.50	0.50	
PeA	3.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.38	0.38	
Pa	1.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	
Bs	1.0 %	Brios	Sandy Loam	0.35	0.25	0.00	----	0.46	0.46	
Weight.Av	100.0 %			----	----	0.00	5.56	0.18	0.31	

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
119	0.86	0.50	0.00	5.56	0.31	0.0	80.98

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 120

S-GRAPH PARAMETERS

Area = 0.54 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.33	41.0	0.240

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.33 mi
Lca = 50.0 % of (L)= 0.67 mi

Av.Slope= 30.8 ft/mi — Av.slope =(SUM(Li)/I)^2

Lag = 85.98 min — Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHET condi
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rocko crops
Mr	69.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	
LcA	14.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.47	
PeB	5.0 %	Perryville	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	
Mp	5.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	
Aa	4.0 %	Agualt	Loam	0.35	0.25	0.00	----	0.29	0.55	
GxA	3.0 %	Gunsight	Sandy Loam	0.35	0.25	0.00	----	0.39	0.39	
Weight.Av	100.0 %			----	----	0.00	7.23	0.11	0.19	

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
120	0.54	0.50	0.00	7.23	0.19	0.0	85.98

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 121A

S-GRAPH PARAMETERS

Area = 0.5 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.12	30.0	0.216

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.12 mi
Lca = 50.0 % of (L)= 0.56 mi

Av.Slope= 26.8 ft/mi — Av.slope =(SUM(Li)/I)^2

Lag = 63.93 min — Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHET condi
AGR	70 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur
DRL	30 %	Desert range,Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
Weight.Av	100 %		0.46	0.0	69.0	1.66	0.099	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rocko crops
Mr	32.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.08	
GgA	26.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.41	
Mp	10.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.08	
Cb	10.0 %	Carrizo	Loamy Sand	0.35	0.30	0.00	----	1.12	1.85	
LcA	8.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.41	
TD	7.0 %	Torri-	Loamy Sand	0.35	0.30	0.00	----	1.20	1.99	
Vh	3.0 %	Vint	Loamy Sand	0.35	0.29	0.00	----	1.06	1.76	
Bs	2.0 %	Brios	Sandy Loam	0.35	0.25	0.00	----	0.46	0.46	
Aa	2.0 %	Agualt	Loam	0.35	0.25	0.00	----	0.29	0.48	
Weight.Av	100.0 %			0.31	----	0.00	4.03	0.35	0.57	

Land type weighted DTHETA = 0.09

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
121A	0.50	0.46	0.09	4.03	0.57	0.0	63.93

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 121

S-GRAPH PARAMETERS

Area = 0.5 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.12	31.0	0.213

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.12 mi   Av.Slope= 27.7 ft/mi   Av.slope =(SUM(Li)/I)^2

Lca = 50.0 % of (L)= 0.56 mi

Lag = 63.53 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHET… condi…
AGR	70 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
DRL	30 %	Desert range,Flat slopes	0.35	50%Rock-	20.0	1.11	0.05	Dry
Weight.Av	100 %		0.46	0.0	69.0	1.66	0.099	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rocko… crops
Mr	32.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.08	
GgA	26.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.41	
Mp	10.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.08	
Cb	10.0 %	Carrizo	Loamy Sand	0.35	0.30	0.00	----	1.12	1.85	
LcA	8.0 %	Laveen	Loam	0.35	0.25	0.00	----	0.25	0.41	
TD	7.0 %	Torri-	Loamy Sand	0.35	0.30	0.00	----	1.20	1.99	
Vh	3.0 %	Vint	Loamy Sand	0.35	0.29	0.00	----	1.06	1.76	
Bs	2.0 %	Brios	Sandy Loam	0.35	0.25	0.00	----	0.46	0.46	
Aa	2.0 %	Agualt	Loam	0.35	0.25	0.00	----	0.29	0.48	
Weight.Av	100.0 %			0.31	——	0.00	4.03	0.35	0.57	

Land type weighted DTHETA = 0.09

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
121	0.50	0.46	0.09	4.03	0.57	0.0	63.53

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 122

S-GRAPH PARAMETERS

Area = 0.89 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.41	37.0	0.275

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.41 mi
Lca = 50.0 % of (L)= 0.71 mi

Av.Slope= 26.2 ft/mi

Av.slope =(SUM(Li)/I)^2

Lag = 92.67 min

Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockou crops
Mp	19.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	
Mr	17.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	
Mo	15.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.06	0.11	
Aa	10.0 %	Agualt	Loam	0.35	0.25	0.00	----	0.29	0.55	
Le	9.0 %	Laveen	Loam	0.34	0.23	0.00	----	0.23	0.43	
Tg	7.0 %	Tremant	Sandy Clay Loam	0.25	0.15	0.00	----	0.07	0.13	
Es	7.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	
GgA	5.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	
Vg	4.0 %	Vint	Loamy Sand	0.35	0.29	0.00	----	1.07	2.02	
Ma	4.0 %	Maripo	Sandy Loam	0.35	0.25	0.00	----	0.40	0.40	
Gr	3.0 %	Glenbar	Silty Loam	0.39	0.25	0.00	----	0.15	0.28	
Weight.Av	100.0 %			----	----	0.00	5.83	0.17	0.32	

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
122	0.89	0.50	0.00	5.83	0.32	0.0	92.67

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 123

S-GRAPH PARAMETERS

Area = 0.44 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.12	34.0	0.203

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.12 mi
Lca = 45.0 % of (L)= 0.50 mi

Av.Slope= 30.4 ft/mi

Av.slope =(SUM(Li)/I)^2

Lag = 72.70 min

Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHET cond.
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satu
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rock crop
GgA	43.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	
Mr	22.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	
Mp	22.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	
Es	8.0 %	Estrella	Loam	0.35	0.25	0.00	----	0.25	0.47	
Ma	3.0 %	Maripo	Sandy Loam	0.35	0.25	0.00	----	0.40	0.40	
Mo	2.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.06	0.11	
Weight.Av	100.0 %			----	----	0.00	6.21	0.16	0.30	

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
123	0.44	0.50	0.00	6.21	0.30	0.0	72.70

WHITE TANKS/AGUA FRIA ADMS

SUBBASIN # : 124

S-GRAPH PARAMETERS

Area = 0.57 sq.mi

Flow path inc. (mi)	Elevation inc. (ft)	Ii (mi^3/ft)^.5
1.42	41.0	0.264

I=SUM(Ii)=SUM((Li^3/Hi)^.5)

L = 1.42 mi
Lca = 55.0 % of (L)= 0.78 mi

Av.Slope= 28.9 ft/mi   Av.slope =(SUM(Li)/I)^2

Lag = 94.87 min   Lag = 20*Kn*(((1.2)*(L*Lca/S^.5)^.38)*60)

Land Symbol	% Area	Land use/Land classif. (Tables 4.1 & 5.1)	IA (in)	RTIMP %	Av. Veget cover %	Ck	Kn	DTHETA condit
AGR	100 %	Agricultural (tilled/irrig.field)	0.50	50%Rock-	90.0	1.89	0.12	Satur.
Weight.Av	100 %		0.50	0.0	90.0	1.89	0.120	

RTIMP is taken 50% of Rockoutcrops for noncontiguous undeveloped areas

GREEN & AMPT LOSS RATE PARAMETERS

Ck = 1.0 for sand &sandy loam, = Weigted average Ck for others.......fig 4.1

Average values

Map Unit	% OF Area	Soil Series	Textural class (major componets)	DTHETA (dry)	DTHETA (normal)	DTHETA (satur.)	PSIF (in)	XKSAT (in/hr)	Ck*XKSAT (in/hr)	Rockout crops
GgA	53.0 %	Gilman	Loam	0.35	0.25	0.00	----	0.25	0.47	
Mr	24.0 %	Mohall	Clay Loam	0.25	0.15	0.00	----	0.05	0.09	
Mp	23.0 %	Mohall	Clay Loam	0.26	0.16	0.00	----	0.05	0.09	
Weight.Av	100.0 %			----	----	0.00	6.41	0.16	0.29	

Land type weighted DTHETA = 0.00

INPUT VALUES FOR (MCUHP 2)PROGRAM

SUBBASIN #	Area	IA	DTHETA	PSIF	XKSAT	RTIMP	Lag
124	0.57	0.50	0.00	6.41	0.29	0.0	94.87

WHITE TANKS / AGUA FRIA ADMS

Approximate Delineation on Reems Road

COMPUTATION DATA SHEET

The WLB Group Inc.

Subject: WHITE TANKS/AGUA FRIA ADMS - APPROXIMATE DELINEATION ON REEMS ROAD. Prepared by: JSE Date: 2-19-92

NORTHERN AVENUE TO OLIVE AVENUE

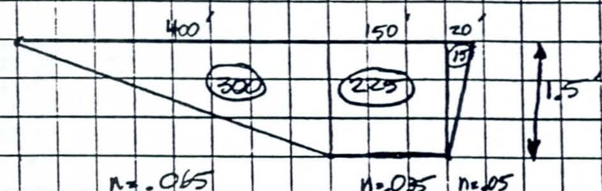
DISCHARGE = ROUTED FLOW FROM DI 193 TO CP 193 = 2255 CFS.

THIS DISCHARGE IS GREATER THAN CAPACITY OF REEMS, THEREFORE APPROXIMATE FLOODPLAIN IS BASED ON TOP OF LEFT BANK ELEVATION AND PROJECTED WEST TO SAME ELEVATION.

OLIVE AVENUE TO PEORIA AVENUE

USE DISCHARGE OF ROUTED FLOW R165 = 3090 cfs

Check Capacity of Typical Cross Section.



S = .0044 '/'

A = 540 ft²

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

$$Q_1 = \frac{1.49}{.065}\, 300 \left(\frac{300}{400}\right)^{2/3} (.0044)^{1/2} + Q_2 = \frac{1.49}{.035}\, 225 \left(\frac{225}{150}\right)^{2/3} (.0044)^{1/2} + Q_3 = \frac{1.49}{.05}\, 15 \left(\frac{15}{20}\right)^{2/3} (.0044)^{1/2}$$

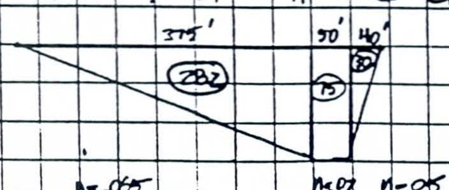
$$Q_T = 376 + 832 + 25 = 1233 \text{ cfs} < 3090 \text{ cfs}$$

∴ Use Top of Left Bank Projected West to Same Elevation for Approximate Delineation.

PEORIA AVENUE TO CACTUS ROAD

USE DISCHARGE OF ROUTED FLOW R146 = 1423 cfs

CHECK CAPACITY OF TYPICAL CROSS SECTION



S = .0067 '/'

A = 387 ft²

(cont.)

Form 209

The WLB Group Inc. **WLB**

COMPUTATION DATA SHEET

Subject REEMS ROAD APPROXIMATE DELINEATION Prepared by JSE Date 2-19-92

Cont. From Last Page

$Q_1 = \frac{1.49}{.065}(282)\left(\frac{282}{375}\right)^{2/3}(.0067)^{1/2} + Q_2 = \frac{1.49}{.03}75\left(\frac{75}{50}\right)^{2/3}.0067^{1/2} + Q_3 = \frac{1.49}{.05}30\left(\frac{30}{40}\right)^{2/3}(.0067)^{1/2}$

$Q_T = 438 + 599 + 60 = 1097\text{ cfs} < 1423\text{ cfs}$

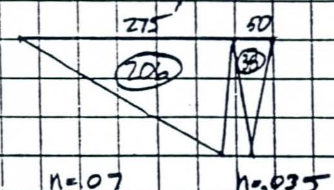
∴ Use Top of Left Bank Elevation Projected West to Same Elevation for Approximate Delineation.

CACTUS ROAD TO WADDELL ROAD

USE DISCHARGE FROM ROUTED FLOW R133 = 273 cfs

Check Capacity From Typical Cross Section

S = .0067 '/'
A = 244 ft²



$Q_1 = \frac{1.49}{.07}(206)\left(\frac{206}{275}\right)^{2/3}(.0067)^{1/2} + Q_2 = \frac{1.49}{.035}(38)\left(\frac{38}{50}\right)^{2/3}(.0067)^{1/2}$

$Q_T = 296 + 110 = 406\text{ cfs} > 273\text{ cfs}$

This is very close so we will still use Top of Left Bank elevation projected west to same elevation for Approximate Delineation

The WLB Group Inc.

COMPUTATION DATA SHEET

Subject: REEMS ROAD APPROXIMATE DELINEATION   Prepared by: JSE   Date: 2-19-92

WADDELL ROAD TO GREENWAY ROAD

USE DISCHARGE = Q AT R122 = 308 cfs

CAPACITY CHECK

THIS CROSS SECTION IS VERY SIMILAR TO THE ONE BETWEEN CACTUS ROAD AND WADDELL ROAD WHICH HAD A CAPACITY OF 406 cfs > 308 cfs.

AGAIN THIS IS VERY CLOSE SO TOP OF LEFT BANK ELEVATION PROJECTED WEST TO SAME ELEVATION WILL BE UTILIZED FOR THE APPROXIMATE DELINEATION

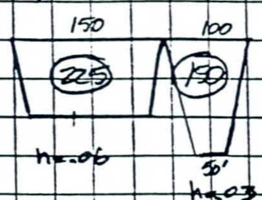
GREENWAY ROAD TO BELL ROAD

USE DISCHARGE = Q AT R115 = 2541 cfs

CHECK CAPACITY

S = .004 '/'

A = 375 ft^2



$$Q_1 = \frac{1.49}{.06}(225)\left(\frac{225}{150}\right)^{2/3}(.004)^{1/2} + Q_2 = \frac{1.49}{.03}150\left(\frac{150}{100}\right)^{2/3}(.004)^{1/2}$$

$$Q_T = 463 + 617\text{ cfs} = 1080\text{ cfs} < 2541\text{ cfs}$$

∴ USE TOP OF LEFT BANK PROJECTED WEST TO SAME ELEVATION FOR APPROXIMATE DELINEATION.

Form 209

The WLB Group Inc. WLB

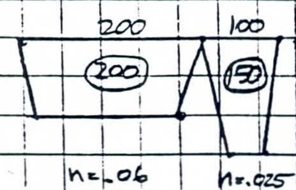
COMPUTATION DATA SHEET

Subject: REEMS ROAD APPROXIMATE DELINEATION   Prepared by: JSE   Date: 2-19-92

BELL ROAD TO UNION HILLS DRIVE

USE DISCHARGE = Q AT R108 = 1123 cfs

CHECK CAPACITY



S = .0050 '/'
A = 350 ft²

$$Q_1 = \frac{1.49}{.06}(200)(1)^{2/3}(.005)^{1/2} + Q_2 = \frac{1.49}{.025}(150)(1.5)^{2/3}(.005)^{1/2}$$

$$Q_T = 351 + 828 = 1180 \text{ cfs} > 1123 \text{ cfs}$$

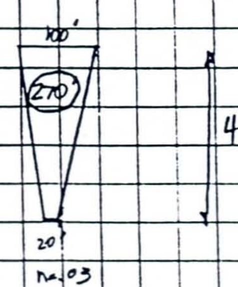
∴ SINCE THIS IS ALMOST THE SAME USE TOP OF LEFT BANK ELEVATION PROJECTED WEST TO APPROXIMATELY THE SAME ELEVATION FOR APPROXIMATE DELINEATION.

UNION HILLS DRIVE TO BEARDSLEY ROAD

USE AVERAGE DISCHARGE BETWEEN CP108 AND CP103 = (1158 + 267)/2 = 712 cfs

CHECK CAPACITY

S = .005 '/'
A = 270 ft²



$$Q = \frac{1.49}{.03}(270)(2.7)^{2/3}(.005)^{1/2} = 1838 \text{ cfs} > 712 \text{ cfs}$$

STILL USE TOP OF LEFT BANK ELEVATION PROJECTED WEST FOR APPROXIMATE DELINEATION.

Form 209

WHITE TANKS / AGUA FRIA ADMS

HEC-1 Output (13688H1C)

```
*****************************************                                       ***************************************
*                                       *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                       *   U.S. ARMY CORPS OF ENGINEERS
*             SEPTEMBER 1990            *                                       *   HYDROLOGIC ENGINEERING CENTER
*              VERSION 4.0              *                                       *         609 SECOND STREET
*                                       *                                       *       DAVIS, CALIFORNIA 95616
* RUN DATE  02/13/1998  TIME  07:31:29 *                                        *          (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        DEL WEBB SUN CITY GRAND REEMS ROAD FLOODLAIN LOMR/LOMA HYDROLOGY
   3           ID
   4           ID        STANLEY CONSULTANTS, INC.
   5           ID        2929 E. CAMELBACK RD.  SUITE 130
   6           ID        PHOENIX, ARIZONA   85016
   7           ID        PHONE: (602)912-6500     FAX: (602)912-6599
   8           ID
   9           ID        SCI PROJECT # 13688      HEC-1 INPUT FILENAME: 13688H1C
  10           ID                                 ------------------------------
  11           ID                                 -> FCD/WLB WTADMS.24 MODEL ("S" GRAPH,
  12           ID                                      GREEN & AMPT LOSS, 24HR TYPE II
  13           ID                                      W/AERIAL REDUCTION)
  14           ID        GENERAL MODEL NOTES:
  15           ID        --------------------
  16           ID        1. THIS MODEL IS A PORTION OF THE WHITE TANKS/AGUA FRIA AREA DRAINAGE
  17           ID           MASTER STUDY MODEL "WTADMS.24" PREPARED BY CONSULTANT "THE WLB GROUP"
  18           ID           FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY.
  19           ID        2. THIS MODEL REPRESENTS ONLY THAT PORTION OF THE WTADMS.24 MODEL FROM
  20           ID           SUB-BASIN 101 THRU SUB-BASIN 122 INCLUSIVE. ALL OTHER HYDROGRAPH
  21           ID           OPERATIONS FROM THE ORIGINAL MODEL HAVE BEEN DELETED.
  22           ID        3. SUB-BASINS 100, 100A, 109 AND 116 ARE NOT CONSIDERED BY EITHER THE
  23           ID           WTADMS.24 MODEL OR THIS MODEL TO CONTRIBUTE RUNOFF TO THE OLD REEMS
  24           ID           ROAD ALIGNMENT FROM BELL ROAD TO BEARDSLEY ROAD.
  25           ID        4. ANY OF THE ORIGINAL INPUT RECORD FROM THE WTADMS.24 MODEL THAT WAS
  26           ID           MODIFIED OR NOT USED BY THIS STANLEY MODEL HAS BEEN RETAINED AS A
  27           ID           "*  COMMENT". IN MOST CASES, A "NOTE: EXPLANATION" IS FOUND EITHER
  28           ID           IMMEDIATELEY BEFORE OR AFTER THE REVISED OR UNUSED RECORD.
  29           ID
               * ID
               * ID      FINAL HYDROLOGY RUN FOR WHITE TANKS ADMS ---- ENTIRE WATERSHED
               * ID      100-YEAR, 24-HOUR STORM                                   WTADMS.24
               * ID
               *DIAGRAM
  30           IT      5                 300
               * IO    3
               * NOTE: CHANGE OUTPUT SPECIFICATION
  31           IO      5
  32           IN     15
  33           JD   4.03    .001
  34           PC   .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
  35           PC   .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
  36           PC   .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
  37           PC   .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
  38           PC   .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
  39           PC   .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
  40           PC   .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
  41           PC   .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
  42           PC   .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
  43           PC   .983    .986    .989    .992    .995    .998    1.00   1.000   1.000   1.000
  44           JD   3.99      10
  45           JD   3.83      50
  46           JD   3.76     100
  47           JD   3.70     200
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  48           KK    101
  49           KM       RUNOFF HYDROGRAPH FROM SUB-BASIN 101.
  50           BA    .16
```

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 51   LG     .35     .32    3.61     .26     .00
 52   UI     22.     76.    121.    165.    258.    205.    150.    106.     54.     34.
 53   UI     22.      7.      7.      7.      0.      0.      0.      0.      0.      0.
 54   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 55   KK    102A
 56   KM         RUNOFF HYDROGRAPH FROM SUB-SUBIN 102.
 57   BA     .51
 58   LG     .40     .20    6.05     .21     .00
 59   UI     40.     43.    142.    190.    228.    270.    327.    453.    484.    378.
 60   UI    319.    263.    218.    176.    114.     71.     66.     44.     40.     15.
 61   UI     12.     12.     12.     12.     12.      0.      0.      0.      0.      0.
 62   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 63   KK   CP101
 64   KM         ADD HYDROGRAPHS AT CP101
 65   HC       2     .67

 66   KK    R101
 67   KM         ROUTE FLOW FROM CP101 TO CP102.
 68   RS       2              -1       0
 69   RC    .025    .022    .022    2750   .0062
 70   RX    1000    1001    1030    1085    1120    1138    1139    1140
 71   RY    1319    1319    1318    1316    1316    1317    1317    1317

 72   KK     102
 73   KM         RUNOFF FROM SUB-BASIN 102
 74   BA     .10
 75   LG     .50     .00    6.05     .29     .00
 76   UI     10.     21.     44.     57.     70.     97.    122.     94.     75.     59.
 77   UI     45.     26.     17.     13.     10.      3.      3.      3.      3.      3.
 78   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 79   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 80   KK   CP102
 81   KM         ADD HYDROGRAPHS AT CP102.
 82   HC       2     .77

 83   KK    R102
 84   KM         ROUTE FLOW FROM CP102 TO CP108
 85   RS      36              -1       0
 86   RC    .075    .075    .075     702   .0054
 87   RX    1000    1001    1120    1700    2030    2630    3070    3270
 88   RY    1289    1289    1288    1286    1286    1288    1290    1292

 89   KK     108
 90   KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 108.
 91   BA     .79
 92   LG     .44     .12    5.53     .25     .00
 93   UI     31.     31.     31.     32.    101.    115.    136.    151.    167.    178.
 94   UI    194.    213.    233.    257.    304.    366.    406.    353.    310.    281.
```



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

 95   UI    259.    240.    217.    197.    181.    163.    148.    132.    108.     88.
 96   UI     56.     54.     52.     51.     45.     31.     31.     31.     24.      9.
 97   UI      9.      9.      9.      9.      9.      9.      9.      9.      9.      9.
 98   UI      9.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 99   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

100   KK   1I108
101   KM         ADD HYDROGRAPHS AT CP108.
102   HC       2    1.56

103   KK     103
104   KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 103.
105   BA     .37
106   LG     .46     .09    4.33     .29     .00
107   UI     19.     19.     20.     64.     79.     93.    105.    116.    131.    148.
108   UI    175.    222.    248.    206.    178.    159.    143.    125.    111.     97.
109   UI     84.     64.     45.     34.     32.     32.     19.     19.     19.      6.
110   UI      6.      6.      6.      6.      6.      6.      6.      6.      0.      0.
111   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

112   KK    R103
113   KM         ROUTE FLOW FROM CP103 TO CP108.
114   RS       4              -1       0
115   RC     .08    .022    .035    5380   .0041
116   RX    1000    1050    1080    1095    1130    1150    1300    1830
117   RY    1285    1284    1282    1280    1280    1282    1284    1286

118   KK   CP108
119   KM         ADD HYDROGRAPHS AT CP108.
120   HC       2    1.93

121   KK    R108
122   KM         ROUTE FLOW FROM CP108 TO CP115.
123   RS       7              -1       0
124   RC    .035    .035    .075    5382   .0037
125   RX    1000    1001    1002    1030    1100    1370    1900    2290
126   RY    1259    1259    1259    1258    1258    1260    1262    1264

127   KK     106
128   KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 106.
129   BA     .77
130   LG     .35     .29    6.63     .16     .00
131   UI     68.    109.    267.    353.    425.    523.    727.    830.    634.    523.
132   UI    422.    338.    237.    132.    114.     77.     65.     21.     21.     21.
133   UI     21.     21.      0.      0.      0.      0.      0.      0.      0.      0.
```

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 134         UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

 135         KK    R106
 136         KM         ROUTE FLOW FROM CP106 TO CP107
 137         RS      3                 -1        0
 138         RC    .075      .03      .03     5382     .039
 139         RX    1000     1430     1860     1890     1940     1960     1969     1970
 140         RY    1292     1291     1290   1289.5   1289.5     1290   1290.5   1290.5
1                                         HEC-1 INPUT                                                PAGE  4

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


 141         KK     107
 142         KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 107.
 143         BA     .60
 144         LG     .46      .08     5.65      .29      .00
 145         UI     26.      26.      26.      53.      91.     109.     125.     141.     152.     167.
 146         UI    186.     203.     238.     291.     340.     308.     266.     238.     216.     199.
 147         UI    177.     160.     143.     129.     114.      90.      71.      46.      46.      43.
 148         UI     43.      27.      26.      26.      19.       8.       8.       8.       8.       8.
 149         UI      8.       8.       8.       8.       8.       8.       0.       0.       0.       0.
 150         UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

 151         KK   CP107
 152         KM         ADD HYDROGRAPHS AT CP107.
 153         HC       2     1.37

 154         KK    R107
 155         KM         ROUTE FLOW FROM CP107 TO CP115
 156         RS       6                -1        0
 157         RC    .035     .035     .075     6240    .0048
 158         RX    1000     1001     1002     1030     1100     1370     1900     2290
 159         RY    1259     1259     1259     1258     1258     1260     1262     1264

 160         KK     115
 161         KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 115.
 162         BA     .49
 163         LG     .50      .00     7.04      .24      .00
 164         UI     22.      22.      22.      45.      76.      91.     104.     117.     126.     138.
 165         UI    155.     170.     200.     245.     284.     247.     215.     192.     176.     161.
 166         UI    142.     129.     115.     103.      90.      69.      52.      38.      37.      35.
 167         UI     31.      22.      22.      22.      10.       7.       7.       7.       7.       7.
 168         UI      7.       7.       7.       7.       7.       0.       0.       0.       0.       0.
 169         UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

 170         KK   1I115
 171         KM         ADD HYDROGRAPHS AT CP115.
 172         HC       2     1.86

 173         KK   2I115
 174         KM         ADD HYDROGRAPHS AT CP115.
 175         HC       2     3.79

 176         KK     111
 177         KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 111.
 178         BA     .50
 179         LG     .40      .21     5.55      .22      .00
 180         UI     32.      32.      78.     129.     160.     184.     211.     246.     304.     406.
 181         UI    374.     307.     266.     230.     196.     167.     139.      99.      58.      55.
 182         UI     50.      32.      32.      15.      10.      10.      10.      10.      10.      10.
 183         UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 184         UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                                          HEC-1 INPUT                                                PAGE  5

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


 185         KK    D111
 186         KM         DIVERT TO CP119 FROM CP111
 187         DT   DI119
 188         DI       0       32      109      228      389      599      858     1170     1539     1967
 189         DQ       0       11       39       83      145      228      333      462      617      799

 190         KK    R111
 191         KM         ROUTE REMAINDER FROM CP111 TO CP112
 192         RS       9                -1        0
 193         RC    .075     .035     .035     5280    .0040
 194         RX    1000     1570     2040     2370     2440     2468     2469     2470
 195         RY    1312     1310     1308     1306     1306     1307     1307     1307

 196         KK     104
 197         KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 104
 198         BA     .15
 199         LG     .35      .31     4.93      .23      .00
 200         UI     26.     101.     151.     242.     249.     169.     112.      50.      31.      14.
 201         UI      7.       7.       0.       0.       0.       0.       0.       0.       0.       0.
 202         UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

 203         KK    R104
 204         KM         ROUTE FLOW FROM CP104 TO CP112
 205         RS      53                -1        0
 206         RC    .075     .075     .075     6552    .0056
 207         RX    1000     1001     1230     1270     1750     2000     2380     2650
 208         RY    1321     1321     1320     1318     1318     1319     1318     1320

 209         KK     112
 210         KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 112
 211         BA     .97
 212         LG     .50      .00     3.65      .50      .00
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 213      UI     35.     35.     35.     35.     92.    123.    142.    165.    179.    193.
 214      UI    207.    224.    245.    266.    290.    340.    400.    464.    424.    371.
 215      UI    335.    308.    286.    267.    243.    220.    206.    185.    170.    155.
 216      UI    131.    101.     77.     62.     61.     58.     58.     45.     35.     35.
 217      UI     35.     28.     11.     11.     11.     11.     11.     11.     11.     11.
 218      UI     11.     11.     11.     11.     11.      0.      0.      0.      0.      0.
 219      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 220      KK   1I112
 221      KM        ADD HYDROGRAPHS AT CP112.
 222      HC       2    1.12

 223      KK   2I112
 224      KM        ADD HYDROGRAPHS AT CP112.
 225      HC       2    1.62

 226      KK     105
 227      KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 105
 228      BA     .21
 229      LG     .35     .27    7.68     .10     .00
 230      UI     32.    129.    195.    295.    362.    246.    171.     88.     50.     28.
 231      UI     10.     10.     10.      0.      0.      0.      0.      0.      0.      0.
```



```
 232      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 233      KK    R105
 234      KM        ROUTE FLOW FROM CP105 TO CP112
 235      RS       3              -1       0
 236      RC    .022    .022     .03    5220   .0044
 237      RX    1000    1001    1010    1020    1040    1050    1099    1100
 238      RY    1303    1303    1303    1302    1302    1304    1305    1305

 239      KK   CP112
 240      KM        ADD HYDROGRAPHS AT CP112.
 241      HC       2    1.83

 242      KK    D112
 243      KM        DIVERT TO CP120 FROM CP112
 244      DT   DI120
 245      DI       0      48     165     355     625     981    1434    1990
 246      DQ       0      16      55     118     208     327     478     663

 247      KK    D112
 248      KM        DIVERT TO CP121A FROM CP112
 249      DT  1D121A
 250      DI       0      32     110     237     417     654     956    1327
 251      DQ       0      16      55     118     208     327     478     663

 252      KK    R112
 253      KM        ROUTE REMAINDER FROM CP112 TO CP113A
 254      RS       6              -1       0
 255      RC    .075    .035    .035    2640   .0023
 256      RX    1000    1490    1830    2600    2770    2788    2789    2790
 257      RY    1290    1288    1286    1284    1284    1285    1285    1285

 258      KK    113A
 259      KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 113A
 260      BA     .50
 261      LG     .50     .00    7.93     .15     .00
 262      UI     22.     22.     22.     42.     75.     89.    103.    115.    125.    137.
 263      UI    152.    167.    192.    238.    276.    260.    224.    199.    181.    167.
 264      UI    149.    134.    121.    108.     98.     79.     62.     40.     38.     36.
 265      UI     35.     26.     22.     22.     20.      7.      7.      7.      7.      7.
 266      UI      7.      7.      7.      7.      7.      7.      0.      0.      0.      0.
 267      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 268      KK  CP113A
 269      KM        ADD HYDROGRAPHS AT CP113A
 270      HC       2    2.33

 271      KK   D113A
 272      KM        DIVERT TO CP121A FROM CP113A
 273      DT  2D121A
 274      DI       0      26      67     134     232     278     399     561     799    1106
 275      DQ       0       0       0       0       0       4      22      58     120     211
```



```
 276      KK   R113A
 277      KM        ROUTE REMAINDER FROM CP113A TO CP113
 278      RS      25              -1       0
 279      RC    .075    .035    .035    5280   .0032
 280      RX    1000    1080    2620    2725    2735    2798    2799    2800
 281      RY    1278    1277    1277    1276    1276    1277    1277    1277

 282      KK     113
 283      KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 113
 284      BA     .50
 285      LG     .50     .00    8.54     .11     .00
 286      UI     22.     22.     22.     49.     79.     95.    108.    122.    132.    145.
 287      UI    162.    178.    213.    261.    291.    248.    216.    195.    178.    161.
 288      UI    143.    131.    114.    105.     88.     65.     46.     39.     37.     37.
 289      UI     27.     22.     22.     20.      7.      7.      7.      7.      7.      7.
 290      UI      7.      7.      7.      7.      7.      0.      0.      0.      0.      0.
 291      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
```

```
KK    CP113
KM         ADD HYDROGRAPHS AT CP113.
HC         2    2.83

KK     D113
KM         DIVERT TO CP122 FROM CP113
DT     1D122
DI         0       79      257      523      872     1307     1829
DQ         0       63      205      416      692     1033     1422

KK     R113
KM         ROUTE REMAINDER FROM CP113 TO CP114
RS         6                -1        0
RC      .075      .04      .04     2100    .0038
RX      1000     1020     1100     1850     2030     2048     2049     2050
RY      1266     1264     1262     1260     1260     1261     1261     1261

KK      114
KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 114
BA       .38
LG       .50      .00     8.35      .13      .00
UI       17.      17.      17.      41.      62.      75.      86.      95.     104.     115.
UI      129.     144.     177.     215.     216.     183.     161.     146.     133.     118.
UI      106.      95.      85.      74.      58.      44.      31.      30.      28.      25.
UI       17.      17.      17.       6.       5.       5.       5.       5.       5.       5.
UI        5.       5.       5.       5.       0.       0.       0.       0.       0.       0.
UI        0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

KK    CP114
KM         ADD HYDROGRAPHS AT CP114.
HC         2    3.21
                                  HEC-1 INPUT                                              PAGE  8

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

KK     D114
KM         DIVERT TO CP122 FROM CP114
DT     2D122
DI         0       17       54       80      333      952     2066
DQ         0        0        0        0       70      438     1217

KK     R114
KM         ROUTE REMAINDER FROM CP114 TO CP115
RS         2                -1        0
RC       .06     .022      .35     2652    .0034
RX      1000     1380     1790     1800     1840     1850     1899     1900
RY      1258     1256     1254     1250     1250     1252     1253     1253

KK    CP115
KM         ADD HYDROGRAPHS AT CP115.
HC         2     7.0

KK     R115
KM         ROUTE FLOWS FROM CP115 TO CP122
RS         6                -1        0
RC      .035     .035     .075     5280    .0038
RX      1000     1001     1002     1015     1035     1360     1920     2460
RY      1239     1239     1239     1238     1238     1240     1241     1242

KK     D113
KM         RETURN DIVERT AT CP113
DR     1D122

KK     R113
KM         ROUTE FLOW FROM CP113 TO CP122
RS        36                -1        0
RC       .08      .08      .08     7488    .0049
RX      1000     1001     1610     1820     1990     2010     3059     3060
RY      1248     1248     1246     1245     1245     1246     1248     1248

KK     D114
KM         RETURN DIVERT AT CP114
DR     2D122

KK     R114
KM         ROUTE FLOW FROM CP114 TO CP122
RS        45                -1        0
RC      .075     .075     .075     6240    .0046
RX      1000     1001     1610     1820     1990     2010     3059     3060
RY      1248     1248     1246     1245     1245     1246     1248     1248

KK      122
KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 122
BA       .89
LG       .50      .00     5.83      .32      .00
UI       32.      32.      32.      32.      87.     114.     132.     153.     166.     179.
UI      193.     207.     229.     247.     272.     319.     378.     428.     385.     338.
UI      306.     281.     262.     243.     220.     201.     188.     167.     155.     138.
UI      114.      93.      63.      57.      56.      53.      53.      36.      32.      32.
                                  HEC-1 INPUT                                              PAGE  9

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

UI       32.      20.      10.      10.      10.      10.      10.      10.      10.      10.
UI       10.      10.      10.      10.      10.       0.       0.       0.       0.       0.
UI        0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

KK     1I122
```

```
            369          KM       ADD HYDROGRAPHS AT CP122
            370          HC        3     4.1

            371          KK    CP122
            372          KM       ADD HYDROGRAPHS AT CP122
            373          HC        2     7.89
            374          ZZ
1
                  SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE       (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  48      101
            .
            .
  55        .        102A
            .           .
            .           .
  63    CP101............
            V
            V
  66     R101
            .
            .
  72        .         102
            .           .
            .           .
  80    CP102............
            V
            V
  83     R102
            .
            .
  89        .         108
            .           .
            .           .
 100    1I108............
            .
            .
 103        .         103
            .           V
            .           V
 112        .        R103
            .           .
            .           .
 118    CP108............
            V
            V
 121     R108
            .
            .
 127        .         106
            .           V
            .           V
 135        .        R106
            .           .
            .           .
 141        .           .         107
            .           .           .
            .           .           .
 151        .       CP107............
            .           V
            .           V
 154        .        R107
            .           .
            .           .
 160        .           .         115
            .           .           .
            .           .           .
 170        .       1I115............
            .           .
            .           .
 173    2I115............
            .
            .
 176        .         111
            .           .
            .           .
 187        .           .------->   DI119
 185        .        D111
            .           V
            .           V
 190        .        R111
            .           .
            .           .
 196        .           .         104
            .           .           V
            .           .           V
 203        .           .        R104
            .           .           .
            .           .           .
 209        .           .           .         112
            .           .           .           .
            .           .           .           .
 220        .           .       1I112............
            .           .           .
            .           .           .
 223        .       2I112............
```

```
              .           .
226           .           .         105
              .           .           V
              .           .           V
233           .           .        R105
              .           .           .
              .           .           .
239           .       CP112............
              .           .
              .           .
244           .           .------->   DI120
242           .        D112
              .           .
              .           .
249           .           .------->  1D121A
247           .        D112
              .           V
              .           V
252           .        R112
              .           .
              .           .
258           .           .        113A
              .           .           .
              .           .           .
268           .      CP113A............
              .           .
              .           .
273           .           .------->  2D121A
271           .       D113A
              .           V
              .           V
276           .       R113A
              .           .
              .           .
282           .           .         113
              .           .           .
              .           .           .
292           .       CP113............
              .           .
              .           .
297           .           .------->   1D122
295           .        D113
              .           V
              .           V
300           .        R113
              .           .
              .           .
306           .           .         114
              .           .           .
              .           .           .
316           .       CP114............
              .           .
              .           .
321           .           .------->   2D122
319           .        D114
              .           V
              .           V
324           .        R114
              .           .
              .           .
330        CP115............
              V
              V
333         R115
              .
              .
341           .           .<-------   1D122
339           .        D113
              .           V
              .           V
342           .        R113
              .           .
              .           .
350           .           .           .<-------   2D122
348           .           .        D114
              .           .           V
              .           .           V
351           .           .        R114
              .           .           .
              .           .           .
357           .           .           .        122
              .           .           .          .
              .           .           .          .
368           .       1I122.......................
              .           .
              .           .
371        CP122............

1
31 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                     NMIN           5  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1   0  STARTING DATE
                     ITIME       0000  STARTING TIME
```

```
     NQ          300  NUMBER OF HYDROGRAPH ORDINATES
 NDDATE        2   0  ENDING DATE
 NDTIME         0055  ENDING TIME
 ICENT            19  CENTURY MARK

COMPUTATION INTERVAL     .08 HOURS
     TOTAL TIME BASE   24.92 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
```

1

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	101	233.	12.25	22.	5.	5.	.16		
+	HYDROGRAPH AT	102A	525.	12.58	73.	18.	18.	.51		
+	2 COMBINED AT	CP101	635.	12.50	95.	24.	23.	.67		
+	ROUTED TO	R101	629.	12.50	95.	24.	23.	.67		
+	HYDROGRAPH AT	102	135.	12.42	17.	4.	4.	.10		
+	2 COMBINED AT	CP102	753.	12.50	112.	28.	27.	.77		
+	ROUTED TO	R102	763.	12.58	112.	28.	27.	.77		
+	HYDROGRAPH AT	108	478.	13.25	117.	29.	28.	.79		
+	2 COMBINED AT	1I108	999.	12.58	228.	57.	55.	1.56		
+	HYDROGRAPH AT	103	286.	12.92	55.	14.	13.	.37		
+	ROUTED TO	R103	267.	13.08	55.	14.	13.	.37		
+	2 COMBINED AT	CP108	1158.	12.75	283.	71.	68.	1.93		
+	ROUTED TO	R108	1123.	13.25	283.	71.	68.	1.93		
+	HYDROGRAPH AT	106	871.	12.50	111.	28.	27.	.77		
+	ROUTED TO	R106	778.	12.67	111.	28.	27.	.77		
+	HYDROGRAPH AT	107	398.	13.08	88.	22.	21.	.60		
+	2 COMBINED AT	CP107	1044.	12.75	199.	50.	48.	1.37		
+	ROUTED TO	R107	948.	13.17	199.	50.	48.	1.37		
+	HYDROGRAPH AT	115	379.	13.08	89.	22.	22.	.49		
+	2 COMBINED AT	1I115	1313.	13.17	288.	72.	69.	1.86		
+	2 COMBINED AT	2I115	2429.	13.17	570.	143.	137.	3.79		
+	HYDROGRAPH AT	111	443.	12.67	71.	18.	17.	.50		
+	DIVERSION TO	DI119	166.	12.67	26.	7.	6.	.50		
+	HYDROGRAPH AT	D111	276.	12.67	45.	11.	11.	.50		
+	ROUTED TO	R111	232.	13.33	45.	11.	11.	.50		

+	HYDROGRAPH AT	104	236.	12.17	20.	5.	5.	.15
+	ROUTED TO	R104	89.	14.67	20.	5.	5.	.15
+	HYDROGRAPH AT	112	534.	13.33	138.	34.	33.	.97
+	2 COMBINED AT	1I112	534.	13.33	157.	40.	38.	1.12
+	2 COMBINED AT	2I112	765.	13.33	202.	51.	49.	1.62
+	HYDROGRAPH AT	105	354.	12.25	34.	9.	8.	.21
+	ROUTED TO	R105	316.	12.42	34.	9.	8.	.21
+	2 COMBINED AT	CP112	790.	13.33	236.	59.	57.	1.83
+	DIVERSION TO	DI120	263.	13.33	79.	20.	19.	1.83
+	HYDROGRAPH AT	D112	527.	13.33	158.	40.	38.	1.83
+	DIVERSION TO	1D121A	263.	13.33	79.	20.	19.	1.83
+	HYDROGRAPH AT	D112	264.	13.33	79.	20.	19.	1.83
+	ROUTED TO	R112	241.	13.75	79.	20.	19.	1.83
+	HYDROGRAPH AT	113A	409.	13.08	106.	27.	26.	.50
+	2 COMBINED AT	CP113A	560.	13.08	183.	46.	45.	2.33
+	DIVERSION TO	2D121A	58.	13.08	9.	2.	2.	2.33
+	HYDROGRAPH AT	D113A	502.	13.08	174.	44.	42.	2.33
+	ROUTED TO	R113A	444.	15.00	173.	44.	42.	2.33
+	HYDROGRAPH AT	113	431.	13.08	117.	29.	28.	.50
+	2 COMBINED AT	CP113	556.	13.08	284.	73.	71.	2.83
+	DIVERSION TO	1D122	442.	13.08	226.	58.	56.	2.83
+	HYDROGRAPH AT	D113	114.	13.08	58.	15.	14.	2.83
+	ROUTED TO	R113	106.	13.50	58.	15.	14.	2.83
+	HYDROGRAPH AT	114	326.	13.00	84.	21.	20.	.38
+	2 COMBINED AT	CP114	376.	13.08	140.	36.	35.	3.21
+	DIVERSION TO	2D122	96.	13.08	20.	5.	5.	3.21
+	HYDROGRAPH AT	D114	280.	13.08	120.	31.	30.	3.21
+	ROUTED TO	R114	278.	13.17	119.	31.	30.	3.21
+	2 COMBINED AT	CP115	2705.	13.17	688.	173.	167.	7.00
+	ROUTED TO	R115	2541.	13.67	686.	173.	167.	7.00
+	HYDROGRAPH AT	D113	442.	13.08	226.	58.	56.	2.83
+	ROUTED TO	R113	393.	14.50	220.	58.	56.	2.83
+	HYDROGRAPH AT	D114	96.	13.08	20.	5.	5.	3.21

+	ROUTED TO	R114	74.	15.08	20.	5.	5.	3.21
+	HYDROGRAPH AT	122	552.	13.33	146.	37.	35.	.89
+	3 COMBINED AT	1I122	571.	14.33	357.	99.	96.	4.10
+	2 COMBINED AT	CP122	2976.	13.58	1041.	273.	263.	7.89

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

APPENDIX D: LOMR HYDROLOGY

1. Table D1: Rainfall Loss and S-Graph Parameters for HEC-1 Model (13688LMR)
2. MCUHP2 Output
3. Routing Parameters for HEC-1 Model (13688LMR)
4. Retention Basin Summary Tables D2, D3
5. Diversion Operations along Bell Road
6. HEC-1 Model Output (13688LMR)

TABLE D1
SUN CITY GRAND REEMS ROAD FLOODPLAIN LOMR
RAINFALL LOSS AND S-GRAPH PARAMETERS FOR HEC-1 MODELS

SUB-BASIN	LAND USE	LAND USE %	IA (IN)	DTHETA	PSIF (IN)	XKSAT (IN/HR)	VEG COVER %	CK	ADJ XKSAT	RTIMP %	Kn
102	PRE-DEV	55	0.50	0.00	6.05	0.17	90	1.7	0.29	0.0	0.12
102	GOLF	10	0.50	0.25	6.05	0.17	50	1.5	0.26	0.0	0.08
102	SINGLE FAM	35	0.25	0.25	6.05	0.17	40	1.4	0.24	30.0	0.05
102	WEIGHTED		0.41	0.11	6.05				0.27	10.5	0.09
103	PRE-DEV	5	0.46	0.09	4.33	0.22	70	1.3	0.29	0.0	0.12
103	GOLF	15	0.50	0.25	4.33	0.22	50	1.5	0.33	0.0	0.08
103	SINGLE FAM	80	0.25	0.25	4.33	0.22	40	1.4	0.31	30.0	0.05
103	WEIGHTED		0.3	0.24	4.33				0.31	24.0	0.06
107	PRE-DEV	17	0.46	0.08	5.65	0.18	70	1.3	0.23	0.0	0.12
107	GOLF	15	0.50	0.25	5.65	0.18	50	1.5	0.27	0.0	0.08
107	SINGLE FAM	68	0.25	0.25	5.65	0.18	40	1.4	0.25	30.0	0.05
107	WEIGHTED		0.32	0.22	5.65				0.25	20.4	0.07
108	PRE-DEV	40	0.44	0.12	5.53	0.18	0	1.0	0.18	0.0	0.12
108	GOLF	20	0.50	0.25	5.53	0.18	50	1.5	0.27	0.0	0.08
108	SINGLE FAM	40	0.25	0.25	5.53	0.18	40	1.4	0.25	30.0	0.05
108	WEIGHTED		0.38	0.20	5.53				0.23	12.0	0.08
113	PRE-DEV	0	0.50	0.00	8.54	0.06	0	1.0	0.06	0.0	0.12
113	GOLF	15	0.50	0.15	8.54	0.06	50	1.5	0.09	0.0	0.08
113	SINGLE FAM	85	0.25	0.15	8.54	0.06	40	1.4	0.08	30.0	0.05
113	WEIGHTED		0.29	0.15	8.54				0.08	25.5	0.05
114	PRE-DEV	0	0.50	0.00	8.35	0.05	0	1.0	0.05	0.0	0.12
114	GOLF	20	0.50	0.15	8.35	0.05	50	1.5	0.08	0.0	0.08
114	SINGLE FAM	80	0.25	0.15	8.35	0.05	40	1.4	0.07	30.0	0.05
114	WEIGHTED		0.3	0.15	8.35				0.07	24.0	0.06
115	PRE-DEV	20	0.50	0.00	7.04	0.12	0	1.0	0.12	0.0	0.12
115	GOLF	10	0.50	0.20	7.04	0.12	50	1.5	0.18	0.0	0.08
115	SINGLE FAM	70	0.25	0.20	7.04	0.12	40	1.4	0.17	30.0	0.05
115	WEIGHTED		0.33	0.16	7.04				0.16	21.0	0.07

NOTES:
1. IA VALUES FOR PRE-DEV FROM WTADMS.24; ALL OTHERS FROM TABLE 4.2a.
2. DTHETA PRE-DEV VALUES FROM WTADMS.24; ALL OTHERS CALCULATED FROM TABLE 4.2 CORRESPONDING TO PSIF (ASSUMING NORMAL).
3. ALL PSIF VALUES FROM WTADMS.24.
4. XKSAT VALUES FOR PRE-DEV FROM WTADMS.24; ALL OTHERS CALCULATED FROM TABLE 4.2 CORRESPONDING TO PSIF. PRE-DEV VALUES ARE BARE GROUND IN SUB-BASINS 108, 113, 114 AND 115.
5. % VEG COVER AND RTIMP VALUES FROM TABLE 4.2a.
6. CK VALUES FROM FIGURE 4.4.
7. Kn VALUES FROM APPENDIX K.

```
ID
ID       DEL WEBB SUN CITY GRAND REEMS ROAD FLOODLAIN LOMR/LOMA HYDROLOGY
ID
ID       STANLEY CONSULTANTS, INC.
ID       2929 E. CAMELBACK RD.  SUITE 130
ID       PHOENIX, ARIZONA   85016
ID       PHONE: (602)912-6500     FAX: (602)912-6599
ID
ID       SCI PROJECT # 13688      HEC-1 INPUT FILENAME: LMR.MCU
ID
ID       OUTPUT FROM COUNTY MCUHP2
ID       USE PARAMETERS FROM ORGINAL WLB'S ADMS REPORT AND TABLE D1
ID
ID       FILE:  C:\MYFILES\HEC1\REEMS\LOMR\LMR.MCU
IT      5                      300
IO      3
KK
KM BASIN 102
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=       .4  Lca=       .2   S=   21.4  Kn= .090  LAG=  25.3
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   .10
IN   15
KM RAINFALL DEPTH OF 4.03 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
KM AN AREAL REDUCTION COEFFICIENT OF 1.000 WAS USED
PB 4.030
KM THE FOLLOWING PC RECORD USED A 24-HOUR SCS TYPE II RAINFALL
PC  .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
PC  .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
PC  .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
PC  .110    .115    .120    .126    .135    .142    .150    .158    .166    .175
PC  .184    .195    .208    .224    .243    .266    .318    .479    .678    .716
PC  .743    .764    .781    .795    .808    .818    .828    .837    .844    .851
PC  .858    .865    .871    .877    .883    .889    .895    .900    .905    .910
PC  .915    .919    .923    .927    .931    .935    .939    .943    .947    .951
PC  .954    .957    .960    .963    .966    .969    .972    .975    .978    .981
PC  .984    .987    .990    .993    .996    .999   1.000
LG   .41     .11    6.05     .27   10.50
UI   13.     44.     72.     96.    151.    132.     97.     70.     41.     23.
UI   15.      7.      4.      4.      4.      0.      0.      0.      0.      0.
UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
KK
KM BASIN 103
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=      1.2  Lca=       .6   S=   33.9  Kn= .060  LAG=  39.4
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   .37
LG   .30     .24    4.33     .31   24.00
UI   32.     45.    119.    159.    190.    231.    308.    393.    316.    259.
UI  212.    172.    137.     81.     55.     48.     32.     23.     10.     10.
UI   10.     10.     10.      0.      0.      0.      0.      0.      0.      0.
UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
KK
KM BASIN 107
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=      1.5  Lca=       .6   S=   27.7  Kn= .070  LAG=  52.8
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   .60
LG   .32     .22    5.65     .25   20.40
UI   38.     38.     88.    149.    186.    215.    244.    285.    344.    460.
UI  462.    374.    322.    282.    240.    205.    176.    128.     82.     66.
UI   63.     43.     38.     28.     12.     12.     12.     12.     12.     12.
UI   12.      0.      0.      0.      0.      0.      0.      0.      0.      0.
UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
KK
KM BASIN 108
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=      1.9  Lca=       .9   S=   27.6  Kn= .080  LAG=  75.4
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   .79
LG   .38     .20    5.53     .23   12.00
UI   35.     35.     35.     78.    125.    151.    173.    193.    209.    230.
UI  258.    284.    340.    418.    459.    390.    340.    307.    281.    253.
UI  225.    205.    180.    166.    136.    101.     69.     62.     59.     58.
UI   41.     35.     35.     28.     11.     11.     11.     11.     11.     11.
UI   11.     11.     11.     11.     11.      0.      0.      0.      0.      0.
UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
KK
KM BASIN 113
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=      1.1  Lca=       .6   S=   30.4  Kn= .050  LAG=  31.5
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   .50
LG   .29     .15    8.54     .08   25.50
UI   53.    124.    244.    315.    400.    594.    594.    448.    350.    270.
UI  175.     93.     76.     53.     20.     16.     16.     16.      0.      0.
UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
KK
KM BASIN 114
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=      1.1  Lca=       .5   S=   29.6  Kn= .060  LAG=  37.0
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   .38
LG   .30     .15    8.35     .07   24.00
UI   35.     58.    137.    181.    220.    273.    392.    399.    307.    252.
UI  202.    159.    102.     60.     53.     35.     24.     11.     11.     11.
UI   11.     11.      0.      0.      0.      0.      0.      0.      0.      0.
UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
KK
KM BASIN 115
```

```
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=       1.1  Lca=       .6   S=   28.6  Kn= .070  LAG=  44.6
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   .49
LG   .33     .16     7.04     .16    21.00
UI   37.     37.     123.    168.    203.    237.    283.    376.    464.    379.
UI  315.    268.     223.    183.    141.     86.     64.     59.     37.     36.
UI   11.     11.      11.     11.     11.     11.      0.      0.      0.      0.
UI    0.      0.       0.      0.      0.      0.      0.      0.      0.      0.
ZZ
```

Routing Parameters for HEC-1 (13688LMR)

STANLEY CONSULTANTS

Project No. 13688.02.00-LMR23 Page No.

Subject

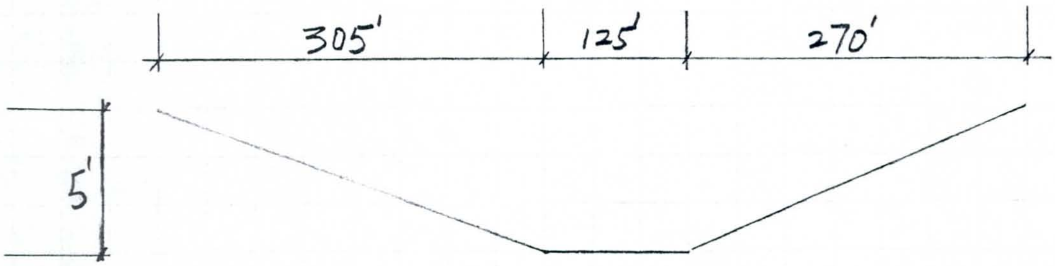
Computed by MFG Date 2/20/98

Checked by Date

Approved by Date

Sheet No. 1 of 8

R102 – Through golf course in 108



$n = 0.05$
$S = 0.0042$

$Q = 725$ cfs

Using normal depth from Manning's Eq

$d = 1.6'$

$A = 347.2 \text{ ft}^2$

$V = Q/A = 2$ fps

NSTPS = L / V / NMIN

= 9000 / 2 / (5×60)

= 15

STANLEY CONSULTANTS

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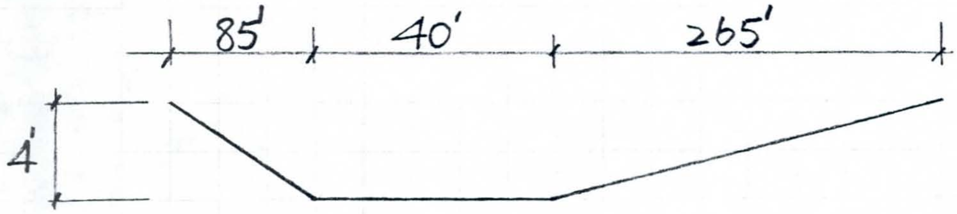
Sheet No. 2 of 8

R106 — through Golf course in 107



$n = 0.05$

$S = 0.0031$

$Q = 871$ cfs

Using normal depth from Manning's Eq.

$d = 2.6'$

$A = 400\ ft^2$

$V = Q/A = 2.2$ fps

$NSTPS = L / V / NMIN$

$= 6800 / 2.2 / (5 \times 60)$

$= 10$

SC 3004R3 795

STANLEY CONSULTANTS

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Subject

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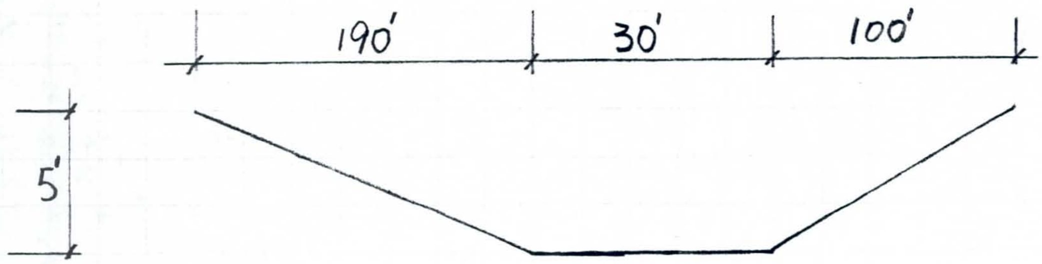
Sheet No. 3 of 8

R107 – Through golf Course in 115



$n = 0.05$
$S = 0.0028$

$Q = 710$ cfs

Using normal depth from Manning's Eq.

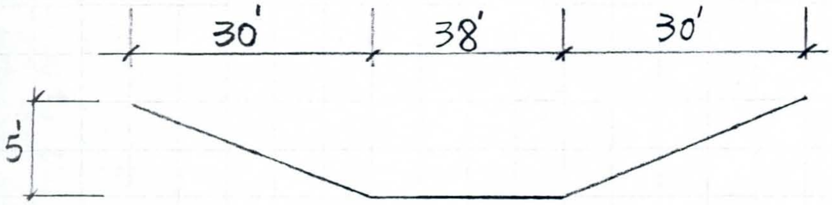
$d = 2.86'$

$A = 323 \text{ ft}^2$

$V = Q/A = 2.2$ fps

$NSTPS = L / V / NMIN$
$= 7000 / 2.2 / (5 \times 60)$
$= 11$

R113 – through golf course in 114 along Bell Rd.



n = 0.05
S = 0.0038

Q = 500 cfs

Using normal depth from Manning's Eq.

d = 2.9'

A = 160.66 ft²

V = Q/A = 3.11 fps

NSTPS = L / V / NMIN

= 2100 / 3.11 / (5×60)

= 2

STANLEY CONSULTANTS

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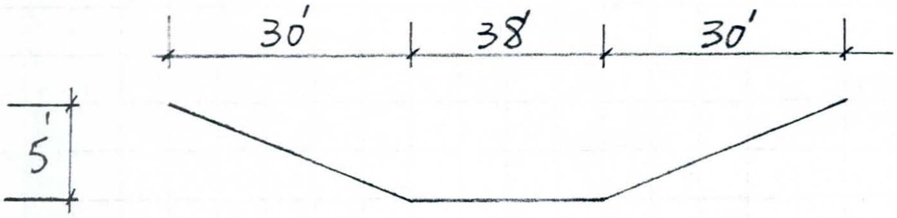
R114 - through golf course in 115 along Bell Rd



$n = 0.05$

$S = 0.0034$

$Q = 55$ cfs

Using normal depth from Manning's Eq.

$d = 0.87'$

$A = 37.6 \text{ ft}^2$

$V = Q/A = 1.46$ fps

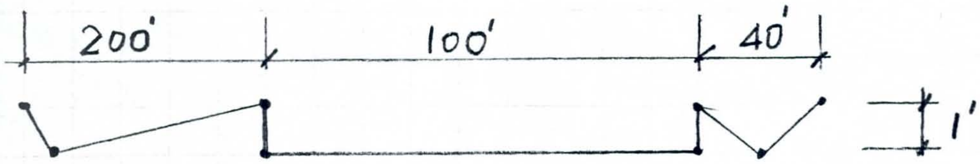
$NSTPS = L / V / NMIN$

$= 2652 / 1.46 / (5 \times 60)$

$= 6$

SC 3004R3 795

R113A - routing along Bell Rd right-of-way



USE Average $n = 0.035$

$S = 0.0032$

$Q = 558$ cfs

Assume $d = 1.3'$

$A = (0.3 \times (200+100+40)) + (200 \times 1 \times 0.5) + (100 \times 1) + (40 \times 1 \times 0.5)$

$= 322\ ft^2$

$P = 340$ ft

$R = A/P = 0.947$ ft

$Q = \left(\frac{1.49}{0.035}\right) \times (322) \times (.947)^{2/3} \times (0.0032)^{1/2} = 748$ cfs

So use $d = 1.3'$

$V = 748/322 = 2.3$ fps

NSTPS = L/V/NMIN

$= 5280/2.3/(5 \times 60)$

$= 8$

STANLEY CONSULTANTS

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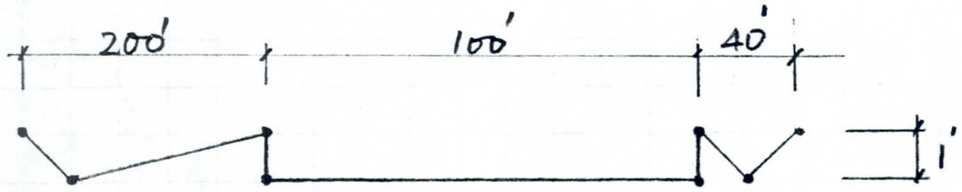
Sheet No. 7 of 8

R113 – routing along Bell Rd right-of-way



USE AVERAGE $n = 0.035$

$S = 0.0038$

$Q = 203$ cfs

Assume $d = 1'$

$A = (1 \times 200 \times 0.5) + (100 \times 1) + (1 \times 40 \times 0.5)$

$= 220\ ft^2$

$P = 340$ ft

$R = A/P = 0.647$ ft

$Q = \left(\frac{1.49}{0.035}\right) \times (220) \times (0.647)^{2/3} \times (0.0038)^{1/2} = 432$ cfs

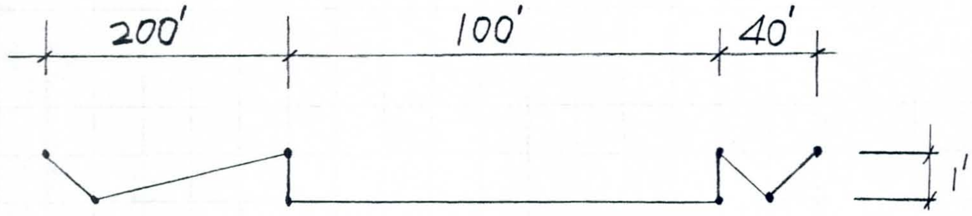
So use $d = 1'$

$V = Q/A = 432/220 = 2.0$ fps

$NSTPS = 2100/2/(5 \times 60)$

$= 4$

R114 – routing along Bell Rd right-of-way



USE AVERAGE $n = 0.035$

$S = 0.0034$

$Q = 200$ cfs

Assume $d = 1'$

$A = (1 \times 200 \times 0.5) + (100 \times 1) + (1 \times 40 \times 0.5)$

$= 220 \text{ ft}^2$

$P = 340$ ft

$R = A/P = 0.647$ ft

$Q = \left(\frac{1.49}{0.035}\right) \times (220) \times (0.647)^{2/3} \times (0.0034)^{1/2} = 408$ cfs

So use $d = 1'$

$V = Q/A = 408/220 = 1.85$ fps

NSTPS = L/V/NMIN

$= 2652/1.85/(5 \times 60)$

$= 5$

Retention Basin Summary

TABLE D-2
SUN CITY GRAND PHASE 1
RETENTION BASIN SUMMARY
(Refer to HEC-1 Files 13688H1A and PH1RET)

	Retention Basin Operation	Located in ADMS Sub-basin	Depth (Ft) @ Spillway Elevation	Volume (AC FT) @ Spillway Elevation
1	DT114	107	2.1	4.66
2	DT112	107	3.6	10.03
3	DT115A	107	2.6	7.58
4	DT115B	107	3.8	3.48
5	DT101	103	4.6	10.95
6	DT102	103	3.6	9.14
7	DT105	108	5.5	8.12
8	DT107A	108	3.1	4.09
9	DT107B	108	2.1	1.58
10	DT104	103	4.1	7.36
11	DT111	107	4.1	15.33
12	DT107	108	4.5	20.07
13	DT108A	103	3.1	7.21
14	DT108B	108	3.1	3.59
15	DT109	108	4.6	27.40
16	DT110	108	6.6	69.23
			Average Depth = 3.8 ft.	Total Volume = 209.82 AC FT
Total Retention Volume in ADMS Sub-Basin 103 = 34.66 AC FT.				
Total Retention Volume in ADMS Sub-Basin 107 = 41.08 AC FT.				
Total Retention Volume in ADMS Sub-Basin 108 = 134.08 AC FT.				

TABLE D-3
SUN CITY GRAND PHASE 2
RETENTION BASIN SUMMARY
(Refer to HEC-1 Files 13688H1B and PH2RET)

	Retention Basin Operation	Located in ADMS Sub-basin	Depth (Ft) @ Spillway Elevation	Volume (AC FT) @ Spillway Elevation
1	DT203A	107	6.4	6.52
2	DT203B	107	4.6	2.21
3	DT205A	107	3.6	5.00
4	DT205B	107	2.6	3.59
5	DT209	107	4.1	15.00
6	DT215A	114	5.5	5.32
7	DT215B	113	5.0	4.61
8	DT224	113	4.0	4.60
9	DT217	113	4.5	4.28
10	DT220A	113	4.5	4.21
11	DT220B	113	7.1	20.87
12	DT49A1	113	2.1	0.67
13	DT49A2	113	1.1	0.26
14	DT49A3	113	1.1	0.44
15	DT249B	114	4.6	4.06
16	1DT230	114	8.5	17.41
17	2DT230	114	7.1	13.94
18	1DT246	114	2.6	6.05
19	DT238B	114	4.0	1.37
20	DT246A	114	3.6	11.18
21	1DT237	115	5.5	6.73
22	2DT237	115	6.5	3.23
23	3DT237	115	6.5	3.61
24	4DT237	115	6.5	3.17
25	5DT237	115	6.0	3.41
26	1DT240	115	7.0	6.31
27	2DT240	115	6.0	3.33
28	3DT240	115	5.5	3.61
29	DT246B	115	8.0	22.35
			Average Depth = 5.0 ft.	Total Volume = 187.34 AC FT
Total Retention Volume in ADMS Sub-Basin 107 = 32.32 AC FT.				
Total Retention Volume in ADMS Sub-Basin 113 = 39.94 AC FT.				
Total Retention Volume in ADMS Sub-Basin 114 = 59.33 AC FT.				
Total Retention Volume in ADMS Sub-Basin 115 = 55.75 AC FT.				

Diversion Operations along Bell Road

Extracted from the Master Drainage Report for Del Webb's Grand Avenue Property

Diversion at SR303L and Bell Road
D113A

STANLEY CONSULTANTS

Job No. 12291-3-700 Page No. ______

Computed by JRM Date 10/8/94

Checked by JRB Date 12/13/94

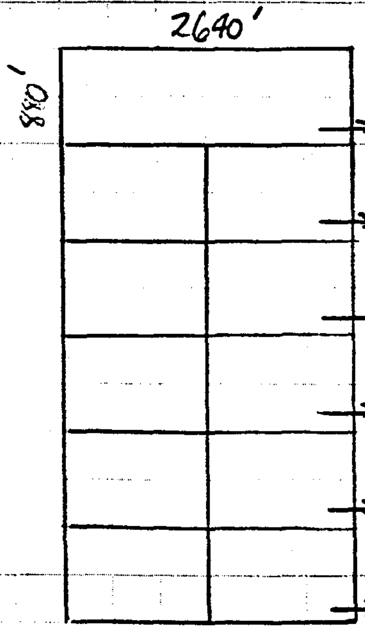
Reviewed by ______ Date ______

Approved by ______ Date ______

Subject FLOW DIVERSION S113A TO S113

Sheet No. ______ of ______

S113A:



CULVERT #	Q (cfs)	
39	16	
37	14	
35	16	
33	15	
31	16	$Q_T = 77$ cfs
969+00	12.4	(FULL FLOW)

TOTAL Q = 89.4 cfs

1D113A
Q=46

2D113A
Q=15

3D113A
Q=28

NOTE: Q_{PEAK} AT CROSS CULVERTS GREATER THAN CAPACITY.

$$Q_{PEAK} = 0.25(2.8)(52) = 36 \text{ cfs}$$

IRRIGATION CHANNELS ASSUMED FULL!

ASSUME:
1. OVERTOPPING CAPACITY OF CROSS-CULVERTS FLOW EAST. REMAINING RUNOFF FLOWS SOUTH.
2. OVERTOPPING ELEVATION DEFINED AS TOP OF IRRIGATION DITCH AND NOT ROADWAY PROFILE.

STANLEY CONSULTANTS

Computed by JRM Date 10/21/94

Checked by ________ Date ________

Reviewed by ________ Date ________

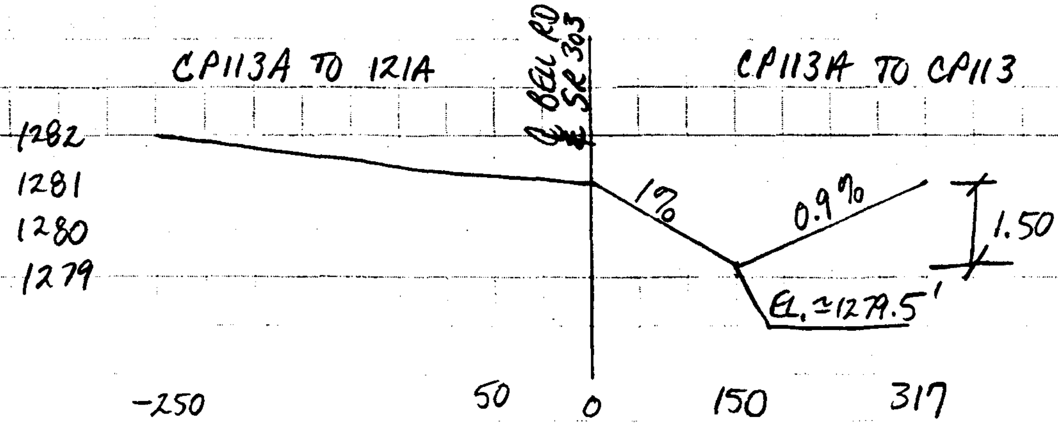
Approved by ________ Date ________

Job No. 12291-3-700 Page No. ________

Subject FLOW DIVERSION

℄ BELL RD. & SR303

Sheet No. ________ of ________



S=0.01 ft/ft
DIVERSION
(WEST)

S=0.002 ft/ft
n=0.025
REMAINDER
(NORTH)

DT 2D113A

DI	0	165	545	642	893	1913
DQ	0	0	0	12	74	467

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: DIVERSION CP113A
Description: CP113A TO CP113
Solve For Discharge
Given Constant Data;
Z-Left............. 111.00
Z-Right............ 110.00
Mannings 'n'....... 0.025
Channel Slope...... 0.0020

VARIABLE COMPUTED COMPUTED

Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity (fps)
111.00	110.00	0.025	0.0020	0.25	4.59	0.66
111.00	110.00	0.025	0.0020	0.50	29.14	1.05
111.00	110.00	0.025	0.0020	0.75	85.92	1.38
111.00	110.00	0.025	0.0020	1.00	185.04	1.67
111.00	110.00	0.025	0.0020	1.25	335.49	1.94
111.00	110.00	0.025	0.0020	1.50	545.55	2.19

Given Constant Data;
Bottom Width....... 317.00
Z-Left............. 111.00
Z-Right............ 0.00
Mannings 'n'....... 0.025
Channel Slope...... 0.0020

VARIABLE COMPUTED COMPUTED

Bottom Width ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity fps
317.00	111.00	0.00	0.025	0.0020	0.25	84.86	1.03
317.00	111.00	0.00	0.025	0.0020	0.50	273.89	1.59
317.00	111.00	0.00	0.025	0.0020	0.75	547.85	2.04
317.00	111.00	0.00	0.025	0.0020	1.00	901.22	2.42

Description: CP113A TO S121A
Given Constant Data;
Z-Left............. 0.00
Z-Right............ 250.00
Mannings 'n'....... 0.025
Channel Slope...... 0.0100

VARIABLE COMPUTED COMPUTED

Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity (fps)
0.00	250.00	0.025	0.0100	0.25	11.58	1.48
0.00	250.00	0.025	0.0100	0.50	73.52	2.35
0.00	250.00	0.025	0.0100	0.75	216.76	3.08
0.00	250.00	0.025	0.0100	1.00	466.81	3.73

Open Channel Flow Module, Version 3.21 (c)

Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

VERTICAL CURVE CALCULATION	LENGTH OF CURVE	- 200		VERT CORR AT PI	-	+0.472
	BACK GRADE IN %	- -1.000		AHEAD GRADE IN %	-	+0.889
	STATION AT PI	- 96975.00		PI TANGENT ELEV	-	1278.98
	LOW STATION	- 96980.85		LOW ELEVATION	-	1279.45

STATION -	ELEV	STATION -	ELEV	STATION -	ELEV
96875.00	-1279.98	96950.00	-1279.50	97025.00	-1279.54
96880.00	-1279.93	96955.00	-1279.48	97030.00	-1279.56
96885.00	-1279.88	96960.00	-1279.47	97035.00	-1279.59
96890.00	-1279.84	96965.00	-1279.46	97040.00	-1279.62
96895.00	-1279.80	96970.00	-1279.46	97045.00	-1279.65
96900.00	-1279.76	96975.00	-1279.45	97050.00	-1279.68
96905.00	-1279.72	96980.00	-1279.45	97055.00	-1279.71
96910.00	-1279.69	96985.00	-1279.45	97060.00	-1279.75
96915.00	-1279.66	96990.00	-1279.45	97065.00	-1279.79
96920.00	-1279.63	96995.00	-1279.46	97070.00	-1279.83
96925.00	-1279.60	97000.00	-1279.47	97075.00	-1279.87
96930.00	-1279.57	97005.00	-1279.48		
96935.00	-1279.55	97010.00	-1279.49		
96940.00	-1279.53	97015.00	-1279.51		
96945.00	-1279.51	97020.00	-1279.52		

<Shift> <Prt Sc> print <Return> repeat <Space Bar> back to menu

4/7

CURRENT DATE: 10-08-1994
CURRENT TIME: 18:46:31

FILE DATE: 10-08-1994
FILE NAME: 96900

FHWA CULVERT ANALYSIS
HY-8, VERSION 4.0

C U L V #	SITE DATA: INLET ELEV. (FT)	OUTLET ELEV. (FT)	CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	1275.50	1274.90	180.00	1 RCP	2.00	2.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (CFS) FILE: 96900 DATE: 10-08-1994

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1279.00	0	0	0	0	0	0	0	0	1
1279.03	5	2	0	0	0	0	0	3	14
1279.05	10	3	0	0	0	0	0	7	11
1279.07	15	4	0	0	0	0	0	11	9
1279.09	20	4	0	0	0	0	0	16	7
1279.11	25	5	0	0	0	0	0	20	7
1279.12	30	5	0	0	0	0	0	25	6
1279.14	35	5	0	0	0	0	0	30	6
1279.15	40	5	0	0	0	0	0	34	5
1279.16	45	6	0	0	0	0	0	39	5
1279.18	50	6	0	0	0	0	0	44	5
1279.00	0	0	0	0	0	0	0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: 96900 DATE: 10-08-1994

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
1279.00	0.00	0	0	0.00
1279.03	-0.00	5	0	0.54
1279.05	-0.00	10	0	0.89
1279.07	-0.00	15	0	0.78
1279.09	-0.00	20	0	0.97
1279.11	-0.00	25	0	0.71
1279.12	-0.00	30	0	0.64
1279.14	-0.00	35	0	0.57
1279.15	-0.00	40	0	0.82
1279.16	-0.00	45	0	0.62
1279.18	-0.00	50	0	0.58

<1> TOLERANCE (FT) = 0.010 <2> TOLERANCE (%) = 1.000

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CURRENT DATE: 10-08-1994
FILE DATE: 10-08-1994
'''RRENT TIME: 18:46:31
FILE NAME: 96900

PERFORMANCE CURVE FOR CULVERT # 1 - 1 (2 BY 2) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRITICAL DEPTH (ft)	OUTLET VEL. (fps)	OUTLET DEPTH (ft)	TAILWATER VEL. (fps)	TAILWATER DEPTH (ft)
0	1279.00	0.00	3.50	0-NF	0.00	0.00	0.00	0.00	0.00	4.10
2	1279.02	0.64	3.52	4-FFt	0.53	0.51	0.71	2.00	0.00	4.10
3	1279.04	0.78	3.54	4-FFt	0.62	0.60	0.95	2.00	0.00	4.10
4	1279.07	0.90	3.57	4-FFt	0.69	0.67	1.18	2.00	0.00	4.10
4	1279.09	0.98	3.59	4-FFt	0.75	0.72	1.35	2.00	0.00	4.10
5	1279.11	1.05	3.61	4-FFt	0.79	0.75	1.48	2.00	0.00	4.10
5	1279.12	1.09	3.62	4-FFt	0.82	0.78	1.59	2.00	0.00	4.10
5	1279.13	1.12	3.63	4-FFt	0.84	0.80	1.65	2.00	0.00	4.10
5	1279.14	1.15	3.64	4-FFt	0.85	0.82	1.72	2.00	0.00	4.10
6	1279.16	1.19	3.66	4-FFt	0.88	0.84	1.82	2.00	0.00	4.10
6	1279.17	1.22	3.67	4-FFt	0.90	0.86	1.89	2.00	0.00	4.10

El. inlet face invert 1275.50 ft El. outlet invert 1274.90 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **************

INLET STATION (FT)	0.00
INLET ELEVATION (FT)	1275.50
OUTLET STATION (FT)	180.00
OUTLET ELEVATION (FT)	1274.90
NUMBER OF BARRELS	1
SLOPE (V-FT/H-FT)	0.0033
CULVERT LENGTH ALONG SLOPE (FT)	180.00

***** CULVERT DATA SUMMARY ************************

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	2.00 FT
BARREL MATERIAL	CONCRETE
BARREL MANNING'S N	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	BEVELED EDGE (1:1)
INLET DEPRESSION	NONE

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CURRENT DATE: 10-08-1994 FILE DATE: 10-08-1994
CURRENT TIME: 18:46:31 FILE NAME: 96900

TAILWATER

CONSTANT WATER SURFACE ELEVATION
1279.00

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH (FT)	180.00
CREST LENGTH (FT)	200.00
OVERTOPPING CREST ELEVATION (FT)	1279.00

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Diversion at Sarival Avenue and Bell Road
D113

DESIGNED BY VRM	DATE 11-19-94	SHEET NO.		PAGE NO.	
CHECKED BY JRB	DATE 12/13/94	OF		JOB NO. 12291	
REVIEWED BY	DATE	SUBJECT: DIVERSION TABLE			
APPROVED BY	DATE	CP113			

DT 1D122

DI	0	105	354	622	1153	1882
DQ	0	0	195	395	845	1480

DESIGNED BY JRM	DATE 11-19-94	SHEET NO.		PAGE NO.	
CHECKED BY	DATE	OF		JOB NO.	
REVIEWED BY	DATE	SUBJECT: DIVERSION TABLE			
APPROVED BY	DATE	CP 113			

STATION	ELEV.	COMMENT
1010	1266	
1035	1265.5	
1059	1266	
1085	1267	
1091	1268	
1430	1269	

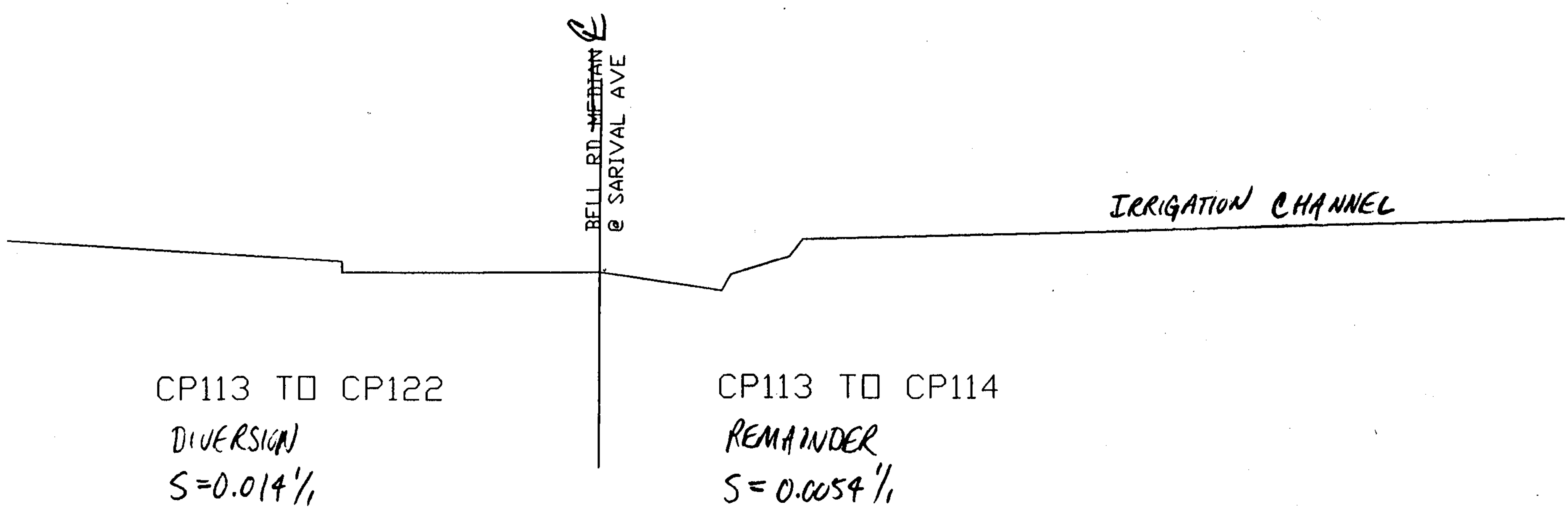
EL. 1266.2 @ ℄ (0.02%, FOR 10')
EL. 1265.1 @ FACE OF CURB (0.02' FOR 55')

$S = 0.014 = \frac{1}{70}$ TO CP122

$S = \frac{2}{370} = 0.0054\%$ (ALONG ROAD) TO CP114

Q = 106

SC 3020


BELL RD MEDIAN ℄
@ SARIVAL AVE
IRRIGATION CHANNEL
CP113 TO CP122
DIVERSION
S=0.014'/1
CP113 TO CP114
REMAINDER
S=0.0054'/1

3/10

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CP113

Description: CP113 TO CP114

Solve For Discharge

Given Constant Data;

Bottom Width.......	13.00
Z-Left.............	12.00
Z-Right............	0.00
Mannings 'n'.......	0.016
Channel Slope......	0.0054

Variable Input Data	Minimum	Maximum	Increment By
Channel Depth	1.00	2.00	0.25

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Bottom Width ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	VARIABLE Channel Depth ft	COMPUTED Channel Discharge cfs	COMPUTED Velocity fps	ELEV.
13.00	12.00	0.00	0.016	0.0054	1.00	105.09	5.53	1266.20
13.00	12.00	0.00	0.016	0.0054	1.25	159.93	6.24	1266.45
13.00	12.00	0.00	0.016	0.0054	1.50	227.23	6.89	1266.70
13.00	12.00	0.00	0.016	0.0054	1.75	307.73	7.48	1266.95
13.00	12.00	0.00	0.016	0.0054	2.00	402.15	8.04	1267.20

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CP113

Comment: CP113 TO CP114

Solve For Discharge

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	0.00:1 (H:V)
Right Side Slope.	50.00:1 (H:V)
Manning's n......	0.016
Channel Slope....	0.0054 ft/ft
Depth...........	1.00 ft

Computed Results:

Discharge........	106.06 cfs
Velocity.........	4.24 fps
Flow Area........	25.00 sf
Flow Top Width...	50.00 ft
Wetted Perimeter.	51.01 ft
Critical Depth...	1.02 ft
Critical Slope...	0.0048 ft/ft
Froude Number....	1.06 (flow is Supercritical)

ROAD CAPACITY CALIBRATION

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CP113

Description: CP113 TO CP122

Solve For Discharge

Given Constant Data;

(INTERSECTION OPENING)

Bottom Width....... 115.00
Z-Left............. 0.00
Z-Right............ 0.00
Mannings 'n'....... 0.016
Channel Slope...... 0.0140

Variable Input Data	Minimum	Maximum	Increment By
Channel Depth	0.25	0.50	0.25

DEPTH	Q	ELEV.
0.25	195	1266.45
0.50	395	1266.70
0.75	845	1266.95
1.00	1480	1267.20

Open Channel Flow Module, Version 3.21 (c)
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

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Bottom Width ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	VARIABLE Channel Depth ft	COMPUTED Channel Discharge cfs	COMPUTED Velocity fps
115.00	0.00	0.00	0.016	0.0140	0.25	125.02	4.35
115.00	0.00	0.00	0.016	0.0140	0.50	395.76	6.88

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CP113

Description: CP113 TO CP122

Solve For Discharge

Given Constant Data;

Bottom Width.......	97.00
Z-Left.............	0.00
Z-Right............	150.00
Mannings 'n'.......	0.016
Channel Slope......	0.0140

Variable Input Data	Minimum	Maximum	Increment By
Channel Depth	0.50	1.00	0.25

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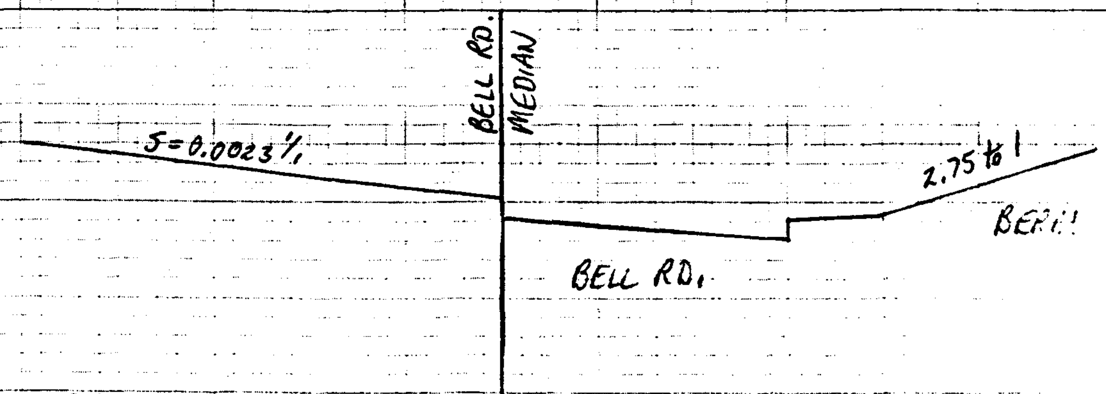
Bottom Width ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	VARIABLE Channel Depth ft	COMPUTED Channel Discharge cfs	COMPUTED Velocity fps
97.00	0.00	150.00	0.016	0.0140	0.50	394.39	5.86
97.00	0.00	150.00	0.016	0.0140	0.75	844.45	7.35
97.00	0.00	150.00	0.016	0.0140	1.00	1480.94	8.61

Diversion at Bell Road Between Sarival Avenue and Reems Road
D114

DESIGNED BY JRM	DATE 11-19-94	SHEET NO. 1	PAGE NO.
CHECKED BY JRB	DATE 12-13-94	OF	JOB NO. 12291
REVIEWED BY	DATE	SUBJECT: DIVERSION TABLE	
APPROVED BY	DATE	BELL RD. 2000'E. SARIVAL AVE.	



BELL ROAD MEDIAN (WEST) DIVERSION WEIR FLOW

2000'E. OF SARIVAL (NORTH) REMAINDER $S=0.0023\%$ (1' C.I. TOPO)

DT 20122

DI	0	235	313	480	717	1056
DQ	0	0	2	81	225	462

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name:

Description: CP114 TO CP115

Solve For Discharge

Given Constant Data;

Bottom Width.......	32.60
Z-Left.............	2.75
Z-Right............	0.00
Mannings 'n'.......	0.016
Channel Slope......	0.0023

Variable Input Data	Minimum	Maximum	Increment By
Channel Depth	1.34	2.34	0.25

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Bottom Width ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	VARIABLE Channel Depth ft	COMPUTED Channel Discharge cfs	COMPUTED Velocity fps
32.60	2.75	0.00	0.016	0.0023	1.34	234.58	5.08
32.60	2.75	0.00	0.016	0.0023	1.59	311.82	5.64
32.60	2.75	0.00	0.016	0.0023	1.84	397.64	6.15
32.60	2.75	0.00	0.016	0.0023	2.09	491.70	6.63
32.60	2.75	0.00	0.016	0.0023	2.34	593.73	7.08

DESIGNED BY	VRM	DATE	11-19-94	SHEET NO.	2	PAGE NO.	
CHECKED BY		DATE		OF		JOB NO.	12291
REVIEWED BY		DATE		SUBJECT:	DIVERSION @ BELL ROAD		
APPROVED BY		DATE			2000' E. OF SARIVAL AVE		

STATION	ELEV.	COMMENT
1057	1258	
1061	1259	
1066	1260	
1079	1266	TOP OF BERM

$S = \frac{1}{440} = 0.0023$ '/'

$S = \frac{1258-1257}{440}$ @ BERM

AVG. BANK SLOPE OF BERM $= \frac{8}{22} = 2.75$ to 1

MEDIAN SLOPE ≈ 0.003 '/' WEST

AREA BELOW MEDIAN CURB $= 58.5$ ft² $W_p = 61.4'$

AREA WITHIN ROADWAY $= 48$ ft² $W_p = 47.2'$

d = TOP OF MEDIAN

$$Q_1 = \frac{1.49}{0.016}(48)\left(\frac{48}{47.2}\right)^{2/3}(0.0023)^{1/2} = 216.8 \text{ cfs}$$

$$Q_2 = \frac{1.49}{0.035}(10.5)\left(\frac{10.5}{14.2}\right)^{2/3}(0.0023)^{1/2} = 17.5 \text{ cfs}$$

(USE TO CALIBRATE TRAP. CHANNEL) $Q_T = 234.3$ cfs

WEIR FLOW OVER MEDIAN: $Q = CLH^{3/2}$ $C = 3.0$

WEIR SLOPE ≈ 0.0023 (ASSUME $d/2$ = AVERAGE DEPTH)

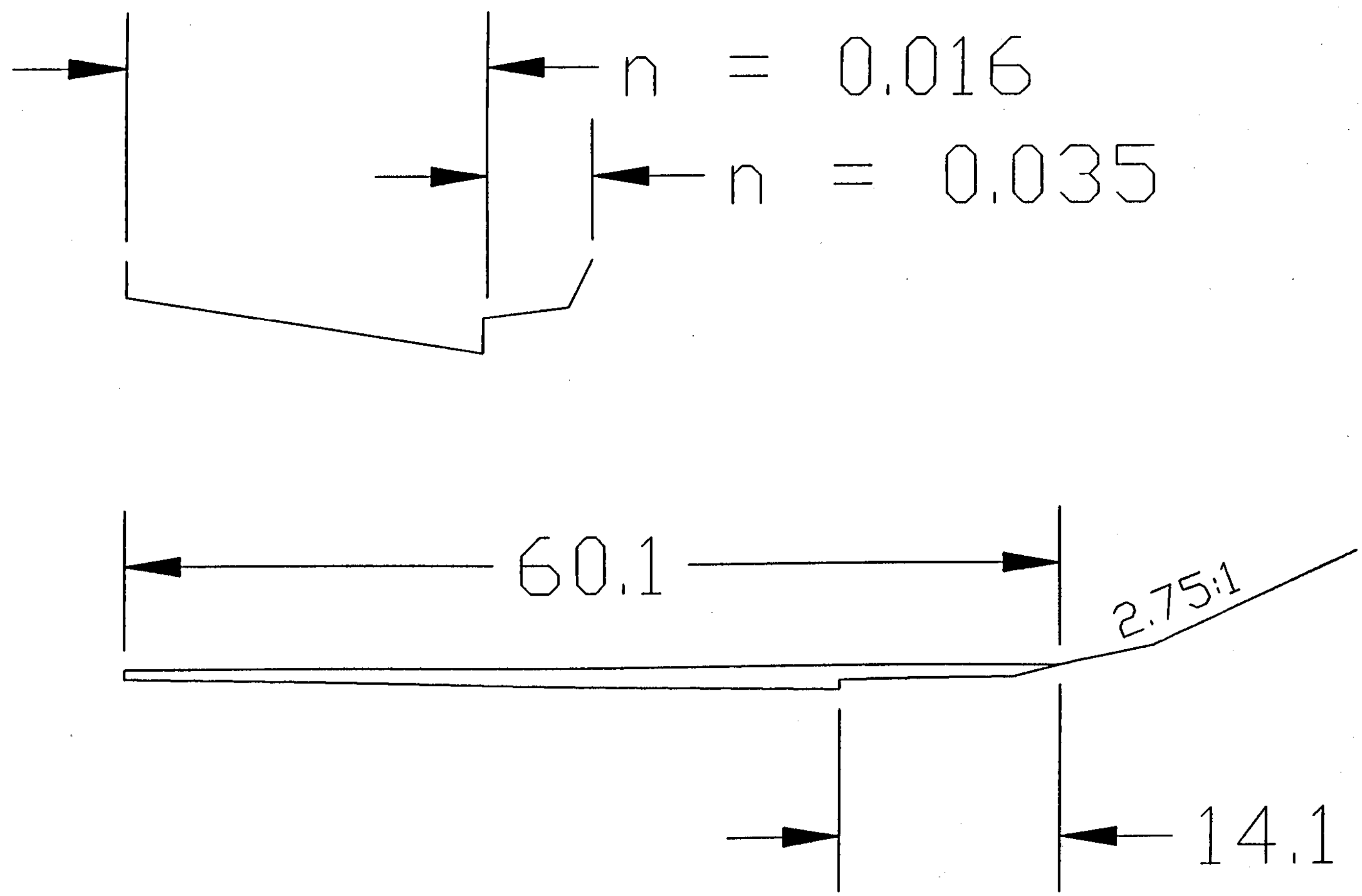
$d = 0.25'$ $Q = 3.0(11)(0.125)^{3/2} = 1.5$ cfs

$d = 0.5'$ $Q = 3.0(217)(0.25)^{3/2} = 81$ cfs

$d = 0.75'$ $Q = 3.0(326)(0.375)^{3/2} = 225$ cfs

$d = 1'$ $Q = 3.0(435)(0.5)^{3/2} = 462$ cfs

SC 3020



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HEC-1 Model (13688LMR)

```
1******************************************
*                                        *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *
*             SEPTEMBER 1990             *
*               VERSION 4.0              *
*                                        *
*  RUN DATE  03/24/1998  TIME  20:27:46  *
*                                        *
******************************************
```

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

            ID
            ID        DEL WEBB SUN CITY GRAND REEMS ROAD FLOODLAIN LOMR HYDROLOGY
            ID
            ID        STANLEY CONSULTANTS, INC.
            ID        2929 E. CAMELBACK RD.  SUITE 130
            ID        PHOENIX, ARIZONA   85016
            ID        PHONE: (602)912-6500      FAX: (602)912-6599
            ID
            ID        SCI PROJECT # 13688       HEC-1 INPUT FILENAME: 13688LMR
            ID                                  MODEL SUMMARY:
            ID                                  ------------------------------
            ID                                  -> MODEL BASED ON FCD/WLB WTADMS.24 MODEL (PHX
            ID                                       VALLEY S-GRAPH, GREEN & AMPT LOSS, 24HR
            ID                                       TYPE II STORM, P=4.03" W/AERIAL REDUCT);
            ID                                       TRUNCATED TO INCLUDE ONLY SUB-BASINS 101
            ID                                       THRU 122, INCLUSIVE
            ID                                  -> BELL RD DIVERTS ADJACENT TO PHASE 2 ARE FROM
            ID                                       STANLEY'S DEL WEBB GRAND AVENUE PROPERTY
            ID                                       MASTER DRAINAGE REPORT EXISTING CONDITION
            ID                                       HEC-1 MODEL E12291.DAT
            ID                                  -> SCG PHASES 1 AND 2 ASSUMED 100% CONSTRUCTED
            ID                                       AND REFLECTED BY MODIFIED LOSS RATE
            ID                                       PARAMETERS AND "S" GRAPHS AND BY CHANGING
            ID                                       THE ONSITE REACH ROUTING CROSS SECTION
            ID                                       GEOMETRY
            ID                                  -> SUMMED DEAD STORAGE VOLUME DIVERT STEPS
            ID                                       REFLECT ONSITE RETENTION
            ID                                  -> OFFSITE FLOWS ALONG BELL RD. KEPT SEPARATE
            ID                                       FROM ONSITE PHASE 2 RUNOFF AND RETENTION
            ID                                  -> CORRECTED REACH ROUTING @ R102 AND R106
            ID        GENERAL MODEL NOTES:
            ID        --------------------
            ID        1. THIS MODEL IS BASED ON THE WHITE TANKS/AGUA FRIA AREA DRAINAGE
            ID           MASTER STUDY MODEL "WTADMS.24" PREPARED BY CONSULTANT "THE WLB GROUP"
            ID           FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY.
            ID        2. THIS MODEL REPRESENTS ONLY THAT PORTION OF THE WTADMS.24 MODEL FROM
            ID           SUB-BASIN 101 THRU SUB-BASIN 122 INCLUSIVE. ALL OTHER HYDROGRAPH
            ID           OPERATIONS FROM THE ORIGINAL MODEL HAVE BEEN DELETED.
            ID        3. SUB-BASINS 100, 100A, 109 AND 116 ARE NOT CONSIDERED BY EITHER THE
            ID           WTADMS.24 MODEL OR THIS MODEL TO CONTRIBUTE RUNOFF TO THE OLD REEMS
            ID           ROAD ALIGNMENT FROM BELL ROAD TO BEARDSLEY ROAD.
            ID        4. ANY OF THE ORIGINAL INPUT RECORD FROM THE WTADMS.24 MODEL THAT WAS
            ID           MODIFIED OR NOT USED BY THIS STANLEY MODEL HAS BEEN RETAINED AS A
            ID           "*  COMMENT". IN MOST CASES, A "NOTE: EXPLANATION" IS FOUND EITHER
            ID           IMMEDIATELEY BEFORE OR AFTER THE REVISED OR UNUSED RECORD.
            ID        5. THE DIVERSION OPERATIONS ALONG BELL ROAD AT CITRUS ROAD AND AT
            ID           COTTON LANE ARE FROM THE ORIGINAL WTADMS.24 MODEL. BELL ROAD
            ID           DIVERSION OPERATIONS AT SR303L, SARIVAL AVENUE AND D114 FROM THE
            ID           ORIGINAL WTADMS.24 MODEL HAVE BEEN REPLACED BY OPERATIONS FROM
            ID           STANLEY'S MASTER DRAINAGE REPORT FOR DEL WEBB'S GRAND AVENUE PROPERTY
            ID           EXISTING CONDITION MODEL E12291.DAT.
            ID        6. SUN CITY GRAND PHASES 1 AND 2, WHICH HAVE BEEN CONSTRUCTED IN SUB-
            ID           BASINS 100, 102, 103, 107, 108, 109, 113, 114, 115 AND 116 ARE
            ID           REFLECTED IN THIS MODEL IN THE FOLLOWING MANNER:
            ID           A. SUB-BASIN BOUNDARIES AND AREAS FROM WTADMS.24 WERE NOT CHANGED;
```



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

            ID              B. INITIAL ABSTRACT AND PERCENT IMPERVIOUS WERE ADJUSTED ON AN AREA-
            ID                 WEIGHTED BASIS TO REFLECT 100% DEVELOPED CONDITIONS; PSIF VALUE
            ID                 HAS NOT BEEN CHANGED BUT DTHETA HAS BEEN ADJUSTED TO CORRESPOND
```

```
 59       ID             TO NORMAL INSTEAD OF SATURATED SOIL CONDITION AND XKSAT VALUES
 60       ID             HAVE BEEN ADJUSTED TO ACCOUNT FOR DEVELOPED CONDITION VEG COVER;
 61       ID          C. PHX VLLY S-GRAPHS FROM THE ORIGINAL WTADMS.24 HAVE BEEN MODIFIED
 62       ID             BY USING MCUHP2 WITH A NEW AREA-WEIGHTED ADJUSTED Kn (L, Lca AND
 63       ID             SLOPE USED IN MCUHP2 HAVE NOT BEEN MODIFIED FROM THE ORIGINAL
 64       ID             WTADMS.24 MODEL);
 65       ID          D. HYDROGRAPH REACH ROUTING STEPS WITHIN SUN CITY GRAND HAVE BEEN
 66       ID             MODIFIED FROM THE ORIGINAL WTADMS.24 MODEL BY UTILIZING A NEW
 67       ID             CROSS SECTION GEOMETRY THAT REFLECTS THE EXISTING GOLF COURSES;
 68       ID          E. THE DEAD STORAGE PORTION OF RETENTION BASIN VOLUME FOR BASINS IN
 69       ID             PHASE 1 AND THE NORTHERN PORTION OF PHASE 2 HAVE BEEN SUMMED AND
 70       ID             MODELED AS SINGLE VOLUME-DIVERTED RETENTION BASINS AT EACH OF THE
 71       ID             TWO CONCENTRATION POINTS ALONG REEMS ROAD AT BEARDSLEY ROAD AND
 72       ID             AT UNION HILLS DRIVE;
 73       ID          F. THE DEAD STORAGE PORTION OF PHASE 2 RETENTION BASIN VOLUME IN
 74       ID             SUB-BASINS 107, 113, 114 AND 115 HAVE BEEN SUMMED AND MODELED AS
 75       ID             SINGLE VOLUME-DIVERTED RETENTION BASINS AT EACH OF THE
 76       ID             CONCENTRATION POINTS CORRESPONDING TO THESE SUB-BASINS;
 77       ID          G. OFFSITE RUNOFF FROM THE WEST THAT CONCENTRATES ALONG BELL RD.
 78       ID             ADJACENT TO PHASE 2 IS MODELED SEPARATE FROM THE ONSITE RUNOFF
 79       ID             AND RETENTION;
 80       ID          H. ONSITE PHASE 2 HYDROGRAPHS CORRESPONDING TO SUB-BASINS 113, 114
 81       ID             AND 115 ARE ROUTED SEPARATE FROM OFFSITE HYDROGRAPHS TO A NEW
 82       ID             ONSITE CONCENTRATION POINT LOCATED AT THE NORTHWEST CORNER OF
 83       ID             BELL ROAD AND REEMS ROAD. THE OUTFLOW FROM THE RETENTION STEP
 84       ID             CORRESPONDING TO THIS NEW CONCENTRATION POINT IS THEN ADDED TO
 85       ID             THE OFFSITE FLOW THAT HAS BEEN ROUTED ALONG BELL ROAD FROM THE
 86       ID             WEST AT A SECOND CONCENTRATION POINT AT THE INTERSECTION OF REEMS
 87       ID             AND BELL. THE SECOND CONCENTRATION POINT CORRESPONDS TO WTADMS.24
 88       ID             CONCENTRATION POINT CP115.
 89       ID       7. APPARENT LENGTH AND SLOPE ERRORS ASSOCIATED WITH REACH ROUTING STEPS
 90       ID          R102 AND R106 FROM THE ORIGINAL WTADMS.24 MODEL HAVE BEEN CORRECTED.
 91       ID
          * ID
          * ID       FINAL HYDROLOGY RUN FOR WHITE TANKS ADMS ---- ENTIRE WATERSHED
          * ID       100-YEAR, 24-HOUR STORM                                 WTADMS.24
          * ID
          *DIAGRAM
 92       IT       5                     300
          * IO     3
          * NOTE: CHANGE OUTPUT SPECIFICATION
 93       IO       5
 94       IN      15
 95       JD    4.03     .001
 96       PC    .000     .002     .005     .008     .011     .014     .017     .020     .023     .026
 97       PC    .029     .032     .035     .038     .041     .044     .048     .052     .056     .060
 98       PC    .064     .068     .072     .076     .080     .085     .090     .095     .100     .105
 99       PC    .110     .115     .120     .126     .133     .140     .147     .155     .163     .172
100       PC    .181     .191     .203     .218     .236     .257     .283     .387     .663     .707
101       PC    .735     .758     .776     .791     .804     .815     .825     .834     .842     .849
102       PC    .856     .863     .869     .875     .881     .887     .893     .898     .903     .908
103       PC    .913     .918     .922     .926     .930     .934     .938     .942     .946     .950
1                                    HEC-1 INPUT                                                        PAGE 3

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

104       PC    .953     .956     .959     .962     .965     .968     .971     .974     .977     .980
105       PC    .983     .986     .989     .992     .995     .998     1.00    1.000    1.000    1.000
106       JD    3.99       10
107       JD    3.83       50
108       JD    3.76      100
109       JD    3.70      200

110       KK     101
111       KM          RUNOFF HYDROGRAPH FROM SUB-BASIN 101.
112       BA     .16
113       LG     .35      .32     3.61      .26      .00
114       UI     22.      76.     121.     165.     258.     205.     150.     106.      54.      34.
115       UI     22.       7.       7.       7.       0.       0.       0.       0.       0.       0.
116       UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

117       KK    102A
118       KM          RUNOFF HYDROGRAPH FROM SUB-SUBIN 102.
          * NOTE: THE ABOVE MESSAGE SHOULD SAY "RUNOFF HYDROGRAPH FROM SUB-BASIN 102A"
119       BA     .51
120       LG     .40      .20     6.05      .21      .00
121       UI     40.      43.     142.     190.     228.     270.     327.     453.     484.     378.
122       UI    319.     263.     218.     176.     114.      71.      66.      44.      40.      15.
123       UI     12.      12.      12.      12.      12.       0.       0.       0.       0.       0.
124       UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

125       KK   CP101
126       KM        ADD HYDROGRAPHS AT CP101
127       HC       2      .67

128       KK    R101
129       KM          ROUTE FLOW FROM CP101 TO CP102.
130       RS       2                -1        0
131       RC    .025     .022     .022     2750    .0062
132       RX    1000     1001     1030     1085     1120     1138     1139     1140
133       RY    1319     1319     1318     1316     1316     1317     1317     1317

134       KK     102
135       KM          RUNOFF FROM SUB-BASIN 102
136       BA     .10
          * LG   .50      .00     6.05      .29      .00
          * NOTE: REVISE ORIG WTADMS.24 LOSS PARAMETERS TO REFLECT SUN CITY GRAND
137       LG     .41      .11     6.05      .27     10.5
          * UI   10.      21.      44.      57.      70.      97.     122.      94.      75.     59.
          * UI   45.      26.      17.      13.      10.       3.       3.       3.       3.      3.
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              * UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * NOTE: REVISE ORIG WTADMS.24 S-GRAPH TO REFLECT SUN CITY GRAND
     138        UI    13.     44.     72.     96.    151.    132.     97.     70.     41.     23.
     139        UI    15.      7.      4.      4.      4.      0.      0.      0.      0.      0.
     140        UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                        HEC-1 INPUT                                              PAGE  4

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


     141        KK   CP102
     142        KM        ADD HYDROGRAPHS AT CP102.
     143        HC       2     .77

     144        KK    R102
     145        KM        ROUTE FLOW FROM CP102 TO CP108
              * RS    36              -1       0
              * RC  .075    .075    .075     702   .0054
              * RX  1000    1001    1120    1700    2030    2630    3070    3270
              * RY  1289    1289    1288    1286    1286    1288    1290    1292
              * NOTE: THERE IS AN APPARENT ERROR IN ROUTING LENGTH IN THE ORIGINAL WTADMS.24
              *       MODEL THAT RESULTS IN A ROUTED DOWNSTREAM PEAK FLOW THAT IS GREATER
              *       THAN THE UPSTREAM PEAK FLOW. REVISE ORIGINAL WTADMS.24 ROUTING LENGTH
              *       OF 702FT WITH CORRECTED LENGTH APPROXIMATED AT 7000FT. ALSO, REVISE
              *       REACH ROUTING CROSS SECTION GEOMETRY TO REFLECT DEVELOPED CONDITIONS.
              *       CONSEQUENTLY, NSTPS ON THE RS RECORD IS ALSO MODIFIED.
     146        RS      15              -1       0
     147        RC    .050    .050    .050    9000   .0042
     148        RX    1000    1183    1244    1305    1430    1484    1538    1700
     149        RY    1299    1296    1295    1294    1294    1295    1296    1299

     150        KK     108
     151        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 108.
     152        BA     .79
              * LG   .44     .12    5.53     .25     .00
              * NOTE: REVISE ORIG WTADMS.24 LOSS PARAMETERS TO REFLECT SUN CITY GRAND
     153        LG     .38     .20    5.53     .23    12.0
              * UI   31.     31.     31.     32.    101.    115.    136.    151.    167.   178.
              * UI  194.    213.    233.    257.    304.    366.    406.    353.    310.   281.
              * UI  259.    240.    217.    197.    181.    163.    148.    132.    108.    88.
              * UI   56.     54.     52.     51.     45.     31.     31.     31.     24.     9.
              * UI    9.      9.      9.      9.      9.      9.      9.      9.      9.     9.
              * UI    9.      0.      0.      0.      0.      0.      0.      0.      0.     0.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.     0.
              * NOTE: REVISE ORIG WTADMS.24 S-GRAPH TO REFLECT SUN CITY GRAND
     154        UI     35.     35.     35.     78.    125.    151.    173.    193.    209.    230.
     155        UI    258.    284.    340.    418.    459.    390.    340.    307.    281.    253.
     156        UI    225.    205.    180.    166.    136.    101.     69.     62.     59.     58.
     157        UI     41.     35.     35.     28.     11.     11.     11.     11.     11.     11.
     158        UI     11.     11.     11.     11.     11.      0.      0.      0.      0.      0.
     159        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

     160        KK   1I108
     161        KM        ADD HYDROGRAPHS AT CP108.
     162        HC       2    1.56

     163        KK     103
     164        KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 103.
     165        BA     .37
              * LG   .46     .09    4.33     .29     .00
              * NOTE: REVISE ORIG WTADMS.24 LOSS PARAMETERS TO REFLECT SUN CITY GRAND
     166        LG     .30     .24    4.33     .31    24.0
              * UI   19.     19.     20.     64.     79.     93.    105.    116.    131.   148.
              * UI  175.    222.    248.    206.    178.    159.    143.    125.    111.    97.
              * UI   84.     64.     45.     34.     32.     32.     19.     19.     19.     6.
              * UI    6.      6.      6.      6.      6.      6.      6.      6.      0.     0.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.     0.
              * NOTE: REVISE ORIG WTADMS.24 S-GRAPH TO REFLECT SUN CITY GRAND
1                                        HEC-1 INPUT                                              PAGE  5

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

     167        UI     32.     45.    119.    159.    190.    231.    308.    393.    316.    259.
     168        UI    212.    172.    137.     81.     55.     48.     32.     23.     10.     10.
     169        UI     10.     10.     10.      0.      0.      0.      0.      0.      0.      0.
     170        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * NOTE: INSERT HYDROGRAPH STEP INTO ORIGINAL WTADMS.24 TO REFLECT RETENTION
              *       STORAGE - SUM OF ALL SUN CITY GRAND DEAD STORAGE RETENTION IN SUB-BASIN
              *       103

     171        KK  103OUT
     172        DT  103RET   34.66
     173        DI       0   10000
     174        DQ       0   10000

     175        KK    R103
              * KM        ROUTE FLOW FROM CP103 TO CP108.
              * NOTE: ROUTE FLOW FROM 103OUT TO CP108
     176        RS       4              -1       0
     177        RC     .08    .022    .035    5380   .0041
     178        RX    1000    1050    1080    1095    1130    1150    1300    1830
     179        RY    1285    1284    1282    1280    1280    1282    1284    1286

     180        KK   CP108
     181        KM        ADD HYDROGRAPHS AT CP108.
     182        HC       2    1.93
              * NOTE: INSERT HYDROGRAPH STEP INTO ORIGINAL WTADMS.24 TO REFLECT RETENTION
              *       STORAGE - SUM OF ALL SUN CITY GRAND DEAD STORAGE RETENTION IN SUB-BASIN
              *       108
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183         KK  108OUT
184         DT  108RET   134.08
185         DI       0    10000
186         DQ       0    10000

187         KK     R108
            * KM     ROUTE FLOW FROM CP108 TO CP115.
            * NOTE: ROUTE FLOW FROM 108OUT TO CP115
188         RS       7               -1        0
189         RC    .035      .035    .075     5382    .0037
190         RX    1000      1001    1002     1030     1100     1370     1900     2290
191         RY    1259      1259    1259     1258     1258     1260     1262     1264

192         KK      106
193         KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 106.
194         BA     .77
195         LG     .35       .29    6.63      .16      .00
196         UI     68.      109.    267.     353.     425.     523.     727.     830.     634.     523.
197         UI    422.      338.    237.     132.     114.      77.      65.      21.      21.      21.
198         UI     21.       21.      0.       0.       0.       0.       0.       0.       0.       0.
199         UI      0.        0.      0.       0.       0.       0.       0.       0.       0.       0.
1                                          HEC-1 INPUT                                                    PAGE 6

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

200         KK     R106
201         KM        ROUTE FLOW FROM CP106 TO CP107
            * RS     3               -1        0
            * RC  .075       .03     .03     5382     .039
            * RX  1000      1430    1860     1890     1940     1960     1969     1970
            * RY  1292      1291    1290   1289.5   1289.5     1290   1290.5   1290.5
            * NOTE: THERE IS AN APPARENT ERROR IN ROUTING SLOPE IN THE ORIGINAL WTADMS.24
            *        REVISE ORIGINAL WTADMS.24 ROUTING SLOPE WITH CORRECTED SLOPE. ALSO,
            *        REVISE REACH ROUTING CROSS SECTION GEOMETRY TO REFLECT DEVELOPED
            *        CONDITIONS. CONSEQUENTLY, NSTPS ON THE RS RECORD IS ALSO MODIFIED.
202         RS      10               -1        0
203         RC     .05       .05     .05     6800    .0031
204         RX    1000      1021    1064     1085     1125     1191     1324     1390
205         RY    1292      1291    1289     1288     1288     1289     1291     1292

206         KK      107
207         KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 107.
208         BA      .60
            * LG   .46       .08    5.65      .29      .00
            * NOTE: REVISE ORIG WTADMS.24 LOSS PARAMETERS TO REFLECT SUN CITY GRAND
209         LG     .32       .22    5.65      .25     20.4
            * UI   26.       26.     26.      53.      91.     109.     125.     141.     152.    167.
            * UI  186.      203.    238.     291.     340.     308.     266.     238.     216.    199.
            * UI  177.      160.    143.     129.     114.      90.      71.      46.      46.     43.
            * UI   43.       27.     26.      26.      19.       8.       8.       8.       8.      8.
            * UI    8.        8.      8.       8.       8.       8.       0.       0.       0.      0.
            * UI    0.        0.      0.       0.       0.       0.       0.       0.       0.      0.
            * NOTE: REVISE ORIG WTADMS.24 S-GRAPH TO REFLECT SUN CITY GRAND
210         UI     38.       38.     88.     149.     186.     215.     244.     285.     344.     460.
211         UI    462.      374.    322.     282.     240.     205.     176.     128.      82.      66.
212         UI     63.       43.     38.      28.      12.      12.      12.      12.      12.      12.
213         UI     12.        0.      0.       0.       0.       0.       0.       0.       0.       0.
214         UI      0.        0.      0.       0.       0.       0.       0.       0.       0.       0.

215         KK   CP107
216         KM        ADD HYDROGRAPHS AT CP107.
217         HC       2      1.37
            * NOTE: INSERT HYDROGRAPH STEP INTO ORIGINAL WTADMS.24 TO REFLECT RETENTION
            *        STORAGE - SUM OF ALL SUN CITY GRAND DEAD STORAGE RETENTION IN SUB-BASIN
            *        107

218         KK  107OUT
219         DT  107RET    72.83
220         DI       0    10000
221         DQ       0    10000

222         KK     R107
223         KM        ROUTE FLOW FROM CP107 TO CP115
            * RS     6               -1        0
            * RC  .035      .035    .075     6240    .0048
            * RX  1000      1001    1002     1030     1100     1370     1900     2290
            * RY  1259      1259    1259     1258     1258     1260     1262     1264
            * NOTE: REVISE REACH ROUTING CROSS SECTION GEOMETRY TO REFLECT DEVELOPED
            *        CONDITIONS. CONSEQUENTLY, NSTPS ON THE RS RECORD IS ALSO MODIFIED.
1                                          HEC-1 INPUT                                                    PAGE 7

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

224         RS      11               -1        0
225         RC    .050      .050    .050     7000    .0028
226         RX    1000      1038    1152     1190     1220     1240     1300     1320
227         RY    1260      1259    1256     1255     1255     1256     1259     1260
            * NOTE: BEGIN NEW SUN CITY GRAND PHASE 2 ONSITE BRANCH IN MODEL

228         KK      113
229         KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 113
230         BA      .50
            * LG   .50       .00    8.54      .11      .00
            * NOTE: REVISE ORIG WTADMS.24 LOSS PARAMETERS TO REFLECT SUN CITY GRAND
231         LG     .29       .15    8.54      .08     25.5
            * UI   22.       22.     22.      49.      79.      95.     108.     122.     132.    145.
            * UI  162.      178.    213.     261.     291.     248.     216.     195.     178.    161.
            * UI  143.      131.    114.     105.      88.      65.      46.      39.      37.     37.
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                * UI   27.      22.      22.      20.       7.       7.       7.       7.       7.     7.
                * UI    7.       7.       7.       7.       7.       0.       0.       0.       0.     0.
                * UI    0.       0.       0.       0.       0.       0.       0.       0.       0.     0.
                * NOTE: REVISE ORIG WTADMS.24 S-GRAPH TO REFLECT SUN CITY GRAND
 232            UI     53.     124.     244.     315.     400.     594.     594.     448.     350.   270.
 233            UI    175.      93.      76.      53.      20.      16.      16.      16.       0.     0.
 234            UI      0.       0.       0.       0.       0.       0.       0.       0.       0.     0.
                * NOTE: DELETE HYDROGRAPH ADDITION AT CP113. IT IS NOT APLICABLE BECAUSE SUN
                *       CITY GRAND ONSITE RUNOFF AND RETENTION IS ESSENTIALLY SEPARATE FROM
                *       OFFSITE RUNOFF ALONG BELL RD.
                * KK CP113
                * KM      ADD HYDROGRAPHS AT CP113.
                * HC     2   2.83
                * NOTE: INSERT HYDROGRAPH STEP INTO ORIGINAL WTADMS.24 TO REFLECT RETENTION
                *       STORAGE - SUM OF ALL SUN CITY GRAND DEAD STORAGE RETENTION IN SUB-BASIN
                *       113

 235            KK  113OUT
 236            DT  113RET     39.94
 237            DI       0     10000
 238            DQ       0     10000

 239            KK     R113
                * RS     6                 -1        0
                * RC  .075       .04      .04     2100    .0038
                * RX  1000      1020     1100     1850     2030     2048     2049     2050
                * RY  1266      1264     1262     1260     1260     1261     1261     1261
                * NOTE: REVISE REACH ROUTING CROSS SECTION GEOMETRY TO REFLECT DEVELOPED
                *       CONDITIONS. CONSEQUENTLY, NSTPS ON THE RS RECORD IS ALSO MODIFIED.
 240            RS       2                 -1        0
 241            RC     .05       .05      .05     2100    .0038
 242            RX    1000      1006     1024     1030     1068     1074     1092     1098
 243            RY    1279      1278     1275     1274     1274     1275     1278     1279

 244            KK      114
 245            KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 114
 246            BA     .38
                * LG   .50       .00     8.35      .13      .00
                * NOTE: REVISE ORIG WTADMS.24 LOSS PARAMETERS TO REFLECT SUN CITY GRAND
 247            LG     .30       .15     8.35      .07     24.0
                * UI   17.       17.      17.      41.      62.      75.      86.      95.     104.   115.
                * UI  129.      144.     177.     215.     216.     183.     161.     146.     133.   118.
                * UI  106.       95.      85.      74.      58.      44.      31.      30.      28.    25.
                * UI   17.       17.      17.       6.       5.       5.       5.       5.       5.     5.
                * UI    5.        5.       5.       5.       0.       0.       0.       0.       0.     0.
                * UI    0.        0.       0.       0.       0.       0.       0.       0.       0.     0.
                * NOTE: REVISE ORIG WTADMS.24 S-GRAPH TO REFLECT SUN CITY GRAND
1                                              HEC-1 INPUT                                                      PAGE  8

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

 248            UI     35.       58.     137.     181.     220.     273.     392.     399.     307.   252.
 249            UI    202.      159.     102.      60.      53.      35.      24.      11.      11.    11.
 250            UI     11.       11.       0.       0.       0.       0.       0.       0.       0.     0.
 251            UI      0.        0.       0.       0.       0.       0.       0.       0.       0.     0.

 252            KK   CP114
 253            KM        ADD HYDROGRAPHS AT CP114
                * HC     2   3.21
                * NOTE: AREA HAS BEEN REVISED TO ONLY INCLUDE SUB-BASINS 113 AND 114
 254            HC       2   0.88
                * NOTE: INSERT HYDROGRAPH STEP INTO ORIGINAL WTADMS.24 TO REFLECT RETENTION
                *       STORAGE - SUM OF ALL SUN CITY GRAND DEAD STORAGE RETENTION IN SUB-BASIN
                *       114

 255            KK  114OUT
 256            DT  114RET     59.33
 257            DI       0     10000
 258            DQ       0     10000

 259            KK     R114
                * RS     2                 -1        0
                * RC   .06      .022      .35     2652    .0034
                * RX  1000      1380     1790     1800     1840     1850     1899     1900
                * RY  1258      1256     1254     1250     1250     1252     1253     1253
                * NOTE: REVISE REACH ROUTING CROSS SECTION GEOMETRY TO REFLECT DEVELOPED
                *       CONDITIONS. CONSEQUENTLY, NSTPS ON THE RS RECORD IS ALSO MODIFIED.
 260            RS       6                 -1        0
 261            RC     .05       .05      .05     2652    .0034
 262            RX    1000      1012     1025     1030     1068     1070     1080     1100
 263            RY    1279      1278     1275     1274     1274     1275     1278     1279

 264            KK      115
 265            KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 115.
 266            BA     .49
                * LG   .50       .00     7.04      .24      .00
                * NOTE: REVISE ORIG WTADMS.24 LOSS PARAMETERS TO REFLECT SUN CITY GRAND
 267            LG     .33       .16     7.04      .16     21.0
                * UI   22.       22.      22.      45.      76.      91.     104.     117.     126.   138.
                * UI  155.      170.     200.     245.     284.     247.     215.     192.     176.   161.
                * UI  142.      129.     115.     103.      90.      69.      52.      38.      37.    35.
                * UI   31.       22.      22.      22.      10.       7.       7.       7.       7.     7.
                * UI    7.        7.       7.       7.       7.       0.       0.       0.       0.     0.
                * UI    0.        0.       0.       0.       0.       0.       0.       0.       0.     0.
                * NOTE: REVISE ORIG WTADMS.24 S-GRAPH TO REFLECT SUN CITY GRAND
 268            UI     37.       37.     123.     168.     203.     237.     283.     376.     464.   379.
 269            UI    315.      268.     223.     183.     141.      86.      64.      59.      37.    36.
 270            UI     11.       11.      11.      11.      11.      11.       0.       0.       0.     0.
 271            UI      0.        0.       0.       0.       0.       0.       0.       0.       0.     0.
                * NOTE: DELETE UNNECESSARY HYDROGRAPH ADDITION STEPS FROM WTADMS.24 MODEL
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* KK 1I115
* KM      ADD HYDROGRAPHS AT CP115.
* HC    2    1.86
* KK 2I115
* KM      ADD HYDROGRAPHS AT CP115.
* KKCP115B
* HC    2    3.79
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LINE   ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

       KK  CP115A
       HC     4     4.67
       * NOTE: AREA HAS BEEN REVISED TO ONLY INCLUDE SUB-BASINS 101, 102A, 102, 103,
       *        106, 107, 108, 113, 114 AND 115
       * NOTE: INSERT HYDROGRAPH STEP INTO ORIGINAL WTADMS.24 TO REFLECT RETENTION
       *        STORAGE SUM OF ALL SUN CITY GRAND RETENTION IN SUB-BASIN 115

       KK  115OUT
       DT  115RET    44.75
       DI       0    10000
       DQ       0    10000
       * NOTE: RESUME HYDROGRAPH STEPS FROM WTADMS.24

       KK     111
       KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 111.
       BA     .50
       LG     .40      .21     5.55      .22      .00
       UI     32.      32.      78.     129.     160.     184.     211.     246.     304.     406.
       UI    374.     307.     266.     230.     196.     167.     139.      99.      58.      55.
       UI     50.      32.      32.      15.      10.      10.      10.      10.      10.      10.
       UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
       UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

       KK    D111
       KM        DIVERT TO CP119 FROM CP111
       DT   DI119
       DI       0       32      109      228      389      599      858     1170     1539     1967
       DQ       0       11       39       83      145      228      333      462      617      799

       KK    R111
       KM        ROUTE REMAINDER FROM CP111 TO CP112
       RS       9                -1        0
       RC    .075     .035     .035     5280    .0040
       RX    1000     1570     2040     2370     2440     2468     2469     2470
       RY    1312     1310     1308     1306     1306     1307     1307     1307

       KK     104
       KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 104
       BA     .15
       LG     .35      .31     4.93      .23      .00
       UI     26.     101.     151.     242.     249.     169.     112.      50.      31.      14.
       UI      7.       7.       0.       0.       0.       0.       0.       0.       0.       0.
       UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

       KK    R104
       KM        ROUTE FLOW FROM CP104 TO CP112
       RS      53                -1        0
       RC    .075     .075     .075     6552    .0056
       RX    1000     1001     1230     1270     1750     2000     2380     2650
       RY    1321     1321     1320     1318     1318     1319     1318     1320
```



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

       KK     112
       KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 112
       BA     .97
       LG     .50      .00     3.65      .50      .00
       UI     35.      35.      35.      35.      92.     123.     142.     165.     179.     193.
       UI    207.     224.     245.     266.     290.     340.     400.     464.     424.     371.
       UI    335.     308.     286.     267.     243.     220.     206.     185.     170.     155.
       UI    131.     101.      77.      62.      61.      58.      58.      45.      35.      35.
       UI     35.      28.      11.      11.      11.      11.      11.      11.      11.      11.
       UI     11.      11.      11.      11.      11.       0.       0.       0.       0.       0.
       UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

       KK   1I112
       KM        ADD HYDROGRAPHS AT CP112.
       HC       2     1.12

       KK   2I112
       KM        ADD HYDROGRAPHS AT CP112.
       HC       2     1.62

       KK     105
       KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 105
       BA     .21
       LG     .35      .27     7.68      .10      .00
       UI     32.     129.     195.     295.     362.     246.     171.      88.      50.      28.
       UI     10.      10.      10.       0.       0.       0.       0.       0.       0.       0.
       UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

       KK    R105
       KM        ROUTE FLOW FROM CP105 TO CP112
       RS       3                -1        0
       RC    .022     .022      .03     5220    .0044
       RX    1000     1001     1010     1020     1040     1050     1099     1100
```

```
340       RY    1303    1303    1303    1302    1302    1304    1305    1305

341       KK   CP112
342       KM        ADD HYDROGRAPHS AT CP112.
343       HC       2    1.83

344       KK    D112
345       KM        DIVERT TO CP120 FROM CP112
346       DT   DI120
347       DI       0      48     165     355     625     981    1434    1990
348       DQ       0      16      55     118     208     327     478     663

349       KK    D112
350       KM        DIVERT TO CP121A FROM CP112
351       DT  1D121A
352       DI       0      32     110     237     417     654     956    1327
353       DQ       0      16      55     118     208     327     478     663
1                                      HEC-1 INPUT                                         PAGE 11

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

354       KK    R112
355       KM        ROUTE REMAINDER FROM CP112 TO CP113A
356       RS       6              -1       0
357       RC    .075    .035    .035    2640   .0023
358       RX    1000    1490    1830    2600    2770    2788    2789    2790
359       RY    1290    1288    1286    1284    1284    1285    1285    1285

360       KK    113A
361       KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 113A
362       BA     .50
363       LG     .50     .00    7.93     .15     .00
364       UI     22.     22.     22.     42.     75.     89.    103.    115.    125.    137.
365       UI    152.    167.    192.    238.    276.    260.    224.    199.    181.    167.
366       UI    149.    134.    121.    108.     98.     79.     62.     40.     38.     36.
367       UI     35.     26.     22.     22.     20.      7.      7.      7.      7.      7.
368       UI      7.      7.      7.      7.      7.      7.      0.      0.      0.      0.
369       UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

370       KK  CP113A
371       KM        ADD HYDROGRAPHS AT CP113A
372       HC       2    2.33
          * KK D113A
          * KM      DIVERT TO CP121A FROM CP113A
          * DT2D121A
          * DI     0      26      67     134     232     278     399     561     799     11
          * DQ     0       0       0       0       0       4      22      58     120      2
          * NOTE: REPLACE WTADMS.24 DIVERSION OPERATION WITH STANLEY'S DIVERSION OPERATION
          *       FROM THE MASTER DRAINAGE REPORT FOR DEL WEBB'S GRAND AVENUE PROPERTY
          *       EXISTING CONDITION MODEL E12291.DAT.

373       KK   D113A
374       KM          DIVERT TO CP121A FROM  CP113A
375       DT  2D121A
376       DI       0     185     545     642     893    1913
377       DQ       0       0       0      12      74     467

378       KK   R113A
379       KM        ROUTE REMAINDER FROM CP113A TO CP113
          * NOTE: THIS ROUTING IS CONSIDERED TO OCCUR ALONG BELL RD SEPARATE FROM SUN
          *       CITY GRAND PHASE 2. REVISE ROUTING TO REFLECT DEVELOPED CONDITIONS
          * RS    25              -1       0
          * RC  .075    .035    .035    5280   .0032
          * RX  1000    1080    2620    2725    2735    2798    2799    2800
          * RY  1278    1277    1277    1276    1276    1277    1277    1277
380       RS       8              -1       0
381       RC    .035    .035    .035    5280   .0032
382       RX    1000    1010    1200    1201    1300    1301    1320    1340
383       RY    1276    1274    1275    1274    1274    1275    1274    1275
          * NOTE: SET ASIDE SUB-BASIN 113 AND CP113 HYDROGRAPH STEPS. SUB-BASIN 113
          *       STEP WAS PREVIOUSLY USED TO BEGIN SEPARATE BRANCH IN MODEL. CP113
          *       HYDROGRAPH ADDITION STEP IS UNNECESSARY.
          * KK    113
          * KM      RUNOFF HYDROGRAPH FROM SUB-BASIN 113
          * BA   .50
          * LG   .50     .00    8.54     .11     .00
          * UI   22.     22.     22.     49.     79.     95.    108.    122.    132.   145.
          * UI  162.    178.    213.    261.    291.    248.    216.    195.    178.   161.
          * UI  143.    131.    114.    105.     88.     65.     46.     39.     37.    37.
          * UI   27.     22.     22.     20.      7.      7.      7.      7.      7.     7.
          * UI    7.      7.      7.      7.      7.      0.      0.      0.      0.     0.
          * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.     0.
          * KK CP113
          * KM      ADD HYDROGRAPHS AT CP113.
          * HC     2    2.83
          * KK  D113
          * KM      DIVERT TO CP122 FROM CP113
          * DT 1D122
          * DI     0      79     257     523     872    1307    1829
          * DQ     0      63     205     416     692    1033    1422
          * NOTE: REPLACE WTADMS.24 DIVERSION OPERATION WITH STANLEY'S DIVERSION OPERATION
          *       FROM THE MASTER DRAINAGE REPORT FOR DEL WEBB'S GRAND AVENUE PROPERTY
          *       EXISTING CONDITION MODEL E12291.DAT.
1                                      HEC-1 INPUT                                         PAGE 12

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

384       KK    D113
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```
385            KM          DIVERT TO CP122 FROM CP113
386            DT    1D122
387            DI        0      105      354      622     1153     1882
388            DQ        0        0      195      395      845     1480

389            KK     R113
390            KM        ROUTE REMAINDER FROM CP113 TO CP114
               * NOTE: THIS ROUTING IS CONSIDERED TO OCCUR ALONG BELL RD SEPARATE FROM SUN
               *        CITY GRAND PHASE 2. REVISE ROUTING TO REFLECT DEVELOPMENT CONDITIONS
               * RS      6                 -1        0
               * RC   .075      .04      .04     2100    .0038
               * RX   1000     1020     1100     1850     2030     2048     2049     2050
               * RY   1266     1264     1262     1260     1260     1261     1261     1261
391            RS        4                 -1        0
392            RC     .035     .035     .035     2100    .0038
393            RX     1000     1010     1200     1201     1300     1301     1320     1340
394            RY     1276     1274     1275     1274     1274     1275     1274     1275
               * NOTE: SET ASIDE SUB-BASIN 114 AND CP114 HYDROGRAPH STEPS WHICH WERE PREVIOUSLY
               *        USED AS PART OF SEPARATE BRANCH IN MODEL.
               * KK    114
               * KM       RUNOFF HYDROGRAPH FROM SUB-BASIN 114
               * BA    .38
               * LG    .50      .00     8.35      .13      .00
               * UI    17.      17.      17.      41.      62.      75.      86.      95.     104.   115.
               * UI   129.     144.     177.     215.     216.     183.     161.     146.     133.   118.
               * UI   106.      95.      85.      74.      58.      44.      31.      30.      28.    25.
               * UI    17.      17.      17.       6.       5.       5.       5.       5.       5.     5.
               * UI     5.       5.       5.       5.       0.       0.       0.       0.       0.     0.
               * UI     0.       0.       0.       0.       0.       0.       0.       0.       0.     0.
               * KK CP114
               * KM       ADD HYDROGRAPHS AT CP114.
               * HC      2     3.21
               * KK   D114
               * KM       DIVERT TO CP122 FROM CP114
               * DT 2D122
               * DI      0       17       54       80      333      952     2066
               * DQ      0        0        0        0       70      438     1217
               * NOTE: REPLACE WTADMS.24 DIVERSION OPERATION WITH STANLEY'S DIVERSION OPERATION
               *        FROM THE MASTER DRAINAGE REPORT FOR DEL WEBB'S GRAND AVENUE PROPERTY
               *        EXISTING CONDITION MODEL E12291.DAT.

395            KK     D114
396            KM          DIVERT TO CP122 FROM CP114
397            DT    2D122
398            DI        0      235      313      480      717     1056
399            DQ        0        0        2       81      225      462

400            KK     R114
               * KM       ROUTE REMAINDER FROM CP114 TO CP115
               * NOTE: ROUTE REMAINDER FROM CP114 TO CP115B
               * NOTE: THIS ROUTING IS CONSIDERED TO OCCUR ALONG BELL RD. SEPARATE FROM SUN
               *        CITY GRAND PHASE 2. REVISE ROUTING TO REFLECT DEVELOPMENT CONDITIONS
               * RS      2                 -1        0
               * RC    .06     .022      .35     2652    .0034
               * RX   1000     1380     1790     1800     1840     1850     1899     1900
               * RY   1258     1256     1254     1250     1250     1252     1253     1253
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

401            RS        5                 -1        0
402            RC     .035     .035     .035     2652    .0034
403            RX     1000     1010     1200     1201     1300     1301     1320     1340
404            RY     1276     1274     1275     1274     1274     1275     1274     1275
               * NOTE: ADD OUTFLOW HYDROGRAPH FROM 115OUT TO OFFSITE HYDROGRAPH ROUTED ALONG
               *        BELL RD FROM WEST AT INTERSECTION OF BELL AND REEMS RDS. THIS
               *        CONCENTRATION POINT CORRESPONDS TO WTADMS.24 CONCENTRATION POINT CP115.

405            KK   CP115B
406            HC        2     7.00

407            KK     R115
               * KM       ROUTE FLOWS FROM CP115 TO CP122
               * NOTE: ROUTE FLOW FROM 115B TO CP122
408            RS        6                 -1        0
409            RC     .035     .035     .075     5280    .0038
410            RX     1000     1001     1002     1015     1035     1360     1920     2460
411            RY     1239     1239     1239     1238     1238     1240     1241     1242

412            KK     D113
413            KM        RETURN DIVERT AT CP113
414            DR    1D122

415            KK     R113
416            KM        ROUTE FLOW FROM CP113 TO CP122
417            RS       36                 -1        0
418            RC      .08      .08      .08     7488    .0049
419            RX     1000     1001     1610     1820     1990     2010     3059     3060
420            RY     1248     1248     1246     1245     1245     1246     1248     1248

421            KK     D114
422            KM        RETURN DIVERT AT CP114
423            DR    2D122

424            KK     R114
425            KM        ROUTE FLOW FROM CP114 TO CP122
426            RS       45                 -1        0
427            RC     .075     .075     .075     6240    .0046
428            RX     1000     1001     1610     1820     1990     2010     3059     3060
429            RY     1248     1248     1246     1245     1245     1246     1248     1248
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           430          KK     122
           431          KM         RUNOFF HYDROGRAPH FROM SUB-BASIN 122
           432          BA     .89
           433          LG     .50      .00     5.83      .32      .00
           434          UI     32.      32.      32.      32.      87.     114.     132.     153.     166.     179.
           435          UI    193.     207.     229.     247.     272.     319.     378.     428.     385.     338.
           436          UI    306.     281.     262.     243.     220.     201.     188.     167.     155.     138.
           437          UI    114.      93.      63.      57.      56.      53.      53.      36.      32.      32.
           438          UI     32.      20.      10.      10.      10.      10.      10.      10.      10.      10.
           439          UI     10.      10.      10.      10.      10.       0.       0.       0.       0.       0.
           440          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
1                                                HEC-1 INPUT                                                   PAGE 14

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

           441          KK    1I122
           442          KM         ADD HYDROGRAPHS AT CP122
           443          HC       3     4.1

           444          KK    CP122
           445          KM         ADD HYDROGRAPHS AT CP122
           446          HC       2    7.89
           447          ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE        (V) ROUTING            (--->) DIVERSION OR PUMP FLOW

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

  110            101
                  .
  117             .           102A
                  .             .
  125         CP101.............
                  V
                  V
  128          R101
                  .
  134             .            102
                  .             .
  141         CP102.............
                  V
                  V
  144          R102
                  .
  150             .            108
                  .             .
  160         1I108.............
                  .
  163             .            103
                  .             .
  172             .             .------->  103RET
  171             .         103OUT
                  .             V
                  .             V
  175             .          R103
                  .             .
  180         CP108.............
                  .
  184             .------->  108RET
  183        108OUT
                  V
                  V
  187          R108
                  .
  192             .            106
                  .             V
                  .             V
  200             .          R106
                  .             .
  206             .             .          107
                  .             .            .
  215             .         CP107.............
                  .             .
  219             .             .------->  107RET
  218             .         107OUT
                  .             V
                  .             V
  222             .          R107
                  .             .
  228             .             .          113
                  .             .            .
```

```
236        .              .              .-------> 113RET
235        .              .         113OUT
           .              .              V
           .              .              V
239        .              .           R113
           .              .              .
           .              .              .
244        .              .              .           114
           .              .              .             .
           .              .              .             .
252        .              .          CP114.............
           .              .              .
           .              .              .
256        .              .              .-------> 114RET
255        .              .         114OUT
           .              .              V
           .              .              V
259        .              .           R114
           .              .              .
           .              .              .
264        .              .              .           115
           .              .              .             .
           .              .              .             .
272   CP115A...........................................
           .
           .
275        .-------> 115RET
274   115OUT
           .
           .
278        .           111
           .              .
           .              .
289        .              .-------> DI119
287        .           D111
           .              V
           .              V
292        .           R111
           .              .
           .              .
298        .              .            104
           .              .              V
           .              .              V
305        .              .           R104
           .              .              .
           .              .              .
311        .              .              .           112
           .              .              .             .
           .              .              .             .
322        .              .          1I112.............
           .              .              .
           .              .              .
325        .          2I112...............
           .              .
           .              .
328        .              .            105
           .              .              V
           .              .              V
335        .              .           R105
           .              .              .
           .              .              .
341        .          CP112...............
           .              .
           .              .
346        .              .-------> DI120
344        .           D112
           .              .
           .              .
351        .              .-------> 1D121A
349        .           D112
           .              V
           .              V
354        .           R112
           .              .
           .              .
360        .              .           113A
           .              .              .
           .              .              .
370        .         CP113A...............
           .              .
           .              .
375        .              .-------> 2D121A
373        .          D113A
           .              V
           .              V
378        .          R113A
           .              .
           .              .
386        .              .-------> 1D122
384        .           D113
           .              V
           .              V
389        .           R113
           .              .
           .              .
397        .              .-------> 2D122
395        .           D114
           .              V
           .              V
```

```
400              .        R114
                 .           .
                 .           .
405       CP115B............
            V
            V
407       R115
            .
            .
414         .            .<-------   1D122
412         .         D113
            .            V
            .            V
415         .         R113
            .            .
            .            .
423         .            .         .<-------   2D122
421         .            .       D114
            .            .          V
            .            .          V
424         .            .       R114
            .            .          .
            .            .          .
430         .            .          .           122
            .            .          .             .
            .            .          .             .
441         .        1I122...........................
            .            .
            .            .
444       CP122............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1*****************************************
*                                        *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *
*           SEPTEMBER 1990               *
*             VERSION 4.0                *
*                                        *
* RUN DATE  03/24/1998  TIME  20:27:46   *
*                                        *
******************************************
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**************************************
*                                    *
*     U.S. ARMY CORPS OF ENGINEERS   *
*     HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616      *
*           (916) 756-1104           *
*                                    *
**************************************
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DEL WEBB SUN CITY GRAND REEMS ROAD FLOODLAIN LOMR HYDROLOGY

STANLEY CONSULTANTS, INC.
2929 E. CAMELBACK RD. SUITE 130
PHOENIX, ARIZONA 85016
PHONE: (602)912-6500 FAX: (602)912-6599

SCI PROJECT # 13688 HEC-1 INPUT FILENAME: 13688LMR
MODEL SUMMARY:

-> MODEL BASED ON FCD/WLB WTADMS.24 MODEL (PHX VALLEY S-GRAPH, GREEN & AMPT LOSS, 24HR TYPE II STORM, P=4.03" W/AERIAL REDUCT); TRUNCATED TO INCLUDE ONLY SUB-BASINS 101 THRU 122, INCLUSIVE
-> BELL RD DIVERTS ADJACENT TO PHASE 2 ARE FROM STANLEY'S DEL WEBB GRAND AVENUE PROPERTY MASTER DRAINAGE REPORT EXISTING CONDITION HEC-1 MODEL E12291.DAT
-> SCG PHASES 1 AND 2 ASSUMED 100% CONSTRUCTED AND REFLECTED BY MODIFIED LOSS RATE PARAMETERS AND "S" GRAPHS AND BY CHANGING THE ONSITE REACH ROUTING CROSS SECTION GEOMETRY
-> SUMMED DEAD STORAGE VOLUME DIVERT STEPS REFLECT ONSITE RETENTION
-> OFFSITE FLOWS ALONG BELL RD. KEPT SEPARATE FROM ONSITE PHASE 2 RUNOFF AND RETENTION
-> CORRECTED REACH ROUTING @ R102 AND R106

GENERAL MODEL NOTES:
----
1. THIS MODEL IS BASED ON THE WHITE TANKS/AGUA FRIA AREA DRAINAGE MASTER STUDY MODEL "WTADMS.24" PREPARED BY CONSULTANT "THE WLB GROUP" FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY.
2. THIS MODEL REPRESENTS ONLY THAT PORTION OF THE WTADMS.24 MODEL FROM SUB-BASIN 101 THRU SUB-BASIN 122 INCLUSIVE. ALL OTHER HYDROGRAPH OPERATIONS FROM THE ORIGINAL MODEL HAVE BEEN DELETED.
3. SUB-BASINS 100, 100A, 109 AND 116 ARE NOT CONSIDERED BY EITHER THE WTADMS.24 MODEL OR THIS MODEL TO CONTRIBUTE RUNOFF TO THE OLD REEMS ROAD ALIGNMENT FROM BELL ROAD TO BEARDSLEY ROAD.
4. ANY OF THE ORIGINAL INPUT RECORD FROM THE WTADMS.24 MODEL THAT WAS MODIFIED OR NOT USED BY THIS STANLEY MODEL HAS BEEN RETAINED AS A "* COMMENT". IN MOST CASES, A "NOTE: EXPLANATION" IS FOUND EITHER IMMEDIATELEY BEFORE OR AFTER THE REVISED OR UNUSED RECORD.
5. THE DIVERSION OPERATIONS ALONG BELL ROAD AT CITRUS ROAD AND AT COTTON LANE ARE FROM THE ORIGINAL WTADMS.24 MODEL. BELL ROAD DIVERSION OPERATIONS AT SR303L, SARIVAL AVENUE AND D114 FROM THE ORIGINAL WTADMS.24 MODEL HAVE BEEN REPLACED BY OPERATIONS FROM STANLEY'S MASTER DRAINAGE REPORT FOR DEL WEBB'S GRAND AVENUE PROPERTY EXISTING CONDITION MODEL E12291.DAT.
6. SUN CITY GRAND PHASES 1 AND 2, WHICH HAVE BEEN CONSTRUCTED IN SUB-BASINS 100, 102, 103, 107, 108, 109, 113, 114, 115 AND 116 ARE REFLECTED IN THIS MODEL IN THE FOLLOWING MANNER:

A. SUB-BASIN BOUNDARIES AND AREAS FROM WTADMS.24 WERE NOT CHANGED;
B. INITIAL ABSTRACT AND PERCENT IMPERVIOUS WERE ADJUSTED ON AN AREA-WEIGHTED BASIS TO REFLECT 100% DEVELOPED CONDITIONS; PSIF VALUE HAS NOT BEEN CHANGED BUT DTHETA HAS BEEN ADJUSTED TO CORRESPOND TO NORMAL INSTEAD OF SATURATED SOIL CONDITION AND XKSAT VALUES HAVE BEEN ADJUSTED TO ACCOUNT FOR DEVELOPED CONDITION VEG COVER;
C. PHX VLLY S-GRAPHS FROM THE ORIGINAL WTADMS.24 HAVE BEEN MODIFIED BY USING MCUHP2 WITH A NEW AREA-WEIGHTED ADJUSTED Kn (L, Lca AND SLOPE USED IN MCUHP2 HAVE NOT BEEN MODIFIED FROM THE ORIGINAL WTADMS.24 MODEL);
D. HYDROGRAPH REACH ROUTING STEPS WITHIN SUN CITY GRAND HAVE BEEN MODIFIED FROM THE ORIGINAL WTADMS.24 MODEL BY UTILIZING A NEW CROSS SECTION GEOMETRY THAT REFLECTS THE EXISTING GOLF COURSES;
E. THE DEAD STORAGE PORTION OF RETENTION BASIN VOLUME FOR BASINS IN PHASE 1 AND THE NORTHERN PORTION OF PHASE 2 HAVE BEEN SUMMED AND MODELED AS SINGLE VOLUME-DIVERTED RETENTION BASINS AT EACH OF THE TWO CONCENTRATION POINTS ALONG REEMS ROAD AT BEARDSLEY ROAD AND AT UNION HILLS DRIVE;
F. THE DEAD STORAGE PORTION OF PHASE 2 RETENTION BASIN VOLUME IN SUB-BASINS 107, 113, 114 AND 115 HAVE BEEN SUMMED AND MODELED AS SINGLE VOLUME-DIVERTED RETENTION BASINS AT EACH OF THE CONCENTRATION POINTS CORRESPONDING TO THESE SUB-BASINS;
G. OFFSITE RUNOFF FROM THE WEST THAT CONCENTRATES ALONG BELL RD. ADJACENT TO PHASE 2 IS MODELED SEPARATE FROM THE ONSITE RUNOFF AND RETENTION;
H. ONSITE PHASE 2 HYDROGRAPHS CORRESPONDING TO SUB-BASINS 113, 114 AND 115 ARE ROUTED SEPARATE FROM OFFSITE HYDROGRAPHS TO A NEW ONSITE CONCENTRATION POINT LOCATED AT THE NORTHWEST CORNER OF BELL ROAD AND REEMS ROAD. THE OUTFLOW FROM THE RETENTION STEP CORRESPONDING TO THIS NEW CONCENTRATION POINT IS THEN ADDED TO THE OFFSITE FLOW THAT HAS BEEN ROUTED ALONG BELL ROAD FROM THE WEST AT A SECOND CONCENTRATION POINT AT THE INTERSECTION OF REEMS AND BELL. THE SECOND CONCENTRATION POINT CORRESPONDS TO WTADMS.24 CONCENTRATION POINT CP115.

7. APPARENT LENGTH AND SLOPE ERRORS ASSOCIATED WITH REACH ROUTING STEPS R102 AND R106 FROM THE ORIGINAL WTADMS.24 MODEL HAVE BEEN CORRECTED.

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

   IT        HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE      1   0  STARTING DATE
                   ITIME       0000  STARTING TIME
                      NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE      2   0  ENDING DATE
                  NDTIME       0055  ENDING TIME
                   ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE   24.92 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

95 JD         INDEX STORM NO. 1
                   STRM        4.03  PRECIPITATION DEPTH
                   TRDA         .00  TRANSPOSITION DRAINAGE AREA

96 PI          PRECIPITATION PATTERN
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
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106 JD         INDEX STORM NO. 2
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STRM 3.99 PRECIPITATION DEPTH
TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
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107 JD INDEX STORM NO. 3
STRM 3.83 PRECIPITATION DEPTH
TRDA 50.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
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108 JD INDEX STORM NO. 4
STRM 3.76 PRECIPITATION DEPTH
TRDA 100.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
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109 JD INDEX STORM NO. 5

STRM 3.70 PRECIPITATION DEPTH

TRDA 200.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
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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			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+					6-HOUR	24-HOUR	72-HOUR			
+	HYDROGRAPH AT	101	233.	12.25	22.	5.	5.	.16		
+	HYDROGRAPH AT	102A	525.	12.58	73.	18.	18.	.51		
+	2 COMBINED AT	CP101	635.	12.50	95.	24.	23.	.67		
+	ROUTED TO	R101	629.	12.50	95.	24.	23.	.67		
+	HYDROGRAPH AT	102	151.	12.25	16.	4.	4.	.10		
+	2 COMBINED AT	CP102	725.	12.42	111.	28.	27.	.77		
+	ROUTED TO	R102	576.	13.42	111.	28.	27.	.77		
+	HYDROGRAPH AT	108	545.	13.08	128.	35.	34.	.79		
+	2 COMBINED AT	1I108	964.	13.33	236.	63.	60.	1.56		
+	HYDROGRAPH AT	103	416.	12.50	64.	19.	18.	.37		
+	DIVERSION TO	103RET	416.	12.50	64.	17.	17.	.37		
+	HYDROGRAPH AT	103OUT	6.	15.92	4.	1.	1.	.37		
+	ROUTED TO	R103	5.	17.33	4.	1.	1.	.37		
+	2 COMBINED AT	CP108	964.	13.33	237.	64.	62.	1.93		
+	DIVERSION TO	108RET	964.	13.33	237.	64.	62.	1.93		
+	HYDROGRAPH AT	108OUT	0.	.08	0.	0.	0.	1.93		
+	ROUTED TO	R108	0.	.08	0.	0.	0.	1.93		
+	HYDROGRAPH AT	106	871.	12.50	111.	28.	27.	.77		

+	ROUTED TO	R106	689.	13.08	111.	28.	27.	.77
+	HYDROGRAPH AT	107	546.	12.75	103.	30.	28.	.60
+	2 COMBINED AT	CP107	1014.	13.00	212.	57.	55.	1.37
+	DIVERSION TO	107RET	1014.	13.00	142.	37.	35.	1.37
+	HYDROGRAPH AT	107OUT	675.	13.33	78.	21.	20.	1.37
+	ROUTED TO	R107	366.	14.33	75.	20.	19.	1.37
+	HYDROGRAPH AT	113	741.	12.33	110.	32.	30.	.50
+	DIVERSION TO	113RET	741.	12.33	76.	20.	19.	.50
+	HYDROGRAPH AT	113OUT	500.	12.58	41.	11.	11.	.50
+	ROUTED TO	R113	322.	12.83	41.	11.	11.	.50
+	HYDROGRAPH AT	114	514.	12.50	86.	24.	23.	.38
+	2 COMBINED AT	CP114	613.	12.75	124.	36.	34.	.88
+	DIVERSION TO	114RET	613.	12.75	115.	30.	29.	.88
+	HYDROGRAPH AT	114OUT	55.	14.08	17.	6.	6.	.88
+	ROUTED TO	R114	39.	14.67	16.	5.	5.	.88
+	HYDROGRAPH AT	115	550.	12.58	93.	26.	25.	.49
+	4 COMBINED AT	CP115A	548.	12.58	172.	52.	50.	4.67
+	DIVERSION TO	115RET	548.	12.58	86.	23.	22.	4.67
+	HYDROGRAPH AT	115OUT	384.	14.33	100.	29.	28.	4.67
+	HYDROGRAPH AT	111	443.	12.67	71.	18.	17.	.50
+	DIVERSION TO	DI119	166.	12.67	26.	7.	6.	.50
+	HYDROGRAPH AT	D111	276.	12.67	45.	11.	11.	.50
+	ROUTED TO	R111	232.	13.33	45.	11.	11.	.50
+	HYDROGRAPH AT	104	236.	12.17	20.	5.	5.	.15
+	ROUTED TO	R104	89.	14.67	20.	5.	5.	.15
+	HYDROGRAPH AT	112	534.	13.33	138.	34.	33.	.97
+	2 COMBINED AT	1I112	534.	13.33	157.	40.	38.	1.12
+	2 COMBINED AT	2I112	765.	13.33	202.	51.	49.	1.62
+	HYDROGRAPH AT	105	354.	12.25	34.	9.	8.	.21
+	ROUTED TO	R105	316.	12.42	34.	9.	8.	.21
+	2 COMBINED AT	CP112	790.	13.33	236.	59.	57.	1.83
+	DIVERSION TO	DI120	263.	13.33	79.	20.	19.	1.83
+	HYDROGRAPH AT	D112	527.	13.33	158.	40.	38.	1.83

+	DIVERSION TO	1D121A	263.	13.33	79.	20.	19.	1.83
+	HYDROGRAPH AT	D112	264.	13.33	79.	20.	19.	1.83
+	ROUTED TO	R112	241.	13.75	79.	20.	19.	1.83
+	HYDROGRAPH AT	113A	409.	13.08	106.	27.	26.	.50
+	2 COMBINED AT	CP113A	560.	13.08	183.	46.	45.	2.33
+	DIVERSION TO	2D121A	2.	13.08	0.	0.	0.	2.33
+	HYDROGRAPH AT	D113A	558.	13.08	183.	46.	45.	2.33
+	ROUTED TO	R113A	529.	13.67	181.	46.	45.	2.33
+	DIVERSION TO	1D122	325.	13.67	83.	21.	20.	2.33
+	HYDROGRAPH AT	D113	203.	13.67	99.	26.	25.	2.33
+	ROUTED TO	R113	200.	14.00	98.	26.	25.	2.33
+	DIVERSION TO	2D122	0.	.08	0.	0.	0.	2.33
+	HYDROGRAPH AT	D114	200.	14.00	98.	26.	25.	2.33
+	ROUTED TO	R114	197.	14.42	96.	26.	25.	2.33
+	2 COMBINED AT	CP115B	578.	14.33	196.	55.	53.	7.00
+	ROUTED TO	R115	515.	14.92	193.	54.	52.	7.00
+	HYDROGRAPH AT	D113	325.	13.67	83.	21.	20.	2.33
+	ROUTED TO	R113	287.	15.33	81.	21.	20.	2.33
+	HYDROGRAPH AT	D114	0.	.08	0.	0.	0.	2.33
+	ROUTED TO	R114	0.	.08	0.	0.	0.	2.33
+	HYDROGRAPH AT	122	552.	13.33	146.	37.	35.	.89
+	3 COMBINED AT	1I122	551.	13.33	217.	57.	55.	4.10
+	2 COMBINED AT	CP122	743.	15.33	386.	111.	106.	7.89

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