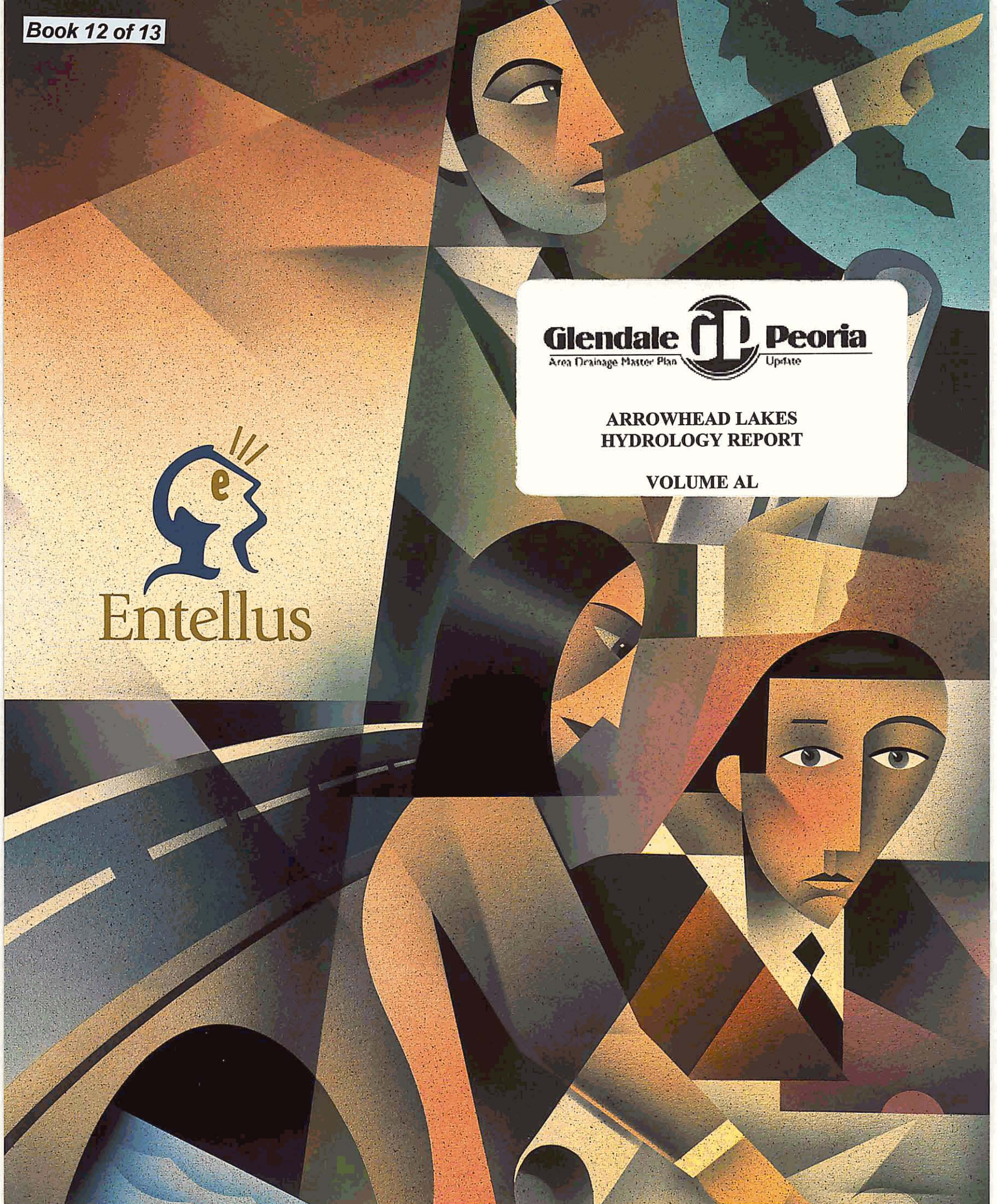
Book 12 of 13



Glendale Peoria
Area Drainage Master Plan Update

ARROWHEAD LAKES HYDROLOGY REPORT

VOLUME AL

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Glendale Peoria
Area Drainage Master Plan Update

ARROWHEAD LAKES HYDROLOGY REPORT

VOLUME AL

Contract FCD 99-44

May 30, 2001

Prepared by:

Intelligent Engineering
Environmental *Solutions*

Registered Professional Engineer (Civil)
CERTIFICATE NO. 34024
PATRICK A. WOLF
Date Signed 3-11-02
ARIZONA, U.S.A.

Registered Professional Engineer (Civil)
CERTIFICATE NO. 29737
HERNAN A. ARISTIZABAL
Date Signed 3-11-02
ARIZONA, U.S.A.

Entellus™
2255 N. 44th Street
Suite 125
Phoenix, AZ 58008
Phone (602) 244 2566
Fax (602) 244 8947
Web: www.entellus.com

In association with:

PENTACORE ARIZONA

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE NO. 20909
J. VINCE GIBBONS
Date Signed 3-18-02
ARIZONA, U.S.A.

January 29, 2001

VOLUME DESIGNATION

VOLUME ID	Volume Name	Number
DC	Data Collection	1
HY	Hydrology	2
PA	Potential Alternatives	3
AA	Alternative Analysis (Level II)	4
RA	Recommended Alternatives (Level III)	5
ZA	Zone A Floodplain Delineation	6
DS	Detailed (Section 15)	7
AL	Arrowhead Lakes Hydrology	8
AR	Administrative Report (Correspondence)	9

Note: Volume ID will be used for Section, Plate, Figure, and Table identifiers.

Glendale/Peoria Area Drainage Master Plan Update

FCD 99-44

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Glendale/Peoria Area Drainage Master Plan Update
FCD No. 99-44

TECHNICAL DATA NOTEBOOK (TDN)
ARROWHEAD LAKES HYDROLOGY

SECTION AL-1: INTRODUCTION

The information and analysis presented in this hydrology submittal is a part of the scope of work performed by Entellus, Inc. and Pentacore Arizona for the Flood Control District of Maricopa County (District) under Contract FCD N0. 99-44. The purpose of this report is to present and summarize the results of the Detailed Hydrology Analysis of the Arrowhead Lakes area which is located in northeast Glendale. In addition, it documents the methodology, assumptions, problems and solutions encountered during the development of the hydrology model.

This area is part of the *Glendale/Peoria Area Drainage Master Plan* (ADMP) study completed in May 1987 (**Reference 1**), which has been subsequently updated by Entellus. The objective of the analysis is to hydrologically model the entire lake system for the 100-year, 24-hour storm event, and perform an as-built survey of the weirs located within the lake systems, golf courses, and retention basins.

The detailed study limits for this task area are comprised of the Arrowhead Lakes, Arrowhead Legends Master Planned Communities, and the master planned development within Section 24, Township 4 North, Range 1 East. The Interstate Loop 101 bounds the area on the south, Thunderbird Park, Hedgpeth Hills, and Deer Valley Road on the north, Hedgpeth Hills on the east, and 75th Avenue on the west (see **Figure AL-1**). The study area consists of approximately 2.7 square miles.

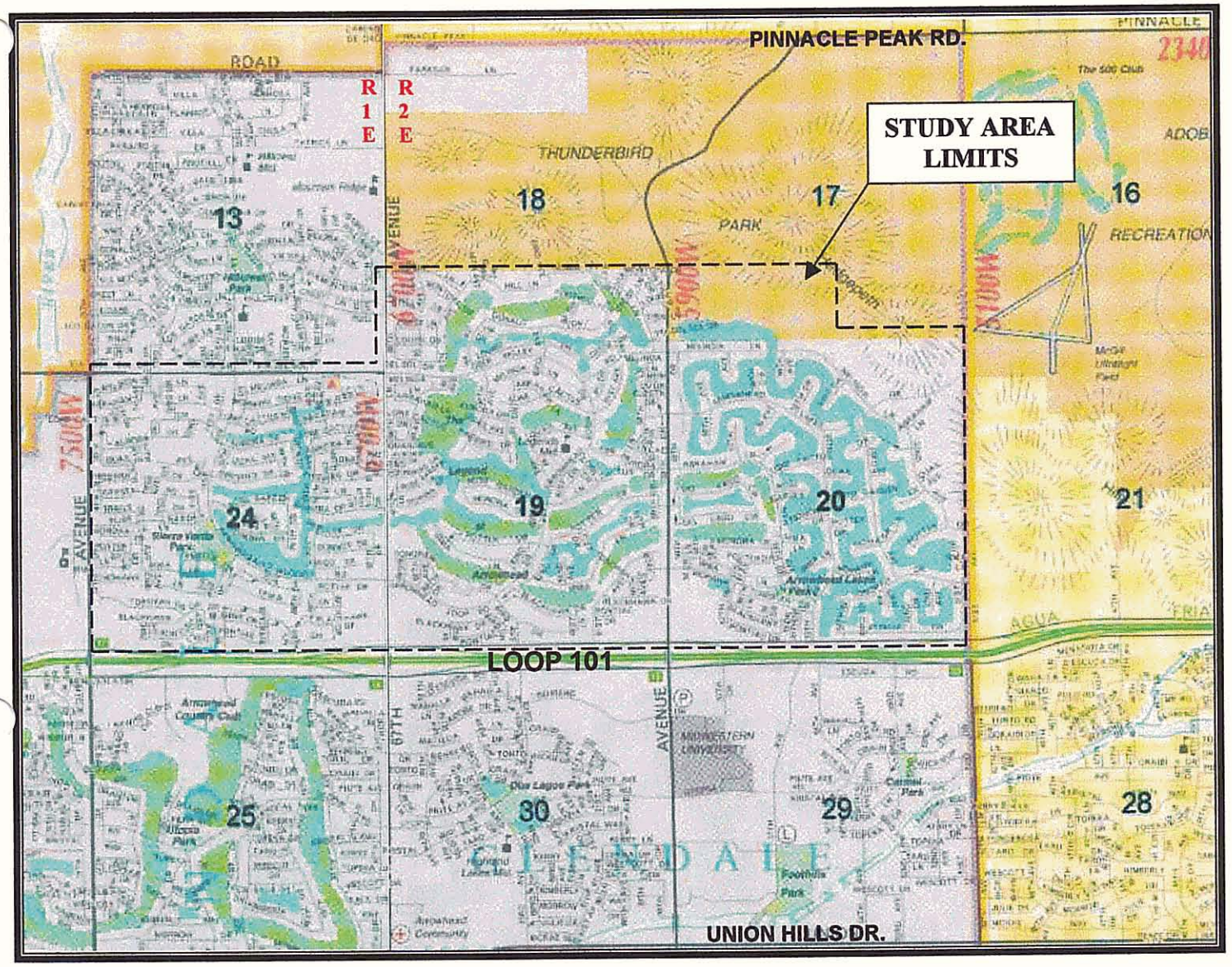

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FIGURE AL-1
Vicinity Map

The Arrowhead Lakes study area is comprised of single family, multi-family, and commercial developments. In addition, a school site, golf courses, and multi-use lakes are incorporated within the Arrowhead Lakes study area.

Currently, most of the runoff from offsite areas and the developed residential communities within this study area drain directly to a series of lakes and/or open spaces that are situated internally within the developed communities. There are additional retention areas within the Legends and Section 24 communities. The lakes were primarily designed to provide a source of irrigation water for the adjacent golf courses and grassed landscape areas. Additionally, the lakes were designed to attenuate tributary storm runoff by surcharging storage in areas that were designed into the over-bank of the lakes. The lake systems design hydrology used the 100-year, 24-hour storm event with the NRCS (formerly SCS) TR20 model (**Reference 2**). Each lake employs a series of weirs that control the operational water surface and the floodwater surface elevation. Storm flows cascade through the system and outfall to either a channel flowing south, located just north of Loop 101 at approximately the 55th Avenue alignment, or to a concrete lined channel flowing west along the north side of Loop 101. The system, on a whole, has reportedly never been completely as built and hydrologically analyzed for the current conditions.

This report provides an updated hydrologic analysis for the different lake systems. The model also includes the as-built data for each weir, drainage structure, and the adjacent ground. A stage-storage-discharge relation for each lake and channel routing parameters were developed using the 1996 topographic mapping (**Reference 3**) and the detailed survey of all structures provided by Pentacore Arizona for this project. Per City of Glendale's request, the model was evaluated for the 100-year, 24-hour storm event assuming that the initial water surface elevation was at the top of weir crests elevation. This assumption may be conservative and some of the lakes may be operating at a lower elevation, but operating the lakes above the weir elevation is unlikely. Therefore, any storage below the weir crest was ignored. The lakes current water surface boundaries were based on the 1996 aerial photographs (**Reference 4**) drawings. The study area is currently developed with

undeveloped tributary area of natural desert and mountain lands to the north and east. Therefore, only the existing condition model was analyzed.

SECTION AL-2: ADWR/FEMA FORMS

This section does not apply to this report.

SECTION AL-3: MAPPING AND SURVEY INFORMATION

3.1. Field Survey Information

Field surveys were conducted by Pentacore Arizona, LLC and were tied to the same controls used for the overall study and documented in the *Glendale/Peoria ADMP Update Survey Report* included in **Appendix C** of the *Glendale/Peoria Area Drainage Master Plan – Hydrology Report - Volume HY.* Refer to **Appendix A.4** of this report for the field survey notes specific to the Arrowhead Lakes Hydrology Study. The weirs, culverts, and adjacent ground elevations were described with enough elevation points so that rating curves could be built for each type of structure.

Aerial mapping vertical and horizontal controls, as well as mapping verification, was performed under a different contract, Contract FCD 1999C065 (**Reference 5**).

3.2 Mapping

The District provided mapping for this study from a couple of sources. One source was the 1996 District aerial topographic mapping and mapping developed for this project by Databased Terrain Mapping, Inc. (DTM), in January 2000, under the above-mentioned contract, the other was the topographic mapping developed as part of the Arizona Canal Diversion Canal Area Drainage Master Study **(Reference 9)**.

3.2.1 Watershed Map

The watershed boundaries and hydrologic parameters were obtained primarily from the 1:200 scale maps with two (2)-foot contour intervals from the sources mentioned above. This mapping covers the entire study area. In addition, the sub-basins were delineated based on previous as-built and grading plans prepared by others (see **Table AL-1** included in **Appendix A**),

1996 aerial photographs provided by the District, aerial photographs generated by DTM as part of the above mentioned contract, and field observations. Refer to **Plate AL-2** for the Hydrology Map.

3.2.2 Soils Map

The electronic soils map was obtained from the District's GIS Department. This mapping is a digital version of the NRCS (formerly SCS) *Soil Survey of Central Maricopa County, Arizona* (**Reference 6**). Refer to **Plate AL-4** for the soils map.

3.2.3 Land Use Map (Existing Conditions)

The existing land use mapping was obtained from the 1996 aerial photographs provided by the District (**Reference 3**) and through field observations. Refer to **Plate AL-3** for the Land Use Map.

SECTION AL-4: HYDROLOGY

4.1 Method Description

The peak flows and volume estimates in this study area were obtained through precipitation/runoff modeling. The hydrologic modeling was performed by means of the 1991 version of the HEC-1 computer program as developed by the U.S. Army Corps of Engineers (**Reference 7**). The models were developed using Green and Ampt methodology to estimate the rainfall losses. Excess rainfall was then routed to the concentration points using the Clark Unit Hydrograph. The estimation procedures for model parameters and components were based on the *Drainage Design Manual for Maricopa County – Volume I – Hydrology* (hereinafter referred as *The Drainage Manual*) (**Reference 8**).

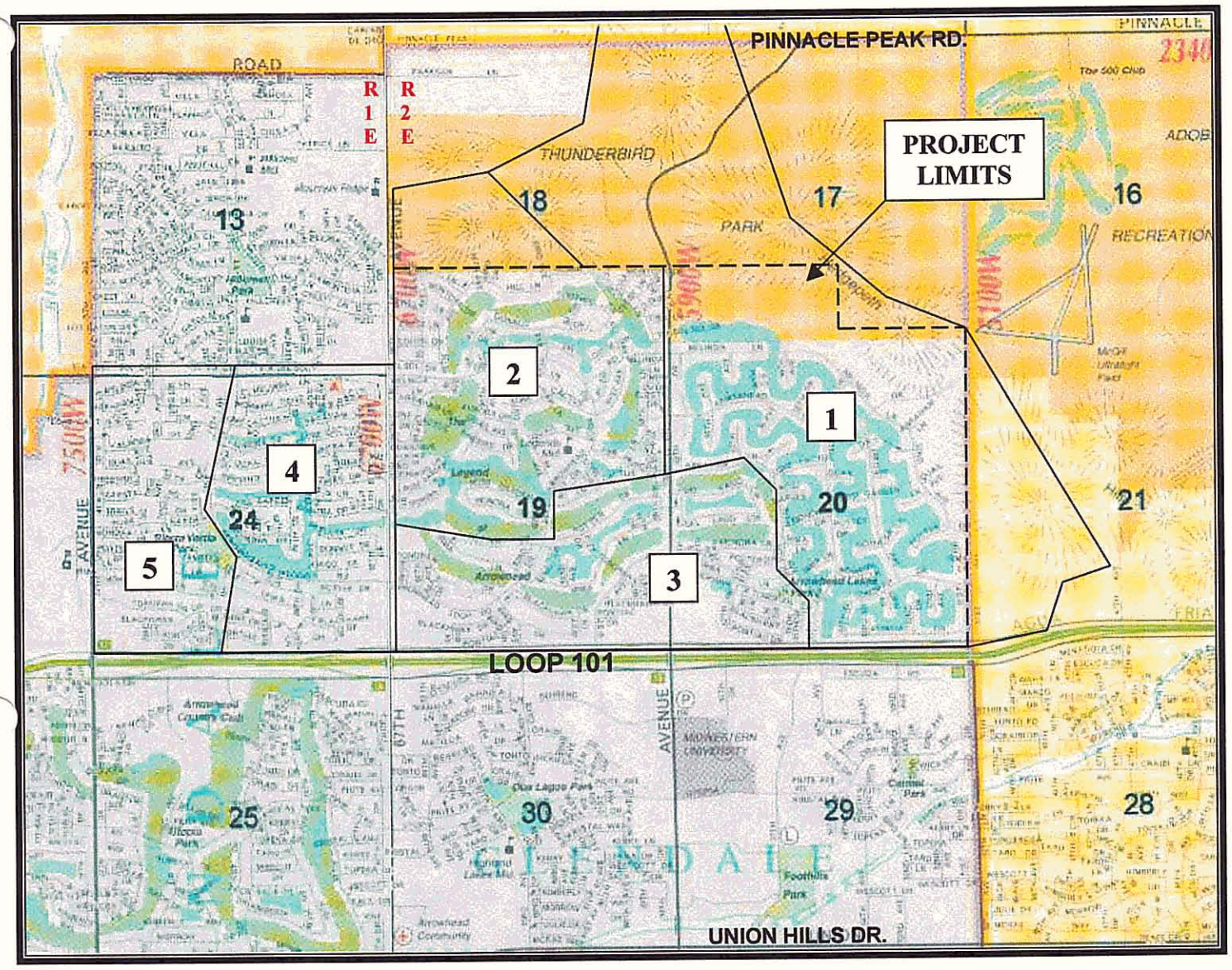
Schematic flow routing diagrams for runoff modeling are presented on **Plate AL-1**. The 100-year, 24-hour storm event was used as the base model for this study because it produces higher volumes than the 6-hour storm. The purpose of this study was to estimate the lakes water surface elevation as the 100-year storm passes through the system. In addition, the 100-year, 2-hour storm was used to calculate retention volumes for the subdivisions and commercial areas located in the southern portion of the Arrowhead Lakes and Legends development that do not drain to the lakes. For those areas within Sections 19 and 20 that has on-site retention, the calculated volume was diverted out of the runoff hydrograph. See the retention volume calculations table included in **Appendix D.4**. Flow through the lakes was modeled using level pool reservoir routing in conjunction with a depth versus storage table. The Normal-Depth routing method was used for routing hydrographs through streets, golf courses, and channels.

4.2 Parameter Estimation

4.2.1 Drainage Area Boundary

Drainage area boundaries were estimated based on the following: topographic mapping information (**Reference 3**), extensive field observations, previous studies, and as-built and grading plans (see **Table AL-1** in **Appendix A**). The study area was divided into five sub-watersheds. The first sub-watershed includes the Arrowhead Lakes community within Section 20, Township 2 North, Range 2 East (see **Figure AL-2**) and off-site tributary area to the north and east. The second sub-watershed consists of the Arrowhead Legends community within Sections 18 and 19, Township 2 North, Range 2 East, and the off-site tributary to the north. The third sub-watershed includes the south half of Section 19 and the southwest quarter of Section 20, Township 2 North, Range 2 east. The fourth sub-watershed consists of the east portion of Section 24, Township 2 North, Range 1 East. The last sub-watershed includes the west portion of Section 24. Each of the sub-watersheds was delineated into several smaller sub-basins as shown in **Plate AL-2.**

The scope of work for modeling the Arrowhead Lakes in this study focused on refining the existing Glendale/Peoria ADMS model (**Reference 9**), which was furnished by the District, by providing a more detailed delineation of sub-basins and updated volume/discharge/stage relationships within the lakes. Most of the sub-basins within Arrowhead Lakes drains to the lakes or detention basins. Flow-split locations were identified and basins were further divided in an attempt to more precisely track the movement of runoff through the area.



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1 - Sub-Watershed Identifier

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FIGURE AL-2
Sub-Watershed Boundaries

4.2.2 Watershed Work Map

The work map for this study was developed mainly from the mapping developed by Kaminski-Hubbard as part of the ACDC ADMS (**Reference 9**) and the new mapping developed by DTM, Inc. specifically for this project (**Reference 5**).

4.2.3 Gage Data

Gage data was available for some of the main watercourses downstream of the study area. However, the model developed for this area focused on the overland flow through streets, parcels, and artificial lakes. Therefore, the gage data would not show a good correlation for the needs of this project.

4.2.4 Statistical Parameters

Precipitation/runoff models were used to develop the hydrology for this area. Therefore, statistical data were not developed as part of this study.

4.2.5 Precipitation

Precipitation data were obtained from the isopluvial maps contained in the NOAA Atlas of Arizona (**Reference 10**). Selected isopluvial maps used for Maricopa County were also encountered in *The Drainage Manual (Figures 2.1 through 2.13)* (**Reference 8**). Copies of these figures, as well as the PreFre output, were included in **Appendix D.1**.

4.2.6 Physical Parameters

4.2.6.1 Basin Parameters

Soil type and land use percentages were measured using the District's Geographic Information System (GIS) database (**Reference 6**). This information, as well as other physical

parameters estimated from the work maps, was entered into the *Drainage Design Menu System* (DDMSW) to obtain the Green and Ampt rainfall loss parameters. The Clark Unit Hydrograph was used in the computation of peak discharges in this study because all the sub-basins are less than five square miles. The Clark Unit Hydrograph parameters were calculated using the MCUHP1 module of the DDMSW software. Supporting documentation and DDMSW reports are included in **Appendix D.2**.

4.2.6.2 Reach Routing Parameters

The Normal-Depth routing method was predominantly used to route flows from one concentration point to the next. The time steps used in the Normal-Depth routing were calculated using the velocity from the Manning's formula for the cross-section. The channel cross-section geometry used for the routings was extracted from the work map and from field observation. For similar configured reaches, typical cross-sections were developed to simplify the modeling procedure.

There were a few routing reaches in the HEC-1 models that used the Muskingum-Cunge routing because the Normal-Depth method resulted in unstable flow.

Slopes and n-values for the routing reaches were estimated based on the topographic mapping, aerial photographs, and field observation. The typical cross-section sketches and tabulated reach routing parameters were included in **Appendix D.3**. The

times of concentration and routing reaches for the project area were shown on **Plate AL-2**.

4.2.6.3 Storage Routing Parameters

Storage for each lake was modeled using the level pool reservoir routing method. Stage/storage/discharge relationships were obtained from the weir rating tables and the incremental capacity of each lake. The starting water surface elevation for both weir and volume calculations were based on the assumption that the operational water surface elevation was the same as the top of weir elevation. In addition, the horizontal limits of each lake were based on aerial photographs and as-built grading plans. Specific information was included in **Appendix D.4**.

4.2.6.4 Subdivision Required Storage

Individual storage for subdivisions and commercial areas specifically within Sections 19 and 20 was estimated by calculating the 2-hour, 100-year runoff volume for areas within the sub-basin that have retention storage. For the commercial area, the volume was reduced by 20% due to the assumption that the parking lot area does not provide the full storage capacity. This reduction was made to compensate for a portion of the runoff bypassing the detention basin, which was often the case. Diversion cards were used for simulating the impact of storage for all subdivisions and commercial development known to meet the storage requirements. Detailed calculations of storage were included in **Appendix D.4**.

4.2.6.5 Flow Splits and Diversions

Flow split estimates for the study area were generally modeled at the lakes that have two or more outfalls, or locations where split-flow conditions may occur. In particular, at weirs, culverts, channels, and storm drains. The flow splits at the weirs were estimated based on an iterative process using the weir's rating curve and HEC-1 peak flow over the weir. Flow splits at culverts and storm drains were estimated based on rating curves specific to each type of structure. In addition, it was assumed that full-flow capacity, not the inlet capacity, governed the discharge capacity of the storm drain for the sub-basins east of 67th Avenue. Therefore, the full-flow pipe capacity was diverted into the storm drain and the excess flow stayed as overland flow in the HEC-1 model. It was assumed that the channels would be flowing full, and any excess flow would continue in its original direction. Detailed calculations of the flow splits were included in **Appendix D.5**.

4.3 Problems Encountered During the Study

4.3.1 Special Problems and Solutions

The problems and solutions for the Arrowhead Lakes Hydrology are presented as follows:

4.3.1.1 Arrowhead Lakes/Arrowhead Legends

The survey points by Pentacore were approximately 1 to 2 feet off from the ACDC ADMP mapping. Therefore, the contour mapping was used only to establish channel routing parameters and identify general trends.

4.3.1.2 Stage/Discharge at 67th Avenue

The configuration of the overflow structures between Lake 16 and Lake L21AP3 (**Plate AL-1**) includes two outlets into a 24-inch diameter storm drain flowing south along 67th Avenue, two weirs controlling flows from each lake, and two 4' x 8' box culverts under 67th Avenue.

The stage/discharge relationship at 67th Avenue was developed differently than the other lakes because the interaction of the lakes on either side of 67th was uncertain. The storage volume required and contributing flow for each lake on either side of 67th Avenue was analyzed. The lake to the east side of 67th Avenue required a greater storage area and the contributing flow was also significantly larger. The hydrographs for both lakes peaked at the same time, which meant that Lake 16 would overflow into Lake L21AP3. The dual 4' x 8' culverts located under 67th Avenue restricted the amount of flow from Lake 16 into Lake L21AP3 and a hydraulic analysis on the culvert was performed to determine the stage/storage/discharge relationship of Lake 16 into Lake L21AP3.

4.3.2 Modeling Warning and Error Messages

4.3.2.1 Arrowhead Lakes/Arrowhead Legends

There were no ERROR messages in the 100-year, 24-hour HEC-1 model. Warning messages generated by the HEC-1 were examined to ensure the model was not adversely affected.

The only warning message encountered for the HEC-1 model of the Arrowhead Lakes sub-basins is as follows:

- WARNING --- MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR FLOWS BETWEEN (*Value*) TO (*Value*)

In all but three cases, the calculated peak discharge was not within the range reported and the comment was disregarded. The hydrographs of the three routing reaches that were within the range of the specified flows were examined. The hydrographs showed no signs of instability and the warning was ignored.

There are additional warning messages for the 100-year, 24-hour model that can be found in the Error and Warning Section of the *Glendale/Peoria Area Drainage Master Plan – Hydrology – Volume HY.*

4.4 Calibration

There is no adequate gaging data or reliable high water marks to make an accurate calibration of the model. Additionally, the nature of the lake system makes it unreliable to compare flows to the District gaging data because a significant amount of storage characterizes this area.

SECTION AL-5: HYDRAULICS

5.1 Method Description

Hydraulic analysis for the Arrowhead Lakes and Legends study area consisted of modeling the existing lake weirs, culverts, channels and storm drain outlets. The lake weir analysis was accomplished by using a weir formula for broad-crested weirs to determine the headwater elevation over the weir crest **(Reference 13)**. Culvert analysis was accomplished by using the FHWA culvert analysis program, HY8, version 6.0 **(Reference 11)**. Channel and storm drain analyses was accomplished by using Manning's formula as implemented by Haested Methods Flowmaster PE, version 6.0 **(Reference 12)**, an open channel flow software program. The hydraulic analysis is presented in **Appendix D.4**.

5.2 Parameter Estimation

Values of weir discharge-coefficients were interpolated linearly from Table 5-3 contained in the *Handbook of Hydraulics* **(Reference 13)**. The Manning's roughness coefficient for channels, culverts and storm drain pipes was estimated from the Manning's n values on page 7-22 of **Reference 13** and engineering judgment. Copies of Table 5-3 and Manning's n values are provided in **Appendix D.4**.

5.3 Hydraulic Analysis

5.3.1 Weir Analysis

The weir formula for broad-crested weirs was utilized to generate a stage-discharge rating table for each weir with the incremental headwater associated to discharge-coefficient values **(Reference 12)**. The headwater elevation over weir crest was determined from the weir formula $Q = C*L*H^{3/2}$. Coefficient

"C" was determined from **Reference 13.** See **Appendix D.4** for the stage-discharge summary and the weir formula rating table.

5.3.2 Culvert Analysis

The outfall culverts in Lake 9 are the controlling factor for the lake stage-storage-discharge analysis due to outlet control. The stage-discharge rating table was generated by using the FHWA culvert analysis program, HY8 version 6.0 (**Reference 11**) to determine the headwater in the lake. For the two (2) outfall culverts in Lake 9, a 6'x 3' and a 4'x 3'measureded in the field, an equivalent two (2) 5'x 3' were used in the HY8 analyses. See culvert HY8 outputs in **Appendix D.4**.

The culvert that drains Lake L21AP4 restricts the outflow of the lake at higher stages. The capacity of this culvert was analyzed using the inlet control nomograph, contained in the FHWA manual (**Reference 15**). Inlet control was assumed because of the short culvert length and the absence of backwater effect. A copy of the inlet control nomograph is included in **Appendix D.4**.

5.3.3 Channel Analysis

The channel between Lake 8 and Lake 9 was the controlling factor for the lake stage-storage-discharge analysis due the submerged weir condition in Lake 8. The stage-discharge rating table was generated by using the Flowmaster program (**Reference 12**) to determine the headwater elevation in the lake. See channel Flowmaster outputs in **Appendix D.4**.

5.3.4 Storm Drain Analysis

The relief storm drain pipes for Lakes 16, 17 and 21 were analyzed with the assumption that the pipes are at flowing-full capacity. The flowing-full capacity was estimated using the Flowmaster program (**Reference 12**). See storm drain Flowmaster outputs in **Appendix D.4**.

5.4 Final Results

5.4.1 Hydrologic Analysis

The estimated 100-year water surface elevations of the lakes within the study area do not appear to adversely affect the adjacent homes. However, there are a few structures that are under capacity for the 100-year rainfall event. These structures will cause water to flood streets and may cause accessibility problems.

The study assumes that all the lakes are at their maximum operating level (top of weir crest) at the beginning of the storm event. Some of the overflow structures could become clogged and would significantly affect the lake elevation. Additionally, the channel along the west side of 69th Avenue south of Arrowhead Loop Road is under capacity for the 100-year event in some areas. The normal depth calculations for this channel are presented in **Appendix E.** This channel drains to a detention basin (Basin N21A43 in **Plate AL-1)** that has an outfall weir and storm drain that appear to be inadequate for the 100-year storm as well. The weir would back up flow in the detention basin to a stage of 1258.9 feet during the 100-year event. Once the water surface exceeds 1258 feet, the water would pond at the corner of 69th Lane and Pontiac Drive as well as the corner of 70th Avenue and Pontiac Drive up to a depth of one foot. The backwater effect on the upstream culvert draining into this detention basin at 69th Lane would cause flow to overtop the road at this location. The building pad of the homes in the area is not known and it is possible that a few homes could become flooded. The outlet of this detention basin (combination of weir and storm drain) seems to be set too high to adequately discharge the 100-year flows without detrimental affects upstream.

The combination of weir and storm drain at the end of route R21A16 restricts the flow and does not add any additional storage area. The channel does have enough capacity for the 100-year event (see calculations in **Appendix E**), but it is possible that the storm drain could become clogged during a major rainfall event and flooding the backyard of the houses along the channel.

Flows within the golf course channel are approximately 2 feet to 4 feet deep under a 100-year storm, with velocities ranging from 2 fps to 6 fps. Major culvert crossings do not seem to overtop the adjacent streets or the golf course berms, judging by the contour elevations obtained from **Reference 2**. Golf courses that are not draining to the lakes drain to drywells located at low points within the golf course, the ponding depths at these drywells are approximately 2 to 3 feet deep.

Peak flows leaving the site through the box culvert located under Loop 101 and the 55th Avenue alignment is estimated to be 730 cfs. Based on the original TR-20 model, peak flow at this same location was 1505 cfs. The new model shows that the flows for the as-built condition are approximately fifty percent of the original design flows. Therefore, downstream facilities are most likely adequate to handle the reduced flows.

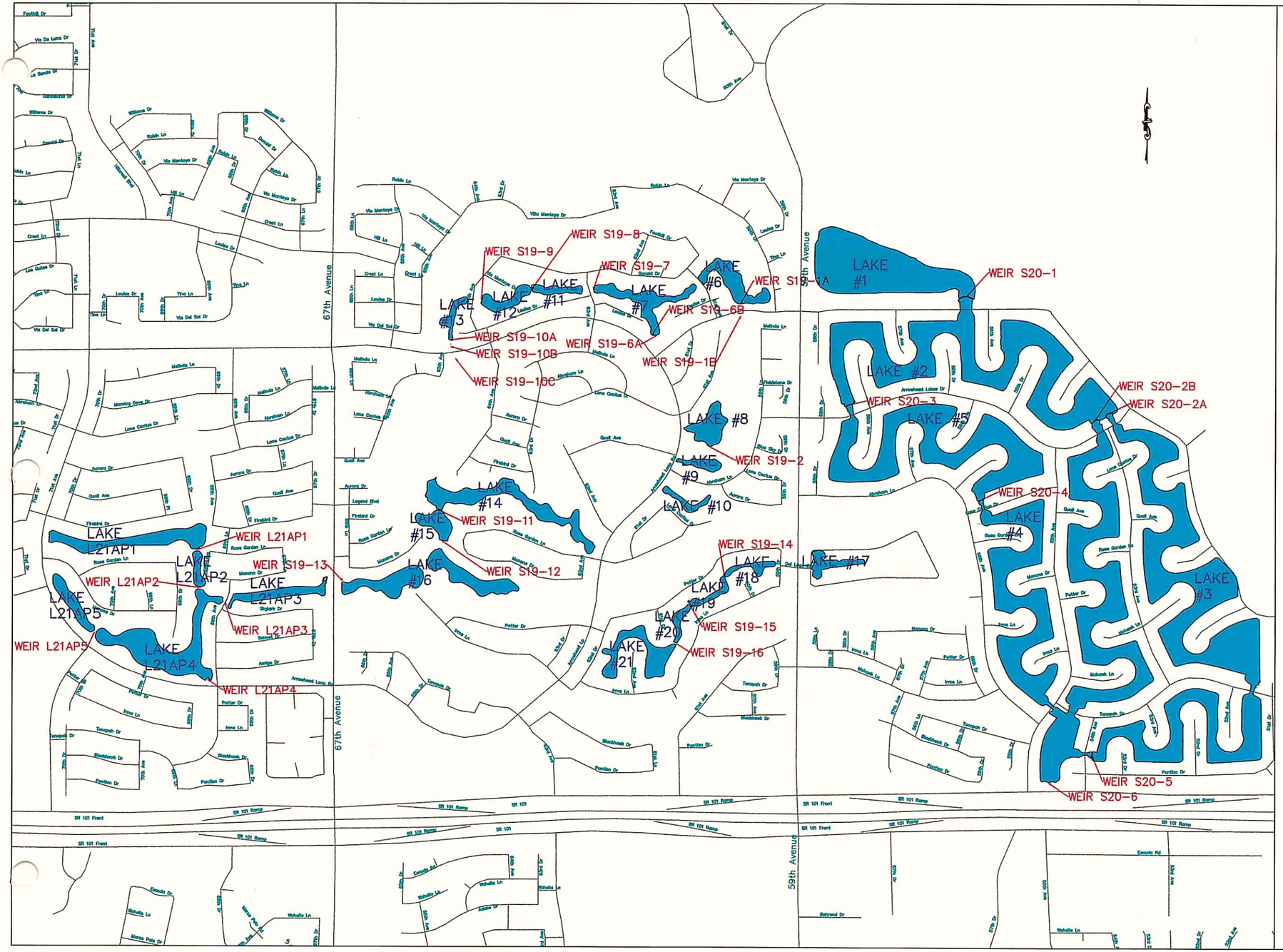
Comparison of the flows also showed a significantly larger flow in the new hydrology model flowing under 67th Avenue to the west into Section 24. Comparison at the two outfall points from Section 24 was not possible because the original TR-20 was developed before Loop 101 was constructed.

The hydrologic analysis results, including the HEC-1 output and background calculations were included in **Appendix F**. A summary of the water surface in the lakes was presented in **Figure AL 3.1 to AL 3.4**.

The HEC-1 model assumes that all weir and other outlet structures are fully functional and free of debris that could possibly clog some of the structures, in particular, the storm drains. Even though the system as modeled appears to function properly, it may not have an adequate safety factor to accommodate unforeseen conditions that may occur under severe storm conditions.

5.4.2 Verification of Results

As mentioned previously, historical gaging records are not available for the study area. In addition, the nature of the lake system makes it unreliable to compare flows to the District gaging data. Therefore, no verification work was performed for the hydrology results.



SCALE
1" = 100'

LEGEND

LAKE #1 LAKE IDENTIFICATION

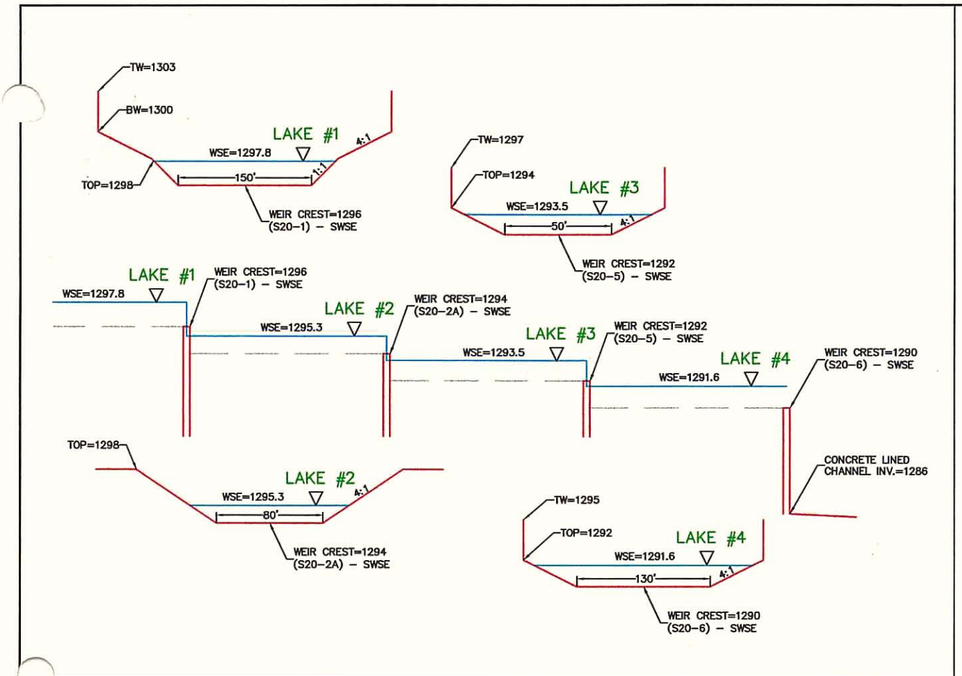
WEIR S20-8 WEIR IDENTIFICATION

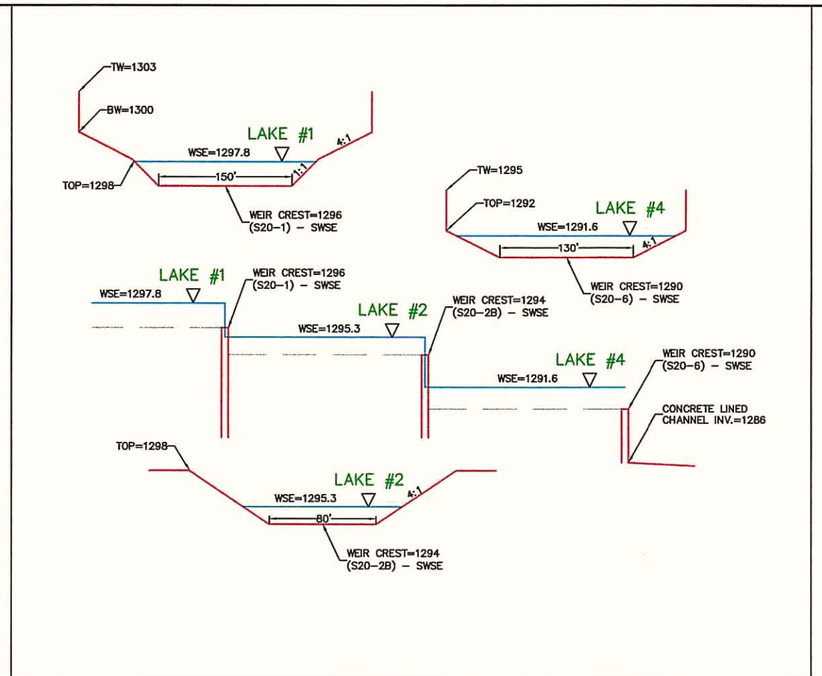
Entellus™
2225 N. 44th Street, Suite 125
Phoenix, AZ 85008-3279
Tel 602.244.2266
Fax 602.244.8947
Project No. 910017

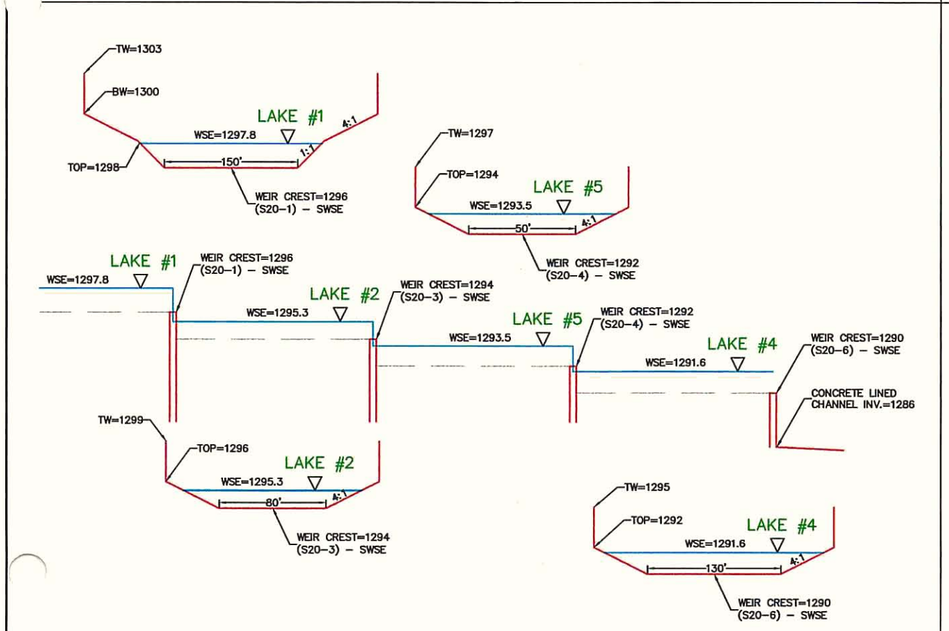
GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

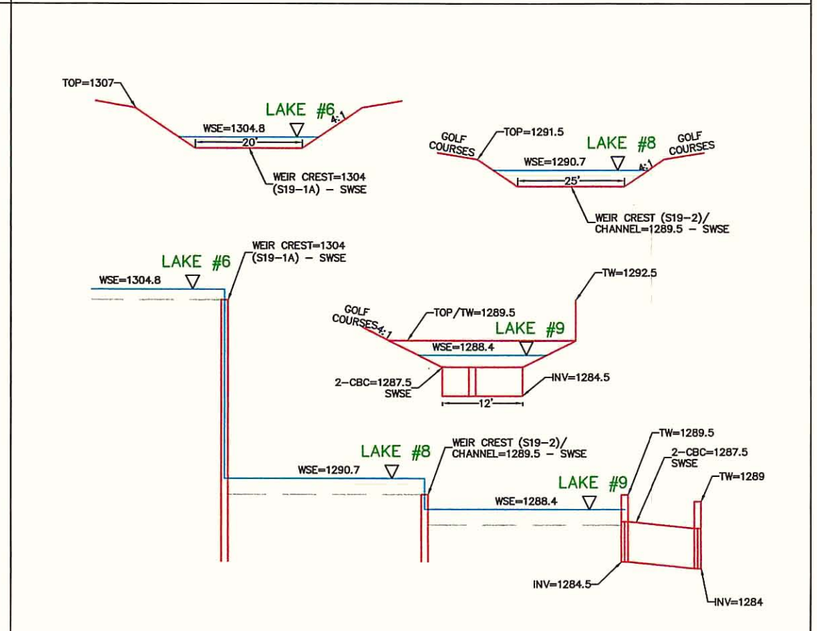
FIGURE AL-3.1
ARROWHEAD LAKES OPTION
100-YEAR WATER SURFACE

IN ASSOCIATION WITH:
PENTAGORE ARIZONA









LEGEND

LAKE #1 — 100-YEAR WATER SURFACE IN LAKE (WSE)

— — STARTING WATER SURFACE IN LAKE (SWSE)

NOTE: ASSUMED STARTING WATER SURFACE IS AT TOP OF WEIR CREST ELEVATION (SWSE)

NOTE: CROSS-SECTIONS ARE APPROXIMATED LOOKING UPSTREAM AT WEIR/OUTFALL

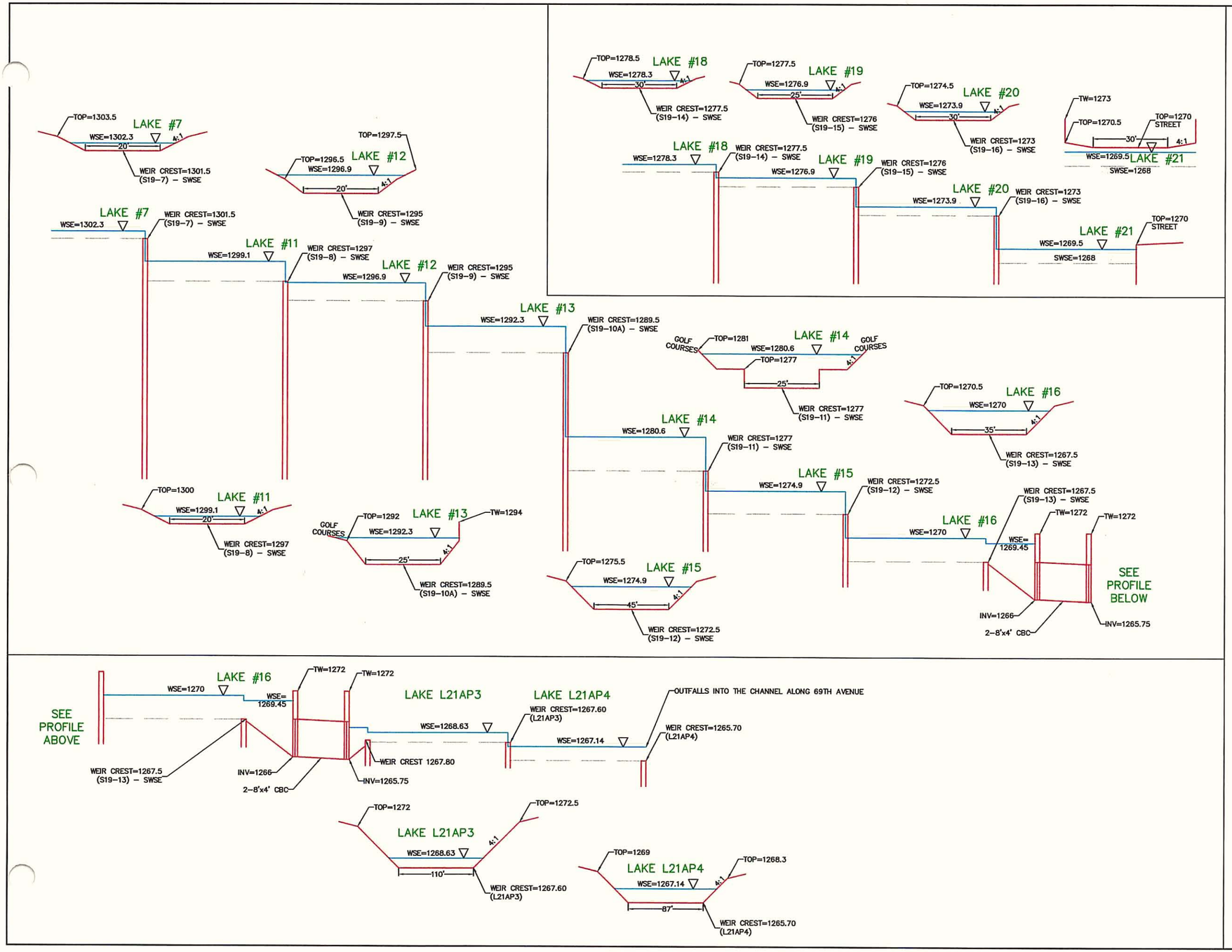
SCALE
H: N/A
V: 1"=10'

Entellus™
2255 N. 44th Street Suite 125
Phoenix, AZ 85008-3279
Tel 602.244.8500
Fax 602.244.8667
Project No. 310.017

GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

FIGURE AL-3.2
ARROWHEAD LAKES
100-YEAR WATER SURFACE

IN ASSOCIATION WITH:
PENTAGORE ARIZONA
Civil Engineers
Land Surveyors
Water Resources
Planners
Phone (602) 956-0327 Fax (602) 956-0333



LEGEND

LAKE #1 — 100-YEAR WATER SURFACE IN LAKE (WSE)

— — STARTING WATER SURFACE IN LAKE (SWSE)

NOTE: ASSUMED STARTING WATER SURFACE IS AT TOP OF WEIR CREST ELEVATION (SWSE)

NOTE: CROSS-SECTIONS ARE APPROXIMATED LOOKING UPSTREAM AT WEIR/OUTFALL

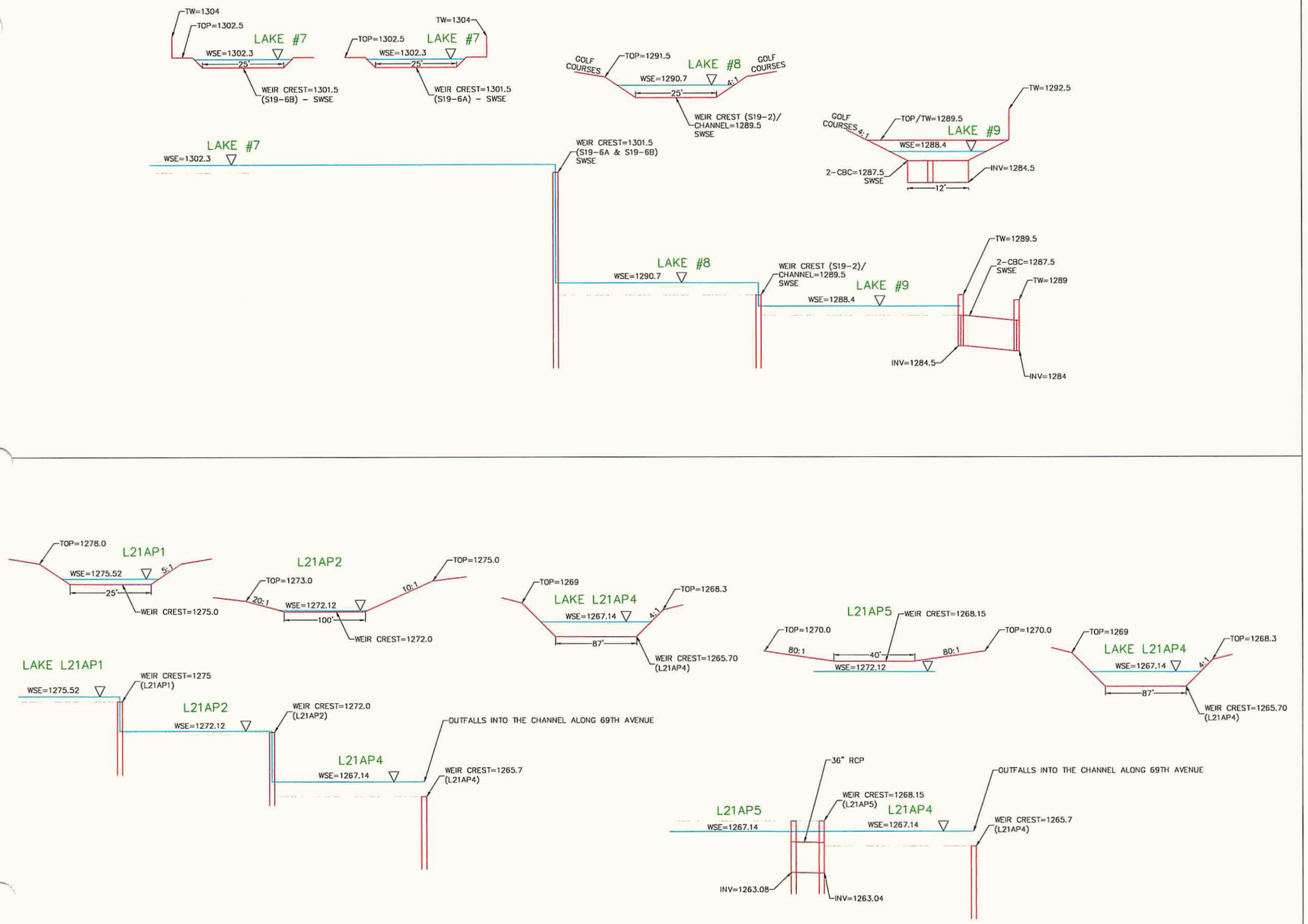
SCALE
H: N/A
V: 1"=10'

Entelus™
2225 N. 44th Street Suite 125
Phoenix, AZ 85008-3279
Tel 602.443.9300
Fax 602.443.9307
Project No. 310.017

GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

FIGURE AL-3.3
ARROWHEAD LAKES
100-YEAR WATER SURFACE

IN ASSOCIATION WITH:
PENTAGORE ARIZONA



LEGEND

LAKE #1 — 100-YEAR WATER SURFACE IN LAKE (WSE)

STARTING WATER SURFACE IN LAKE (SWSE)

NOTE: ASSUMED STARTING WATER SURFACE IS AT TOP OF WEIR CREST ELEVATION (SWSE)

NOTE: CROSS-SECTIONS ARE APPROXIMATED LOOKING UPSTREAM AT WEIR/OUTFALL

SCALE
H: N/A
V: 1"=10'

Entellus™
2255 N. 44th Street, Suite 125
Phoenix, AZ 85008-3279
Tel 602.244.2566
Fax 602.244.8947
Project No. 310.017

CLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

FIGURE AL-3.4
ARROWHEAD LAKES
100-YEAR WATER SURFACE

IN ASSOCIATION WITH:
PENTACORE ARIZONA

APPENDIX A. REFERENCES

A.1. Data Collection Summary

The following **Table AL-1** summarizes the data collected as part of this study.

A.2. Reference Documents

1 CDM INC. and JM Montgomery Inc., Glendale - Peoria Area Drainage Master Plan, May 1987.

2 U.S. Department of Agriculture, Soil Conservation Service, *Technical Release 20 (SCS-TR-20),* 1975.

3 Flood Control District of Maricopa County, *Aerial Topographic Mapping*, 1996.

4 Flood Control District of Maricopa County, *Aerial Photographs*, 1996.

5 Databased Terrain Mapping, Inc. *Glendale/Peoria ADMP update aerial Mapping*, January 2000.

6 U.S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Maricopa County, Arizona-Central Part*, April 1986.

7 U.S Department of Army, Corps of Engineers, Hydrologic Engineering Center, *Generalized Computer Program 723-X6-L2010, HEC-1 Flood Hydrograph Package*, Davis California, February 1981, Revised May 1991.

8 Flood Control District of Maricopa County, *Hydrology Design Manual for Maricopa County, Arizona, Volume 1- Hydrology*, January 1995.

9 Kaminski-Hubbard Engineering, Inc. *Arizona Canal Diversion Channel Area Drainage Master Study*, Volumes 1.2, 1.3, & 1.5, May 1995

10 U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, *Precipitation-Frequency Atlas of the Western United States, Volume VIII – Arizona*, 1993.

11 U.S. Department of Transportation, Federal Highway Administration (FHWA) Culvert Analysis, *HY8*, Version 6.0.

12 Haested Methods, Inc., *Flowmaster PE*, Version 6.0.

13 Ernest F. Brater and Horace Williams King, *Handbook of Hydraulics*, Sixth Edition, Table 5-3, Page 5-40, 1982.

14 Dibble & Associates Consulting Engineers, *Preliminary Storm Drainage Master Plan – Arrowhead Ranch, Glendale, Arizona*, July 1982.

15 U.S. Department of Transportation, Federal Highway Administration (FHWA), *Hydraulic Design of Highway Culverts,* September 1985.

A.3. General Documentation and Correspondence

The General Documentation and Correspondence for the Hydrology Report can be found in the *Glendale/Peoria Area Drainage Master Plan – Administrative Report – Volume AR.*

A.4. Survey Field Notes

The Survey Field Notes for the entire project can be found in the *Glendale/Peoria Area Drainage Master Plan - Data Collection – Volume DC.* The Survey Field Notes pertaining to the Arrowhead Lakes study area are located on the following pages.

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Data Collection Summary - As-Built Plans

Table AL-1

Data Number	Data Description Reports	Prepared by	Date
400	Proposed Hydraulic Modifications to Lake 7 - Arrowhead Lakes	PACE	May-00
401	Hydrology & Hydraulics Report for Camelot Views at Arrowhead Ranch	Clouse Engineering Inc.	Jan-93
403	Hydrology & Hydraulics Report for Arrowhead Lakes Unit 8	Clouse Engineering Inc.	May-93
405	Hydrology & Hydraulics Report for Top of the Ranch One	Clouse Engineering Inc.	Sep-90
406	Arrowhead Ranch Parcel 1 - Drainage Supplement 1	CMX	May-96
407	Drainage Report for Fulton Homes at Arrowhead Ranch Phase 1	American Engineering Company	Jun-92
408	Hydrology & Hydraulics Report for Arrowhead Ranch Parcel 6	Clouse Engineering Inc.	Jun-93
409	Hydrology & Hydraulics Report for Arrowhead Ranch Parcels 3 & 4	Clouse Engineering Inc.	Sep-93
410	Hydrology & Hydraulics Report for Tanoan & Top of the Ranch Three	Clouse Engineering Inc.	Sep-93
411	Hydrology & Hydraulics Report for Arrowhead Lakes Units 5A & 5B	Clouse Engineering Inc.	Mar-93
415	Arrowhead Enclave - Final Drainage Report	CMX	Mar-97
416	Final Drainage Report for the Arrowhead Lakes Unit 6	Sage Engineering	May-93
418	Master Drainage Study for Continental at Arrowhead Ranch	Clouse Engineering Inc.	Dec-93
419	Hydrology & Hydraulics Report for Arrowhead Ranch Parcel 2	Clouse Engineering Inc.	Feb-93
420	Hydrology & Hydraulics Report for Tuscany Point	Clouse Engineering Inc.	Feb-93
421	Drainage Report for Fulton Homes at Arrowhead Ranch Phase 2	American Engineering Company	Oct-92
423	Addendum to Final Drainage Report for Estates at Arrowhead -Phase 1	Harrsion Group	Jan-95
426	Drainage Report for Arrowhead Ranch Parcel 10	Clouse Engineering Inc.	Sep-95
427	Hydrology & Hydraulics Report for Arrowhead Ranch Parcel 5	Clouse Engineering Inc.	Feb-94
432	Final Drainage Report for the Arrowhead Lakes Unit 7	Sage Engineering	May-93
433	Arrowhead Ranch - Preliminary Storm Drainage Master Plan	Dibble & Assoc. Consulting Engineers	Jul-82
434	Lake W Improvements - Arrowhead Ranch Phase III	Dibble & Assoc. Consulting Engineers	Apr-98
435	Arrowhead Ranch Sec. 18 & 19 - Proposed Lake System Storm Drainange	URS Corporation	Apr-86

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Data Collection Summary - As-Built Plans

Table AL-1

Data Number	Data Description As-Built Plans	Prepared by	Date
436	Paving and Grading Plans for Arrowhead Lakes Unit 1	Greiner Engineering	Jun-85
437	Paving and Grading Plans for Arrowhead Lakes Unit III	Greiner Engineering	Jul-85
438	Grading & Drainage Plans Arrowhead Lakes Unit 4	The Harrison Group, Inc.	Jun-92
439	Fulton Homes at Arrowhead Ranch Unit One - Grading Plan	American Engineering Company	Jun-92
440	Fulton Homes at Arrowhead Ranch Unit Two - Grading Plan	American Engineering Company	Oct-92
441	Paving and Grading Plan for Arrowhead Lakes Unit 5A & 5B	Clouse Engineering Inc.	May-93
442	Arrowhead Lakes Unit 6 - Grading Plan	Sage Engineering	Apr-93
443	Arrowhead Lakes Unit 7 - Grading Plan	Sage Engineering	Apr-93
444	Paving and Grading Plan for Arrowhead Lakes Unit 8A & 8B	Clouse Engineering Inc.	Jun-93
445	Grading & Drainage Planes for The Estates at Arrowhead Phase One A	The Harrison Group, Inc.	Dec-94
446	Grading Plans for Estates at Arrowhead Phase One B	The Harrison Group, Inc.	Apr-96
447	Paving/Grading Plans for Arrowhead Manor Estates	The Harrison Group, Inc.	Jun-96
448	Grading Plans Trail's End	The Harrison Group, Inc.	Jun-97
449	Grading & Drainage Plans - Arrowhead Legends	Keogh Engineering, Inc.	Jan-94
450	Grading & Drainage Plan for Tanoan & Top Of The Ranch III	Clouse Engineering Inc.	Dec-93
451	Grading & Drainage Plan for Top Of The Ranch II	Clouse Engineering Inc.	Feb-92
452	Grading & Drainage Plan for Hamilton Arrowhead Ranch Five	Clouse Engineering Inc.	Aug-91
453	Grading & Drainage Plan - Arrowhead Ranch Parcel 1	CMX Group Inc.	Jun-95
454	Grading & Drainage Plan for Arrowhead Ranch Parcel 2	Clouse Engineering Inc.	Mar-93
455	Grading & Drainage Plan for Arrowhead Ranch Parcel 3 & 4	Clouse Engineering Inc.	Oct-93
456	Grading & Drainage Plan for Arrowhead Ranch Parcel 6	Clouse Engineering Inc.	Jul-93
457	Grading & Drainage Plan for Arrowhead Ranch Parcel 7	Clouse Engineering Inc.	Mar-93
458	Grading Plans for Arrowhead Ranch Parcel 8	JMI Associates	Mar-93
459	Grading Plans - Arrowhead Ranch Parcel 9	JMI Associates	Mar-93
460	Grading & Drainage Plan - Arrowhead Enclave	CMX Group Inc.	May-97
461	Discovery at Arrowhead Ranch - Grading & Drainage Plans	The Keith Companies - Arizona	Aug-91
462	Grading & Drainage Plan for Tuscany Point	Clouse Engineering Inc.	Mar-93
463	Grading & Drainage Plan for Camelot Views	Clouse Engineering Inc.	Jun-93
464	Pebble Beach - Grading & Drainage Plan - Phase I	Wood/Patel Associates	Aug-97
465	Sierra Verde - Shea Home - 67th Avenue/Lake "W" Storm Drain	PACE	Dec-97
466	W & S Quarter-Section Map - NO. 41-13 - S.W.1/4 SEC.19, T-4-N, R-2-E	City of Glendale - Engr. Depart.	
467	W & S Quarter-Section Map - NO. 41-14 - S.E.1/4 SEC.19, T-4-N, R-2-E	City of Glendale - Engr. Depart.	
468	W & S Quarter-Section Map - NO. 41-15 - S.W.1/4 SEC.20, T-4-N, R-2-E	City of Glendale - Engr. Depart.	
469	W & S Quarter-Section Map - NO. 41-16 - S.E.1/4 SEC.20, T-4-N, R-2-E	City of Glendale - Engr. Depart.	
470	W & S Quarter-Section Map - NO. 42-13 - N.W.1/4 SEC.19, T-4-N, R-2-E	City of Glendale - Engr. Depart.	
471	W & S Quarter-Section Map - NO. 42-14 - N.E.1/4 SEC.19, T-4-N, R-2-E	City of Glendale - Engr. Depart.	
472	W & S Quarter-Section Map - NO. 42-15 - N.W.1/4 SEC.20, T-4-N, R-2-E	City of Glendale - Engr. Depart.	
473	W & S Quarter-Section Map - NO. 42-16 - N.E.1/4 SEC.20, T-4-N, R-2-E	City of Glendale - Engr. Depart.	
474	W & S Quarter-Section Map - NO. 43-13 - S.W.1/4 SEC.18, T-4-N, R-2-E	City of Glendale - Engr. Depart.	
475	W & S Quarter-Section Map - NO. 43-14 - S.E.1/4 SEC.18, T-4-N, R-2-E	City of Glendale - Engr. Depart.	

A.4. Survey Field Notes

SOKKIA™

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[redacted]

SOKKIA™ BOOK 2

ECONOMY
FIELD BOOK

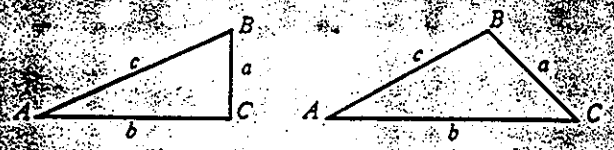
ADMP
UPDATE
ARROWHEAD
LAKES
CONTROL
BOOK 2

SEC. CORE MON. LOCATIONS

ASSOCI

No. 8152-05

FORMULAE FOR SOLVING RIGHT TRIANGLES



$$\text{Sin } A = \frac{a}{c} = \text{Cos } B \qquad \text{Cot } A = \frac{b}{a} = \text{Tan } B$$

$$\text{Cos } A = \frac{b}{c} = \text{Sin } B \qquad \text{Sec } A = \frac{c}{b} = \text{Cosec } B$$

$$\text{Tan } A = \frac{a}{b} = \text{Cot } B \qquad \text{Cosec } A = \frac{c}{a} = \text{Sec } B$$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A,\ a = c \sin A,\ b = c \cos A$
A, b	B, a, c	$B = 90° - A,\ a = b \tan A,\ c = \frac{b}{\cos A}$
A, a	B, b, c	$B = 90° - A,\ b = a \cot A,\ c = \frac{a}{\sin A}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B,\ b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B,\ c = \sqrt{a^2 + b^2}$

FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a},\ c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C,\ c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

MADE IN USA

ADMP – ARROWHEAD LAKES
5043.0001

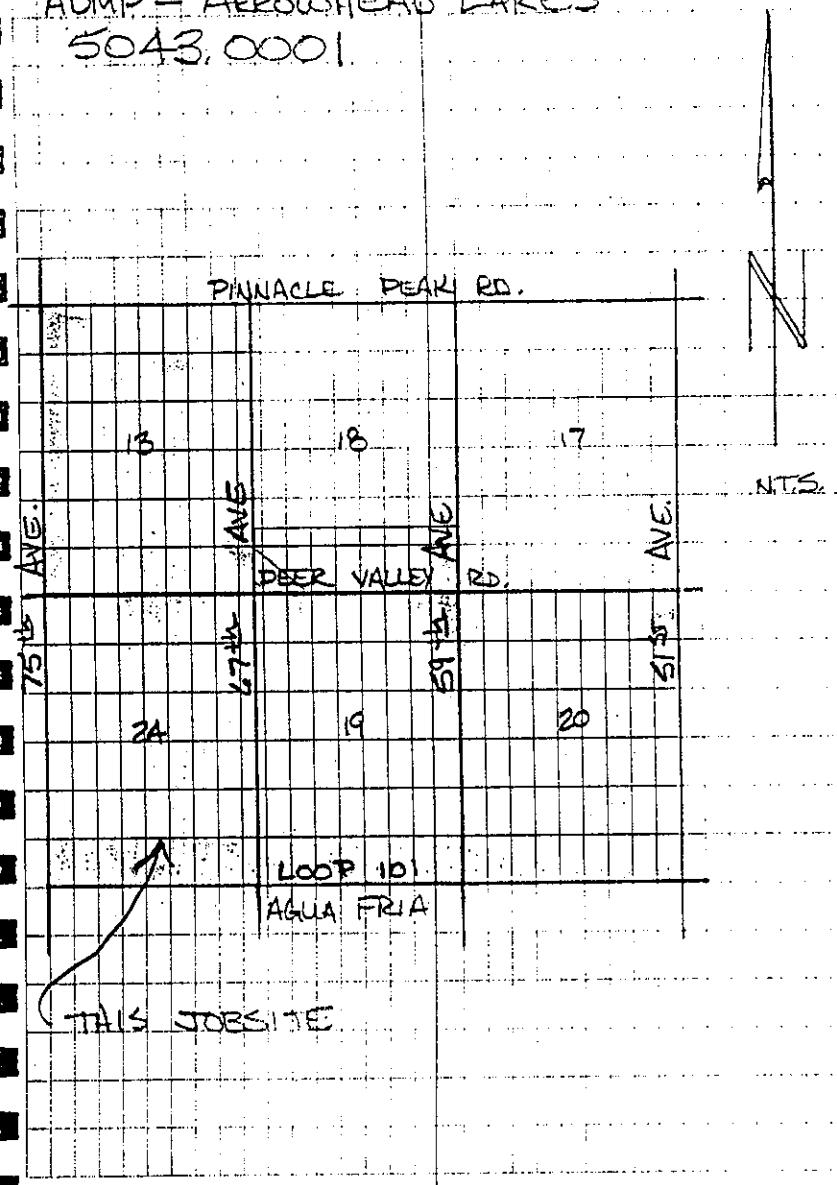


TABLE OF CONTENTS

DESCRIPTION	PG. #		
BENCH LOOP FROM #7203 TO #99112 & #99111	1-7		
CONTROL PT. LOCATIONS & CALIBRATION PT.'S	8-9		
SEC. COR. & MON. LOCATIONS	10-15	GPS	R. ROMAN, J. KRAFT 12-13-2000
	16-17	GPS	R. ROMAN, J. KRAFT 12-14-2000

I		LOOP	TO" 44112	
STA	+	HI	-	ELEV. 1293.60
	-5.83	1299.43		
TP # 1			5.30	1294.13
	6.48	1300.61		
TP # 2			3.75	1296.86
	6.31	1303.17		
TP # 3			6.11	1297.06
	4.44	1301.50		
TP # 4			2.05	1299.45
	8.91	1308.36		
TP # 5			1.06	1307.30
	2.08	1309.38		
		CONT.!		

A JN CLOUDY & HUMID 95°

DESCRIPTION

P.K. W/ SHINER @ COR. OF V.G. & APRON @ NE CORNER OF 64th AVE & LOUISE DR.

"☒" @ B/C-T/C @ 200'+/- N. OF 64th AVE ON E. SIDE OF DEER VALLEY RD.

"☒ @ B/C-T/C @ 6313 DEER VALLEY RD. ON E. SIDE OF DEER VALLEY RD.

"☒" @ B/C-T/C 300'+/- N. OF 63RD AVE. ON E. SIDE OF DEER VALLEY RD.

"☒" @ B/C-T/C @ N BCR OF DEER VALLEY RD & 61ST DR.

"☒" @ B/C-T/C 300'+/- N. OF 61ST AVE ON (E) SIDE OF DEER VALLEY RD.

STA		HI	-	ELEV.	DESCRIPTION
	2.08	1309.38			
TP#6			6.57	1302.81	"⊠" @ B/C-T/C @ 100'+/- N. OF 59th AVE ON MELINDA LANE (DEER VALLEY TO N) ON W. SIDE RD.
	4.76	1307.57			
TP#7			4.47	1303.10	"⊠" @ B/C-T/C · 700'+/- N. OF 59th AVE ON MELINDA ON W. SIDE OF RD.
	4.89	1307.99			
TP#8			3.11	1304.88	"⊠" @ B/C-T/C 600'+/- N. OF T.P. #7, W. SIDE OF RD. @ S. END OF BRIDGE.
	3.15	1308.03			
TP#9			4.44	1303.59	"⊠" @ B/C-T/C 400'+/- N. OF 56th AVE ON W. SIDE OF RD.
	1.00	1304.59			
TP#10			3.98	1300.61	"⊠" @ B/C-T/C @ S. SIDE OF ISLAND @ MELINDA & 53RD DR.
	4.25	1304.86			
		CONT'			

STA	+	HI	−	ELEV.	DESCRIPTION
	4.25	1304.86			
TP#11			5.47	1299.39	"⊠" ¾-⅞ @ 50'± E. OF MELINDA LN. ON ARROWHEAD LAKES DR.
	11.00	1310.39			
TP#12			0.77	1309.62	"⊠" ¾-⅞ @ 10'± E. OF TP #11
	16.40	1326.02			
TP#13			1.15	1324.87	C.O.G. BCFD. ON ℄ OF ARROWHEAD LAKES DR, EAST OF MELINDA LN. POINT IS @ WEST END OF BULL NOSE @ GATED ENTRANCE TO PRIVATE SUBDIVISION.
	0.81	1325.68			
TP#12			16.07	1309.61	
	0.89	1310.50			
TP#11			11.11	1299.39	
	5.22	1304.61			
TP#10			3.98	1300.63	
	3.89	1304.52			
TP#9			0.91	1303.61	
	3.89	1307.50			
TP#8			2.62	1304.88	
	2.27	1307.15			
		CONT'			

STA	+	HI	−	ELEV.
	2.27	1307.15		
TP #7			4.05	1303.10
	4.31	1307.41		
TP #6			4.61	1302.80
	6.97	1309.77		
TP #5			2.48	1307.29
	1.29	1308.58		
TP #4			9.13	1299.45
	2.08	1301.53		
TP #3			4.47	1297.06
	6.25	1303.31		
TP #2			6.45	1296.86
	3.59	1300.45		
TP #1			6.33	1294.12
	4.96	1299.08		
TBM			5.49	1293.59

DESCRIPTION

BEN LOOP TO #99111

STA	+	HI	−	ELEV.
				1299.39
	5.14	1304.53		
TP#1			4.99	1299.54
	7.09	1306.63		
TP#2			8.21	1298.42
	6.38	1304.80		
TP#3			4.59	1300.21
	9.37	1309.58		
TP#4			8.51	1301.07
	15.73	1316.80		
TP#5			4.70	1312.10

DESCRIPTION

TP#11 FROM BENCH LOOP TO #99112
(SEE PG. 3 THIS BOOK)

"⊠" @ B/C-T/C 400'+/- N. OF ARROWHEADS LAKES DR ON W. SIDE OF RD (50'+/- S OF ABRAHAM) (MELINDA CHANGES TO 52ND AVE @ ABRAHAM)

"⊠" @ B/C-T/C 300'+/- N. OF LONE CACTUS ON THE E. SIDE OF 52ND AVE. @ ℄ OF CATCH BASIN

"⊠" @ B/C-T/C 300'+/- N. OF ROSE GARDEN ON W. SIDE OF RD.

"⊠" @ B/C-T/C 150'+/- N. OF POTTER DR ON E SIDE OF RD. (@ ℄ OF MATCH BASIN)

"⊠" @ B/W-T/W 100'+/- E OF POTTER ON 51ST AVE S. SIDE OF RD.

STA		HI	—	ELEV.	DESCRIPTION
	0.25	1312.35			
TP#6			9.45	1302.90	"⊠" @ 3/4"-7/8" 40' E OF IRMA DR/S. SIDE ⌂.
	3.37	1306.27			
TP#7			5.19	1301.08	"⊠" @ 3/4"-7/8" 300'+/- E. OF TONOPAH DR. S. SIDE OF RD.
	5.69	1306.77			
TP#8			4.13	1302.64	P.K. IN SHINER @ SOUTH END OF ℄ DIVIDER BULLNOSE @ 51ST AVE & BEARDSLEY RD. (NORTH FRONTAGE RD. OF LOOP 101)
	3.83	1306.47			
TP#7			5.39	1301.08	
	5.14	1306.22			
TP#6			3.32	1302.90	
	9.82	1312.72			
TP#5			0.61	1312.11	
	4.58	1316.69			
TP#4			15.61	1301.08	
	8.69	1309.77			
TP#3			9.55	1300.22	
	4.57	1304.79			
		CONT'			

STA	+	HI	—	ELEV.	DESCRIPTION
	4.57	1304.79			
TP#2			6.36	1298.43	
	8.12	1306.55			
TP#1			6.99	1299.56	
	4.98	1304.54			
TBM			5.15	1299.39	TP#11 FROM BENCH LOOP TO #99112 (SEE PG. 3, THIS BOOK)

Control & Calibration Pt. Locations

Base @ # 1000 #4RB
Ht = 5.28

Pt #	Description
1001	C.O.G. BCFD @ Arrowheads Lakes Rd & Arrowhead Manor Estates. N.E of Melinda Ln. 400'+/- @ S.W. end of Bullnose (#99112) First Shot
1002	P.K. in shiner @ S. end of ℄ divider bullnose @ 51st Ave & Beardsley Rd. (N. frontage Rd of Loop 101) (#99111)
1003	ADOT BCHH @ 75th Ave & Loop 101. S. side Loop 101 @ ℄ 75th Ave in island N. of crosswalk. (Aerial target) (#99084)
1004	C.O.G. BCFD @ ℄ of Cul-de-sac 7431 W. Monte Lindo (#99913)

Cont'

K. Deer Cloud & Lund 90°

#4RB @ S.W. cor. of 59th Ave & Deer Valley Rd 26'+/- S of Deer Valley & 40'+/- W. of 59th Ave. (All measurements from ℄)

** All control points **
* located in 10 min. *
** sessions. **
* GPS 4800 *

PT. #	DESCRIPTION
1005	C.O.G BCFD @ MONONIA & 67th DRIVE (1 BLOCK W. OF 67th AVE) (#99095)
1006	P.K. IN SHINER @ COR. OF V.G & APRON @ N.E. COR. OF 64th AVE & LOUISE DR. (#7203)
1007	C.O.G BCFD @ 61st DR & DEER VALLEY (#99102)

SITE CALIBRATION PT'S

GRID = #99913
GPS = #1004 HORIZ. & VERT.

GRID = #99084
GPS = #1003 HORIZ & VERT.

GRID = #99095
GPS = #1005 HORIZ. ONLY

LAST SHOT

GRID = #7203
GPS = #1006 HORIZ & VERT.

GRID = #99112
GPS = #1001 VERT. ONLY

GRID = #99111
GPS = #1002 VERT. ONLY

SEC COR & MON. LOCATIONS

BASE @ #1 #4RB (1/2") @ TOP OF SLOPE OUT @ ℄ OF LOT 15
(SEE BOOK 4, PG. 1)
GRND TO ANT. = 4.93 (HOOK TAPE)

PT #	DESCRIPTION
710	FIRST SHOT
710	FD #4RB (1/2") @ INT. OF DEER VALLEY RD & 95th AVE. PROPOSED SEC 1/4 COR. FOR S SIDE OF SEC. 16.
711	FD. #5RB (3/4") @ PROPOSED S.W. COR. OF SEC. 16 (DEER VALLEY RD & 99th AVE ALIGNMENT)
712	FD. #4RB (1/2") @ PROPOSED S. 1/4 COR. FOR SEC. 17.
713	FD. C.O. PEORIA BCHH @ INT. OF DEER VALLEY RD & 107th AVE PROPOSE SW COR. SEC. 17

CONT.

J. [illegible] CLEAR & WARM 65° 10

** ALL SEC. COR.'S & MON. **
* LOCATED IN 1 MIN. *
** SESSIONS **

PT #	DESCRIPTION
714	FD. C.O. PEORIA BC FLUSH @ INT. OF 109th AVE & ROSE GARDEN LN.
715	FD. C.O. PEORIA BCHH @ INT. OF 107th AVE & ROSE GARDEN LN. PROPOSED 1/4 COR. FOR W. SIDE OF SEC. 20.
716	FD. C.O. PEORIA BC FLUSH ON N. SIDE OF ROSE GARDEN LN. BETWEEN 102ND LN & LAKE PLEASANT PKWY. (RD) PROPOSED CENTER OF SEC. 20.
717	FD. C.O. PEORIA BC FLUSH @ INT. OF ROSE GARDEN LN & LAKE PLEASANT RD.
718	FD. PK. NAIL @ INT. OF 111th AVE & BEARDSLEY RD. (1 OF 4)
719	FD. PK. NAIL (2 OF 4)
720	FD. PK. NAIL (3 OF 4)

CONT.

PT #	DESCRIPTION
721	FD. P.K. NAIL @ INT. OF 111th AVE & BEARDSLEY RD. (4 OF 4)
722	FD. BCHH @ INT. OF 107th AVE & BEARDSLEY RD. PROPOSED S.W. COR. OF SEC. 20
723	FD. C.O. PEORIA BC FLUSH ON S. SIDE OF BEARDSLEY RD. @ PROPOSED 1/4 COR ON S SIDE OF SEC. 20
724	FD. P.K. NAIL IN POTHOLE @ INT. OF BEARDSLEY RD. & LAKE PLEASANT RD.
725	FD. C.O. PEORIA BCHH @ INT. OF 99th AVE & BEARDSLEY RD. PROPOSED SE. COR. SEC. 20
726	FD. C.O. PEORIA BCHH @ INT. OF DEER VALLEY RD & 83RD AVE. PROPOSED SE. COR. SEC. 15

CONT'

PT #	DESCRIPTION
727	FD. MARICOPA COUNTY HWY. DIV. BCHH @ INT. OF 83RD AVE & WILLIAMS RD. PROPOSED 1/4 COR. FOR E. SIDE OF SEC. 15
728	FD. MCHD BCHH @ INT. OF 83RD AVE & PINNACLE PEAK RD. PROPOSED 1 N.E. COR. SEC. 15
729	FD. M.C.H.D. BCHH @ INT. OF 83RD AVE & CALLE LEJOS PROPOSED 1/4 COR. FOR E. SIDE OF SEC. 10
730	FD V.O. PEORIA BC FLUSH @ INT. OF PINNACLE PEAK RD. & 87th AVE PROPOSED 1/4 COR. FOR N. SIDE OF SEC. 15
731	FD. STONE IN POTHOLE @ INT. OF PINNACLE PEAK RD & 95th AVE PROPOSED 1/4 COR. FOR N. SIDE OF SEC. 16

CONT.

PT #	DESCRIPTION
732	FD. MCHD. BCHH @ INT. OF PINNACLE PEAK RD & 99th AVE. PROPOSED N.W. COR. SEC. 16
733	FD. #4 RB (1/2") ON E. SIDE OF LAKE PLEASANT RD & PINNACLE PEAK RD. @ ℄ OF PINNACLE PEAK
734	FD #4 RB w/CAP R.A. DELP LS #17178 ON W. SIDE OF LAKE PLEASANT RD. @ ℄ OF PINNACLE PEAK RD., 30'± W. OF EDGE OF PAV.
735	FD. STONE w/ CHISLED "+" @ PROPOSED 1/4 COR. FOR N. SIDE OF SEC. 17
736	FD. #4 RB (1/2") IN VICINITY OF PROPOSE 1/4 COR. FOR N. SIDE OF SEC. 17.
737	FD. #4 RB (1/2") w/CAP RLS #16887 IN VICINITY OF 1/4 FOR N. SIDE OF SEC. 17.

PT #	DESCRIPTION
738	FD. STONE W/ CHISLED "+" @ PROPOSED N.W. COR. OF SEC. 17
738	LAST SHOT

SEC. ● & MON LOCATIONS CONT. J.K. ● P.CLOUDY & WARM 65° 16

BASE @ #1 *4RB (1/2") @ TOP OF SLOPE
CUT @ APPROX ℄ OF LOT 15
(SEE BOOK 4, PG. 1)
GRND TO ANT = 4.93 (HOOK TAPE)

PT #	DESCRIPTION
739	FIRST SHOT
739	FD. M.C.H.D. BCHH @ INT. OF HAPPY VALLEY RD & 67th AVE. PROPOSED N.W. COR. OF SEC. 7
740	FD. MCHD BCHH @ ℄ OF 67th AVE @ PROPOSE NE COR OF SEC. 12 (0.10 MILES SOUTH OF HAPPY VALLEY RD.)
741	FD. MCHD BCHH @ ℄ OF 67th AVE. APPROX 100'+/- SOUTH OF VILLA LINDO @ PROPOSED 1/4 COR. FOR W. SIDE OF SEC. 7

CONT.

T #	DESCRIPTION
742	FD. MCHD BCHH @ INT. OF 67th AVE & PINNACLE PEAK (E. BOUND) PROPOSED SW COR. OF SEC. 7
743	FD. MCHD BCHH @ INT. OF 67th AVE & PINNACLE PEAK (W. BOUND) PROPOSED SE COR OF SEC. 12
744	FD. C.O. GLENDALE B.C. FLUSH @ INT. OF PINNACLE PEAK (W.) & 74th AVE. (ADMP #88049)
745	FD. C.O. GLENDALE BC FLUSH @ INT. OF PINNACLE PEAK (W) & 71ST AVE. (S)
746	FD. BC. SPINDLE @ INT. OF PINNACLE PEAK (W) & 71ST AVE (N)
746	LAST SHOT

Points

Project name	50430629		
Coordinate Units	International feet		
Distance Units	International feet		
Height Units	International feet		
Date printed	5/24/01 9:53:33 AM		
Coordinate System	US State Plane 1983	**Zone**	Arizona Central 0202
Datum	NAD 1983 (Conus)	**Geoid model**	GEOID99 (Conus)

Coordinate units: International feet
Elevation units: International feet

Point listing

Name	Northing	Easting	Elevation	Feature Code
7203	975913.570	614378.727	1293.603	136
99095	973347.006	612666.916	1271.453	136
99913	980807.225	607962.630	1308.213	136
99084	970408.912	607590.196	1258.433	136
1000	976069.839	617774.608	1299.871	136
1001	975272.787	621703.083	1321.038	136
1002	971050.253	623137.975	1298.828	136
1003	970408.536	607589.969	1254.761	136
1004	980807.742	607962.360	1304.562	136
1005	973346.839	612667.073	1267.760	136
1006	975913.596	614379.068	1289.751	136
99111	971050.253	623137.975	0.000	136
99112	975272.787	621703.083	1324.873	136
1007	975921.138	616650.826	1295.255	136

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Points

Project name	50431214		
Coordinate Units	International feet		
Distance Units	International feet		
Height Units	International feet		
Date printed	5/24/01 10:11:02 AM		
Coordinate System	Projection from data collector	**Zone**	Zone from data collector
Datum	(WGS 84)	**Geoid model**	Not selected

Coordinate units: International feet
Elevation units: International feet

Point listing

Name	Northing	Easting	Elevation	Feature Code
1	983699.973	615500.490	1435.716	RB
5	984727.021	615875.485	1375.585	FCBC
6	986814.238	616544.479	1407.078	BCF
7	987854.657	612887.887	1386.726	BCHH
8	983641.640	612847.348	1350.348	BCHH
4	980866.937	615440.782	1342.136	FCBC
9	975911.074	614384.167	1293.568	PK IN SHINER
10	979455.558	614512.403	1391.522	PK IN SHINER
7A	987854.166	612887.656	1387.103	BCHH
8A	983641.557	612847.066	1350.073	PK SHINER
9A	975911.722	614383.809	1293.603	PK SHINER
10A	979455.869	614512.039	1391.543	PK SHINER
4A	980867.039	615440.476	1342.063	FCBC
5A	984727.124	615875.168	1375.673	FCBC
6A	986814.344	616544.155	1407.013	BCFD
100	985264.125	616557.299	1380.458	COR WGWL
101	985257.135	616549.110	1383.208	COR WGWL
102	985231.985	616549.951	1383.280	COR WGWL
103	985225.202	616558.187	1380.520	COR WGWL
104	985253.274	616549.613	1377.367	FL
105	985247.379	616549.852	1377.311	FL
106	985241.799	616550.025	1377.319	FL
107	985235.972	616550.121	1377.443	FL
108	985254.515	616543.308	1382.996	BARRICADE
109	985233.960	616543.797	1382.868	BARRICADE
110	985193.628	616544.501	1381.096	NG
111	985194.155	616535.440	1383.062	EP
112	985195.318	616517.070	1383.325	P
113	985196.407	616496.278	1383.626	BC
114	985195.951	616492.232	1383.706	BW
115	985196.594	616486.853	1383.233	NG
116	985229.347	616479.933	1380.285	CORWGWL
117	985231.982	616489.419	1382.935	CORWGWL
118	985257.068	616488.448	1383.002	CORWGWL
119	985258.992	616479.124	1380.357	CORWGWL
120	985236.016	616488.458	1377.292	FL
121	985241.701	616488.344	1377.308	FL
122	985247.197	616488.250	1377.306	FL
123	985252.831	616488.169	1377.352	FL
124	985235.955	616496.841	1382.793	BC
125	985253.038	616497.143	1382.716	BC

126	985244.443	616499.139	1382.804	CLVG
127	985244.697	616536.000	1382.870	CLVG
128	985244.898	616517.492	1382.862	CLVG
129	985232.003	616535.618	1382.911	EP
130	985257.755	616536.329	1382.904	EP
131	985283.773	616543.339	1382.358	NG
132	985284.780	616536.515	1382.903	EP
133	985285.375	616520.838	1383.035	P
134	985286.024	616497.724	1383.138	BC
135	985286.206	616493.723	1383.197	BW
136	985285.855	616484.666	1385.977	NG
137	985217.025	616241.979	1380.310	TOP
138	985228.384	616242.687	1376.677	TOE
139	985243.635	616240.886	1376.879	TOE
140	985253.235	616239.573	1379.773	TOP
141	985297.261	616237.073	1379.724	NG
142	985384.606	616234.738	1380.791	NG
143	985047.425	615855.835	1376.400	WGWL
144	985053.142	615855.685	1376.409	WGWL
145	985053.994	615876.820	1377.072	WGWL
146	985048.139	615876.829	1376.486	WGWL
147	985061.526	615879.651	1376.554	BARRICADE
148	985052.424	615853.141	1376.919	BARRICADE
149	985047.787	615852.823	1377.495	BW
150	985047.764	615848.847	1377.423	BC
151	985047.447	615831.665	1377.225	P
152	985056.051	615854.689	1376.411	BW
153	985058.890	615851.810	1376.566	BC
154	985063.013	615877.740	1376.494	BW
155	985066.761	615877.730	1376.498	BC
156	985053.248	615861.528	1371.547	FL
157	985053.341	615871.882	1371.590	FL
158	985063.429	615930.627	1377.500	BW
159	985067.365	615930.854	1377.378	BC
160	985084.638	615931.167	1377.362	P
161	985100.580	615931.390	1377.419	BC
162	985104.491	615931.516	1377.472	BW
163	985104.108	615877.117	1376.588	BW
164	985100.163	615877.222	1376.632	BC
165	985084.060	615877.266	1376.581	CONC
166	985083.517	615866.018	1376.443	CONC
167	985083.410	615854.606	1376.546	CONC
168	985082.865	615830.894	1377.264	P
169	985099.814	615832.940	1377.479	BC
170	985103.853	615832.668	1377.575	BW
171	985103.987	615854.073	1376.665	BW
172	985100.148	615854.118	1376.688	BC
173	985108.481	615852.296	1376.992	BARRICADE
174	985108.369	615878.958	1377.952	BARRICADE
175	985113.650	615879.910	1376.633	WGWL
176	985108.970	615876.242	1377.242	WGWL
177	985108.993	615855.188	1377.317	WGWL
178	985114.620	615855.461	1376.849	WGWL
179	985109.239	615859.471	1371.808	FL
180	985109.268	615870.874	1372.095	FL
181	985148.836	615879.542	1380.389	TOP
182	985149.347	615870.167	1372.735	TOE
183	985122.456	615861.650	1371.859	TOE
184	985124.449	615854.915	1379.790	TOP
185	984929.076	615874.590	1371.128	TOE
186	984927.595	615869.179	1371.376	TOE
187	984925.652	615859.985	1377.132	TOP
188	984924.170	615856.611	1377.100	WIFENCE
189	984923.979	615855.477	1377.080	BW

190	984922.699	615851.850	1377.035	BC
191	984918.210	615835.977	1376.964	P
192	984913.995	615819.760	1377.148	BC
193	984907.772	615794.259	1379.484	NG
194	984807.654	615928.618	1376.012	CORHDWL
195	984813.493	615906.853	1376.120	CORHDWL
196	984818.331	615904.246	1375.598	CORWGWL
197	984817.181	615901.471	1376.232	BW
198	984815.530	615897.917	1376.195	BC
199	984809.180	615882.567	1375.988	P
200	984802.430	615867.168	1376.336	BC
201	984796.590	615849.548	1377.713	NG
202	984812.919	615904.849	1375.581	BARRICADE
203	984809.260	615905.093	1375.621	BW
204	984803.740	615903.028	1375.516	BC
205	984806.002	615930.184	1375.682	BARRICADE
206	984799.258	615925.912	1375.434	BW
207	984794.195	615924.157	1375.365	BC
208	984809.834	615922.403	1370.587	FL
209	984812.385	615912.441	1370.631	FL
210	984843.288	615909.830	1370.546	TOE
211	984839.878	615901.396	1370.746	TOE
212	984812.718	615960.243	1375.934	BC
213	984808.953	615961.157	1375.829	BC
214	984782.124	615938.361	1375.624	P
215	984765.797	615942.814	1375.645	BC
216	984762.324	615944.411	1375.671	BW
217	984741.409	615934.751	1375.533	BW
218	984740.012	615931.138	1375.504	BC
219	984715.546	615946.066	1374.791	BW
220	984713.848	615942.632	1374.587	BC
221	984707.666	615927.852	1374.653	P
222	984700.853	615912.167	1374.674	BC
223	984689.136	615907.723	1372.941	TOP
224	984685.359	615899.941	1369.824	TOE
225	984683.539	615888.986	1369.832	TOE
226	984679.862	615878.456	1374.150	TOP
227	984674.167	615869.534	1376.960	NG
228	984720.506	615890.729	1369.952	FL
229	984724.132	615880.513	1370.037	FL
230	984723.048	615870.105	1375.561	CORWGWL
231	984726.118	615875.870	1375.495	CORHDWL
232	984719.100	615895.621	1375.568	CORHDWL
233	984713.477	615898.787	1375.474	CORWGWL
234	984718.989	615898.151	1374.530	BARRICADE
235	984727.691	615873.427	1374.999	BARRICADE
236	984737.443	615878.703	1375.111	BC
237	984728.202	615899.888	1375.044	BC
238	984752.037	615908.415	1375.139	CONC
239	984767.363	615902.946	1375.139	CONC
240	984781.612	615895.132	1375.334	CONC
241	984429.759	615906.647	1372.845	TB
242	984433.878	615889.023	1367.196	TS
243	984436.442	615879.146	1367.146	TS
244	984447.302	615857.642	1372.022	NG
245	984461.133	615826.676	1379.118	TB
246	984466.868	615812.711	1379.814	BC
247	983095.936	614875.964	1362.112	NG
248	983108.017	614840.566	1360.716	TOP
249	983112.097	614824.961	1352.587	TOE
250	983114.601	614815.626	1352.813	TOE
251	983118.276	614799.177	1359.403	TOP
252	983131.404	614753.407	1360.655	NG
253	982158.643	614886.038	1351.291	NG

254	982143.491	614859.534	1350.534	TOP
255	982138.914	614850.581	1346.461	TOE
256	982133.837	614843.605	1346.919	TOE
257	982125.176	614830.508	1350.905	TOP
258	982115.905	614817.709	1352.373	NG
300	991479.987	623382.700	1472.802	BCFD
11A	991469.759	607593.897	1371.020	BCFD
11	991470.294	607593.720	1371.173	BCFD
13	981034.031	597062.571	1313.430	BCHH
302	986073.083	590401.601	1333.814	BC
301	994112.011	595258.936	1396.984	BC
12	994138.013	595622.683	1399.919	RB
12A	995716.900	597200.223	1428.113	RB
13A	981034.181	597063.628	1313.478	RB
402	983326.192	614889.339	1361.886	NG
403	983321.585	614892.413	1363.141	HDWL
404	983308.579	614899.695	1363.239	HDWL
405	983305.877	614906.291	1363.206	HDWL
406	983309.614	614924.566	1363.211	HDWL
407	983311.246	614904.458	1353.720	FL
408	983310.478	614931.272	1363.378	NG
409	983265.392	614984.767	1365.856	NG
410	983280.692	614928.435	1362.897	NG
411	983312.800	614848.031	1362.632	NG
412	983329.281	614784.455	1363.614	NG
413	983284.402	614857.143	1361.875	NG
414	983263.255	614905.990	1362.380	NG
415	983266.268	614902.359	1363.349	HDWL
416	983277.163	614892.732	1363.237	HDWL
417	983279.680	614887.558	1363.373	HDWL
418	983283.620	614861.825	1363.301	HDWL
419	983273.876	614888.376	1353.182	FL
420	982846.026	614706.218	1357.947	NG
421	982844.773	614771.072	1358.227	NG
422	982845.871	614849.240	1358.437	NG
423	982863.369	614795.104	1357.399	NG
424	982871.116	614749.963	1357.749	NG
425	982832.943	614735.453	1357.349	NG
426	982833.322	614802.995	1358.217	NG
427	982832.128	614780.155	1358.412	HDWL
428	982832.814	614751.553	1358.418	HDWL
429	982868.597	614758.789	1358.347	HDWL
430	982859.448	614767.918	1358.326	HDWL
431	982857.868	614775.371	1358.390	HDWL
432	982861.739	614789.588	1358.401	HDWL
433	982861.964	614772.416	1350.926	FL
434	982808.801	614762.338	1350.716	FL
435	988974.175	612731.473	1400.980	HDWL
436	988966.860	612738.191	1403.017	HDWL
437	988966.091	612758.625	1403.014	HDWL
438	988965.238	612781.448	1402.930	HDWL
439	988971.868	612788.446	1400.938	HDWL
440	988966.726	612759.835	1397.563	FL
441	989019.371	612760.663	1398.190	FL
442	988954.334	612690.555	1404.538	BC
443	988948.560	612763.255	1404.357	BC
444	988948.115	612818.559	1404.997	BC
445	988931.546	612687.297	1404.886	BC
446	988925.816	612754.999	1404.575	BC
447	988925.100	612810.614	1404.839	BC
448	988917.708	612818.198	1404.959	BC
449	988910.047	612810.784	1404.789	BC
450	988910.535	612758.702	1404.614	BC
451	988914.739	612700.871	1404.763	BC

452	988891.971	612698.313	1404.354	BC
453	988887.657	612756.596	1404.295	BC
454	988886.873	612819.060	1404.904	BC
455	988861.868	612784.572	1400.353	HDWL
456	988868.994	612778.115	1402.258	HDWL
457	988870.006	612756.472	1402.258	HDWL
458	988870.629	612734.910	1402.283	HDWL
459	988863.932	612727.539	1400.283	HDWL
460	988869.029	612756.417	1396.898	FL
461	988824.434	612755.862	1396.698	FL
462	988889.681	612729.409	1403.642	CB
463	988889.535	612732.777	1403.699	CB
464	988949.277	612736.204	1403.779	CB
465	988950.889	612716.125	1403.814	CB
466	988713.048	612094.279	1394.188	HDWL
467	988722.601	612092.004	1396.151	HDWL
468	988740.931	612103.552	1396.087	HDWL
469	988759.242	612114.932	1396.033	HDWL
470	988761.577	612124.639	1394.033	HDWL
471	988740.741	612104.123	1390.717	FL
472	988711.955	612147.545	1390.945	FL
473	988797.565	612124.579	1399.328	BC
474	988769.133	612103.480	1398.879	BC
475	988749.778	612089.368	1398.398	BC
476	988697.095	612057.619	1397.320	BC
477	988713.283	612022.287	1397.376	BC
478	988770.836	612054.485	1398.348	BC
479	988821.679	612091.386	1399.240	BC
480	988812.473	612110.695	1399.134	P
481	988757.743	612070.715	1398.346	P
482	988691.519	612033.836	1397.065	P
483	988758.755	612017.768	1393.781	HDWL
484	988761.709	612030.118	1395.634	HDWL
485	988780.067	612041.569	1395.604	HDWL
486	988798.430	612053.004	1395.587	HDWL
487	988811.013	612050.401	1393.697	HDWL
488	988780.381	612041.015	1390.156	FL
489	988808.801	611996.734	1389.775	FL
490	989047.349	611174.724	1391.433	NG
491	989029.073	611172.575	1386.669	NG
492	989022.843	611171.766	1385.763	NG
493	989015.382	611171.672	1384.954	TOP
494	989003.468	611172.550	1382.093	TOE
495	988986.222	611171.887	1381.634	TOE
496	988976.313	611172.085	1384.921	TOP
497	988950.368	611170.743	1385.814	NG
498	988920.034	611170.082	1389.618	NG
499	988551.653	609475.718	1365.934	HDWL
500	988563.938	609477.887	1367.834	HDWL
501	988581.668	609465.461	1367.882	HDWL
502	988599.466	609453.005	1367.928	HDWL
503	988601.789	609441.192	1366.197	HDWL
504	988581.216	609464.638	1362.432	FL
505	988557.721	609431.036	1361.070	FL
506	988644.536	609438.444	1370.302	BC
507	988589.753	609477.076	1369.882	BC
508	988535.222	609515.445	1369.744	BC
509	988561.018	609547.861	1369.778	BC
510	988611.033	609512.556	1369.848	BC
511	988666.678	609473.195	1370.425	BC
512	988654.704	609455.670	1370.100	P
513	988599.879	609494.986	1369.685	P
514	988549.857	609530.567	1369.631	P
515	988545.632	609508.974	1369.000	CB

516	988565.822	609494.644	1369.018	CB
517	988588.343	609527.788	1369.010	CB
518	988568.279	609541.859	1369.072	CB
519	988602.957	609544.955	1366.231	HDWL
520	988604.459	609535.473	1368.267	HDWL
521	988622.165	609522.981	1368.300	HDWL
522	988639.972	609510.565	1368.359	HDWL
523	988649.336	609512.047	1366.367	HDWL
524	988622.514	609523.297	1362.870	FL
525	988652.236	609565.817	1363.320	FL
526	987693.690	608226.499	1348.731	HDWL
527	987686.820	608233.268	1350.614	HDWL
528	987665.265	608233.381	1350.542	HDWL
529	987643.768	608233.324	1350.593	HDWL
530	987637.170	608226.527	1348.636	HDWL
531	987665.264	608232.501	1345.664	FL
532	987666.221	608181.416	1341.777	FL
533	987715.076	608248.190	1352.047	BC
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546	987633.476	608304.087	1350.972	CB
547	987614.509	608244.199	1351.001	CB
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549	987636.662	608324.341	1348.894	HDWL
550	987643.454	608317.522	1350.782	HDWL
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552	987686.739	608317.526	1350.879	HDWL
553	987693.429	608324.416	1348.864	HDWL
554	987665.113	608318.058	1345.882	FL
555	987668.744	608372.279	1346.650	FL
556	987936.537	608671.418	1360.460	NG
557	987928.438	608694.130	1356.637	NG
558	987925.225	608702.131	1356.478	NG
559	987922.871	608708.016	1356.350	NG
560	987921.146	608714.197	1356.283	TOP
561	987915.421	608728.276	1352.782	TOE
562	987911.321	608739.521	1353.492	TOE
563	987906.546	608750.993	1356.424	TOP
564	987896.304	608775.569	1357.530	NG
565	987889.802	608790.043	1361.197	NG
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567	991441.874	614277.767	1433.811	HD
568	991421.115	614283.640	1433.813	HD
569	991400.423	614289.561	1433.781	HD
570	991396.269	614296.473	1431.160	HD
571	991421.164	614284.357	1429.595	FL
572	991435.892	614333.748	1430.025	FL
573	991470.637	614257.678	1436.812	BC
574	991416.573	614270.010	1435.231	BC
575	991333.665	614288.652	1433.524	BC
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577	991414.258	614249.257	1435.227	P
578	991466.726	614236.812	1436.825	P
579	991456.056	614218.661	1436.790	BC

580	991405.176	614230.228	1435.258	BC
581	991323.949	614248.774	1433.571	BC
582	991375.414	614214.342	1430.721	HDWL
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584	991401.908	614216.072	1433.268	HDWL
585	991422.566	614210.119	1433.275	HDWL
586	991423.561	614200.476	1430.664	HDWL
587	991401.816	614215.101	1428.970	FL
588	991383.985	614170.495	1428.484	FL
589	991281.145	612807.192	1414.280	HDWL
590	991287.811	612814.053	1416.323	HDWL
591	991309.393	612814.012	1416.222	HDWL
592	991330.915	612813.835	1416.224	HDWL
593	991337.753	612806.834	1414.393	HDWL
594	991309.531	612813.255	1410.752	FL
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598	991238.340	612851.438	1416.973	BC
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607	991255.214	612931.714	1417.534	NG
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610	991332.673	612909.593	1416.554	HDWL
611	991310.774	612909.788	1416.473	HDWL
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613	991288.128	612906.649	1416.425	HDWL
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628	991037.313	612784.337	1407.823	TOE
629	991038.010	612771.356	1407.853	TOE
630	991038.307	612757.777	1411.378	TOP
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636	990244.307	612815.362	1414.840	HDWL
637	990266.005	612815.402	1414.845	HDWL
638	990272.841	612808.506	1412.810	HDWL
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711	975756.602	591799.931	1278.275	RB
712	975773.310	589148.054	1268.301	RB
713	975788.585	586497.111	1245.005	BCHH
714	973117.860	585128.649	1234.166	BCFD
715	973132.718	586453.671	1237.979	BCHH
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717	973119.634	589492.984	1255.861	BCFD
718	970453.657	583781.323	1221.145	PK
719	970453.809	583789.539	1221.198	PK
720	970453.810	583795.591	1221.097	PK
721	970508.674	583781.698	1221.312	PK
722	970477.510	586409.318	1238.237	BCHH
723	970469.299	589066.296	1241.309	BCFD
724	970468.170	589463.940	1241.896	PK
725	970461.633	591723.863	1246.288	BCHH
726	975664.109	602300.463	1279.405	BCHH
727	978338.472	602361.197	1294.298	BCHH
728	980998.804	602363.094	1310.331	BCHH
729	983647.095	602387.349	1331.894	BCHH
730	981016.015	599711.885	1311.306	BCFD
731	981027.458	594421.613	1314.018	STONE
732	981021.601	591787.337	1311.030	BCHH
733	981034.665	590943.655	1304.450	RB
734	981035.799	590872.593	1304.618	RB
735	981061.653	589200.334	1299.266	STONE
736	981059.177	589365.010	1301.046	RB
737	981114.114	589364.618	1301.671	RB
738	981102.973	586542.426	1257.183	STONE
739	986789.725	612887.021	1379.916	BCHH
740	986277.643	612888.106	1373.880	BCHH
741	984151.802	612887.315	1355.694	BCHH
742	981511.760	612887.245	1339.979	BCHH
743	980997.937	612887.089	1337.131	BCHH
744	981005.066	608353.238	1310.048	BCFD
745	981002.212	609972.919	1320.146	BCFD
746	981001.659	610253.178	1322.555	BCFD

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SOKKIA™

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[redacted]

SOKKIA™ Book 3

ECONOMY
FIELD BOOK

ADMP
UPDATE —
ARROWHEAD
LAKES
S20 WIPES

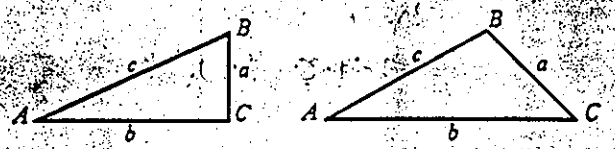
[redacted]

BOOK 3

6.8152-05

SAF 001

FORMULAE FOR SOLVING RIGHT TRIANGLES



$\text{Sin } A = \frac{a}{c} = \text{Cos } B \qquad \text{Cot } A = \frac{b}{a} = \text{Tan } B$

$\text{Cos } A = \frac{b}{c} = \text{Sin } B \qquad \text{Sec } A = \frac{c}{b} = \text{Cosec } B$

$\text{Tan } A = \frac{a}{b} = \text{Cot } B \qquad \text{Cosec } A = \frac{c}{a} = \text{Sec } B$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A.$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}.$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}.$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2}$

FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C, c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

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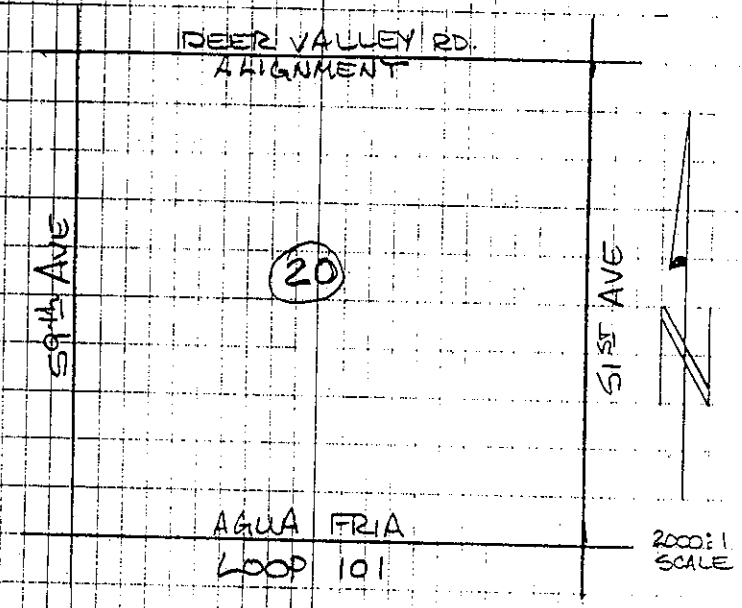
ADMP UPDATE - ARROWHEAD LAKES
WEIR SURVEY IN SEC. 20
5043.0001

THIS SURVEY IS A PORTION OF
SEC. 20, T4N, R2E.



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~~SEC 19 WEIR TOPO'S~~			
~~WEIR 519-1~~	~~16~~		

CONTROL CALIBRATION PT. LOCATIONS

PT. #	DESCRIPTION
1000	#4RB @ S.W. COR. OF 59th AVE & DEER VALLEY RD. 26'+/- S. OF DEER VALLEY RD & 40'+/- W. OF 59th AVE. (ALL MEASUREMENTS FROM B/C) — BASE PT. —
1001	C.O.G. BCFD @ ARROWHEAD LAKES RD. & ARROWHEAD MANOR ESTATES. N.E. OF MELINDA LN. 400'+/- @ S.W. END OF BULLNOSE (#99112)
1002	P.K. IN SHINER @ S. END OF ℄ DIVIDER BULLNOSE @ 51st AVE & BEAROSLEY RD. (N. FRONTAGE RD. OF LOOP 101) (#99111)
1003	ADOT BCHH @ 75th AVE & LOOP 101. S. SIDE OF LOOP 101 @ ℄ 75th AVE IN ISLAND N. OF CROSSWALK (AERIAL TARGET) (#99084)
1004	C.O.G. BCFD @ ℄ OF CUL-DE-SAC 7431 W. MONTE LINDO (#99913)

CONT.

SEE BOOK 2, pg 8-9 FOR ADDITIONAL INFORMATION.

PT #	DESCRIPTION
1005	C.O.G BCFD @ MONONA & 67th DRIVE. (1 BLOCK W. OF 67th AVE) (#99095)
1006	P.K. IN SHINER @ COR. OF V.G. & APRON @ N.E. COR. OF 64th AVE. & LOUISE DR. (#7203)
1007	C.O.G BCFD @ 61st DRIVE & DEER VALLEY (#99102)

SITE CALIBRATION PT'S

GRID #99913
GPS #1004 HORIZ. & VERT.

GRID #99084
GPS #1003 HORIZ & VERT.

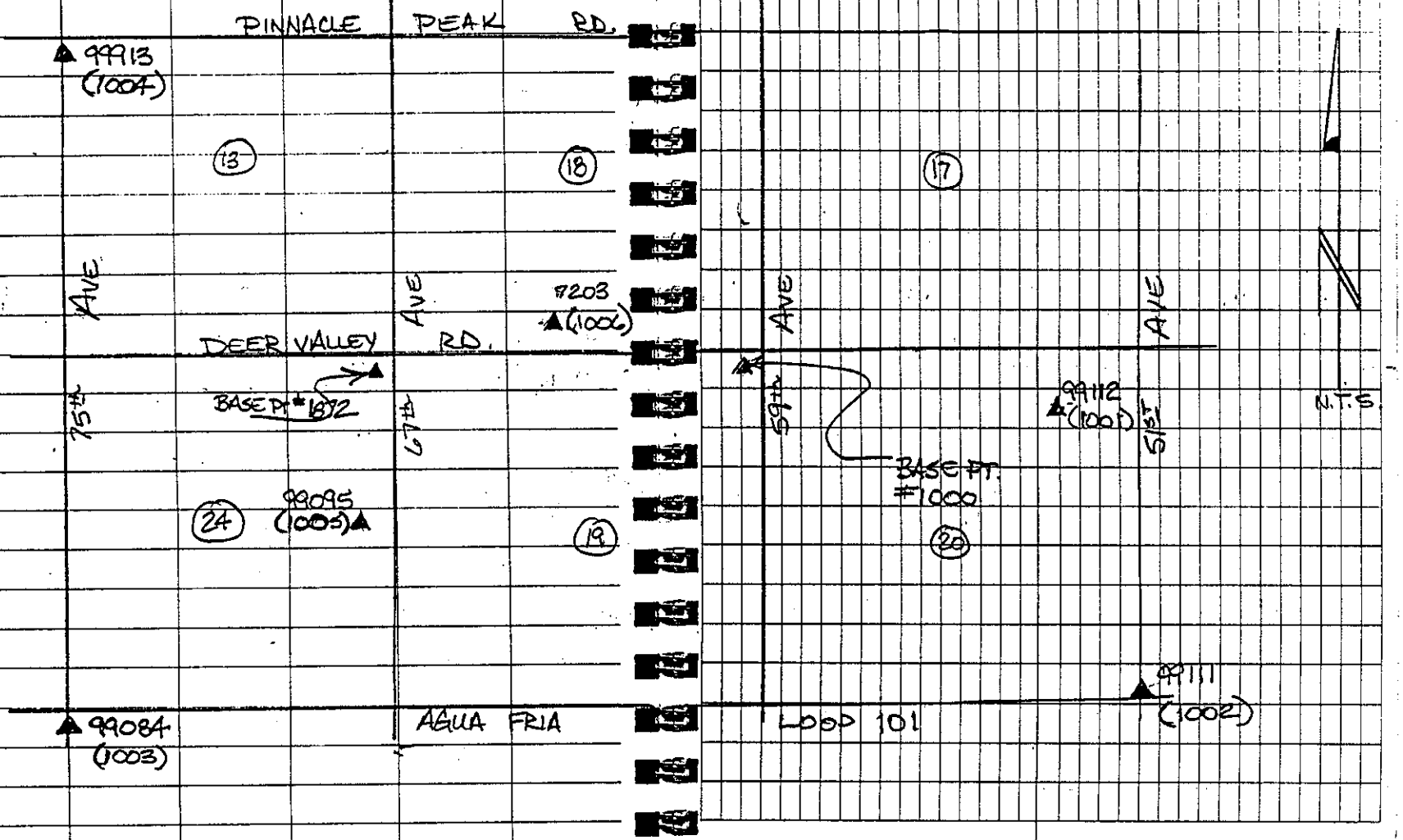
GRID #99095
GPS #1005 HORIZ ONLY

GRID #99112
GPS #1001 VERT ONLY

GRID = #7203
GPS = #1006 HORIZ & VERT.

GRID = #99111
GPS = #1002 VERT ONLY

CONTROL & CALIBRATION PT. MAP



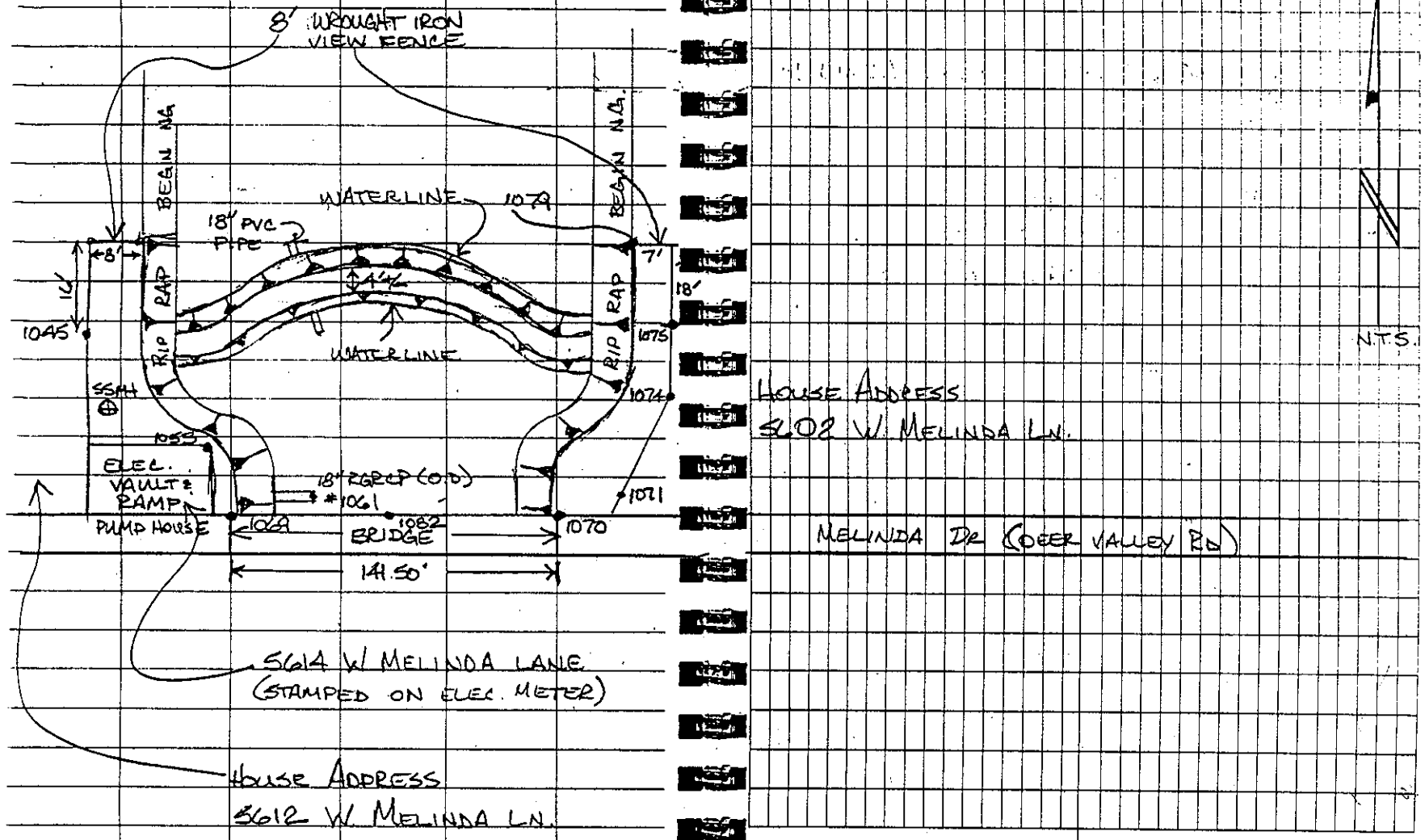
SEC 27 WEIR TOPO'S
WEIR S20-1

BASE @ #1000 #4RB
HI = 5.40

PT #	DESCRIPTION
1010	TWEIR = TOP OF WEIR (TYP.)
1027 & 1028	TOP OF 18" PVC PIPE
1029	WL = WATERLINE (TYP.)
1082	LAST SHOT // FACE OF BRIDGE

S.W. COR. OF 59th AVE & DEER VALLEY RD.
26'± S. OF DEER VALLEY & 40'± W. OF 59th AVE.
(ALL MEASUREMENTS FROM B/C)

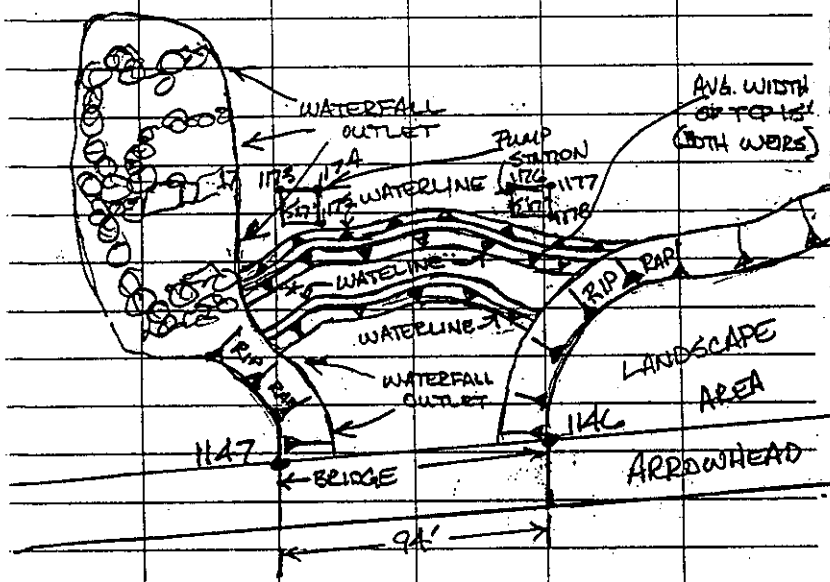
FIRST SHOT

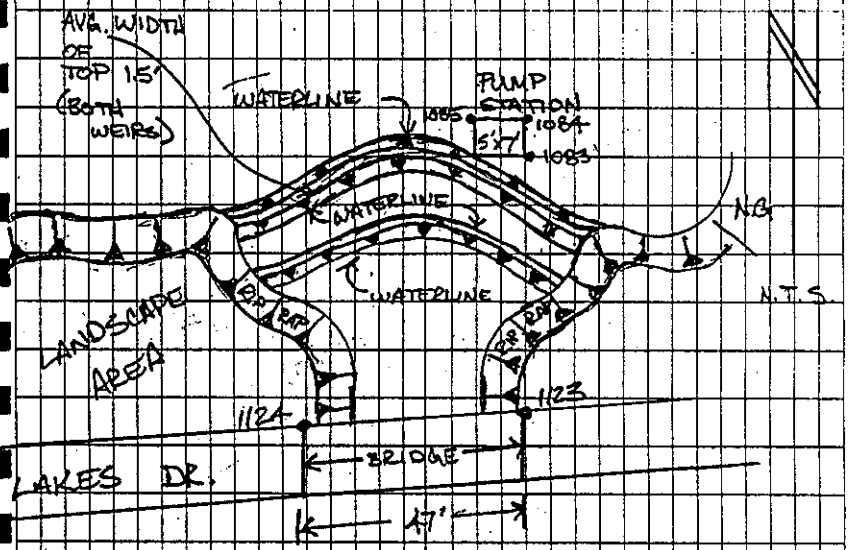

8' WROUGHT IRON VIEW FENCE
BEAM N.A.
BEAM N.A.
WATERLINE
1079
18" PVC PIPE
8'
7'
18'
RAP
RIP
RAP
RIP
1045
1075
WATERLINE
SSMH
1074
1055
ELEC. VAULT & RAMP
18" RCP (O.D.)
#1061
1071
PUMP HOUSE
1069
1062
BRIDGE
1070
141.50'
N.T.S.
5614 W MELINDA LANE (STAMPED ON ELEC. METER)
HOUSE ADDRESS 5612 W MELINDA LN.
HOUSE ADDRESS 5602 W. MELINDA LN.
MELINDA DR (DEER VALLEY RD)

"IEIR 520-2

PT #	DESCRIPTION
1083	FIRST SHOT // COR. PUMP STATION
1107	BEE'S
1121 & 1122	COR. WINGWALL
1125 & 1126, 1144 & 1145, 1148 & 1149	
***	WATERFALL SHOTS @ TOP & BOTT.
1202	LAST SHOT

WEIR S20-2

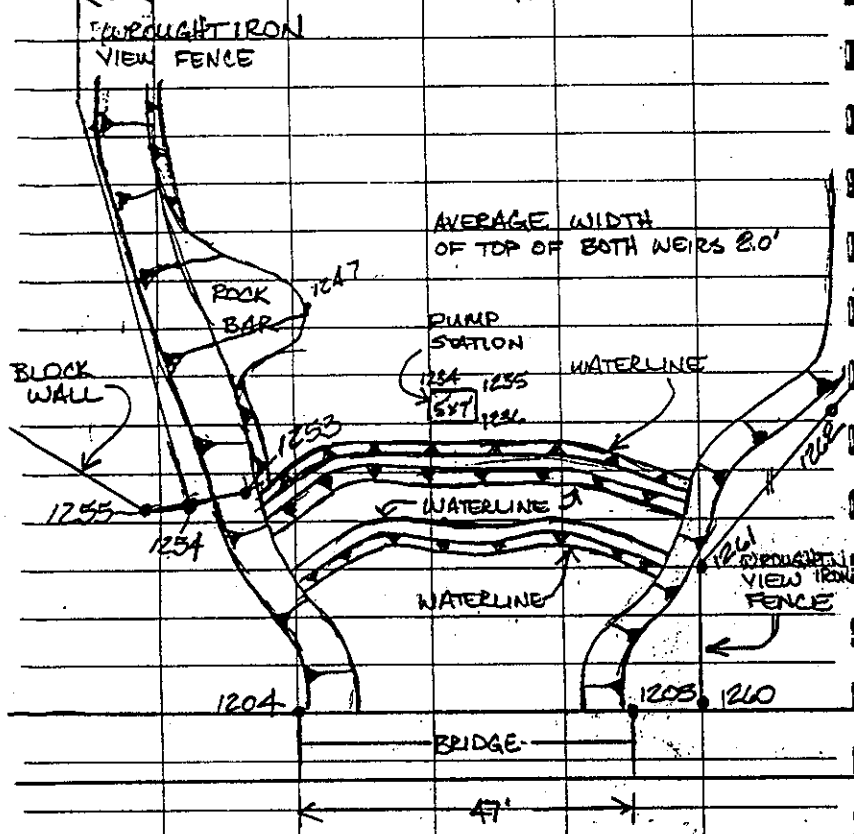

WATERFALL OUTLET
PUMP STATION
AVG. WIDTH OF TOP 1.5' (BOTH WEIRS)
1173
1174
5'x7'
WATERLINE
1176
1177
1178
WATELINE
WATERLINE
RIP RAP
LANDSCAPE AREA
WATERFALL OUTLET
1146
1147
BRIDGE
ARROWHEAD
94'

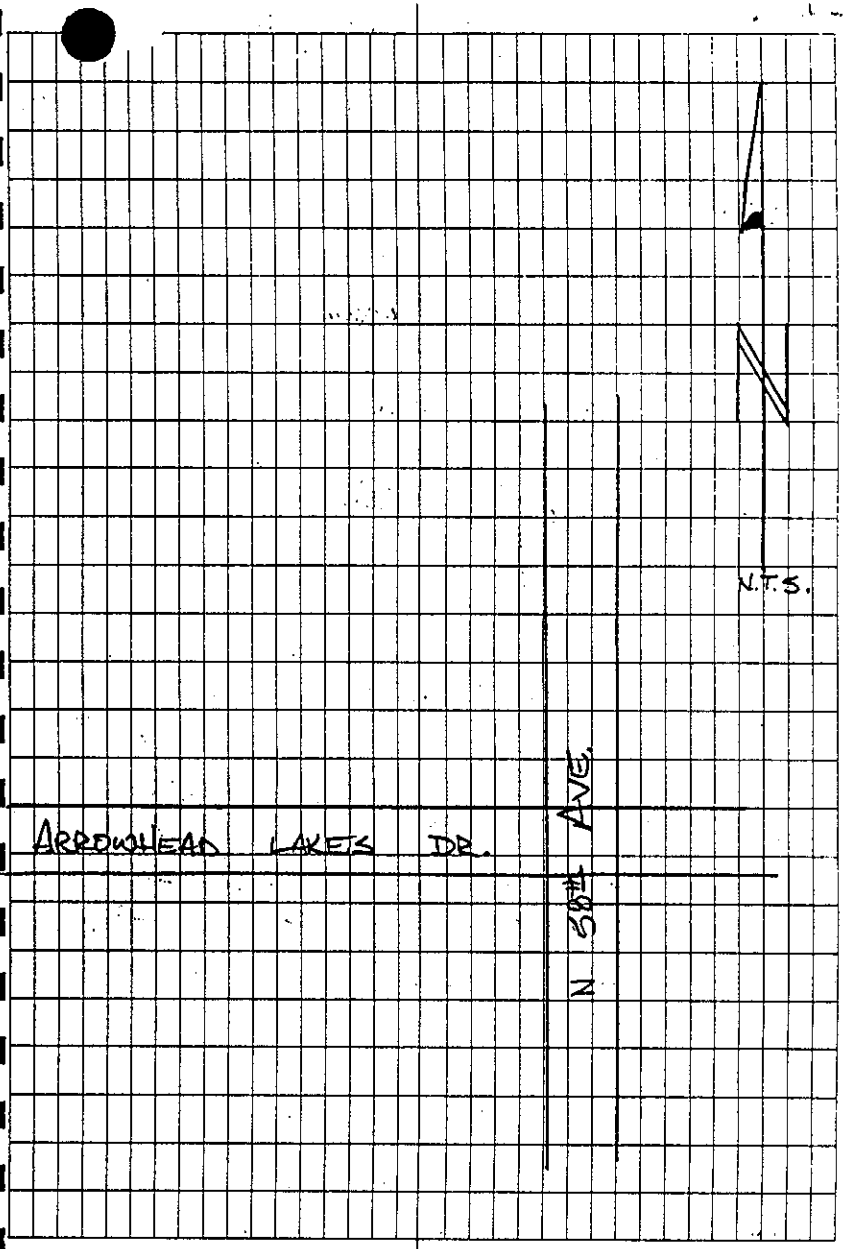

AVG. WIDTH OF TOP 1.5' (BOTH WEIRS)
WATERLINE
PUMP STATION
1085
1084
5'x7'
1083
WATERLINE
WATERLINE
NG
N.T.S.
LANDSCAPE AREA
RIP RAP
1124
1123
BRIDGE
LAKES DR.
47'

WEIR S20-3

PT. #	DESCRIPTION
1203	FIRST SHOT
1205-1208	COR WINGWALL
1262	LAST SHOT

WEIR S20-3

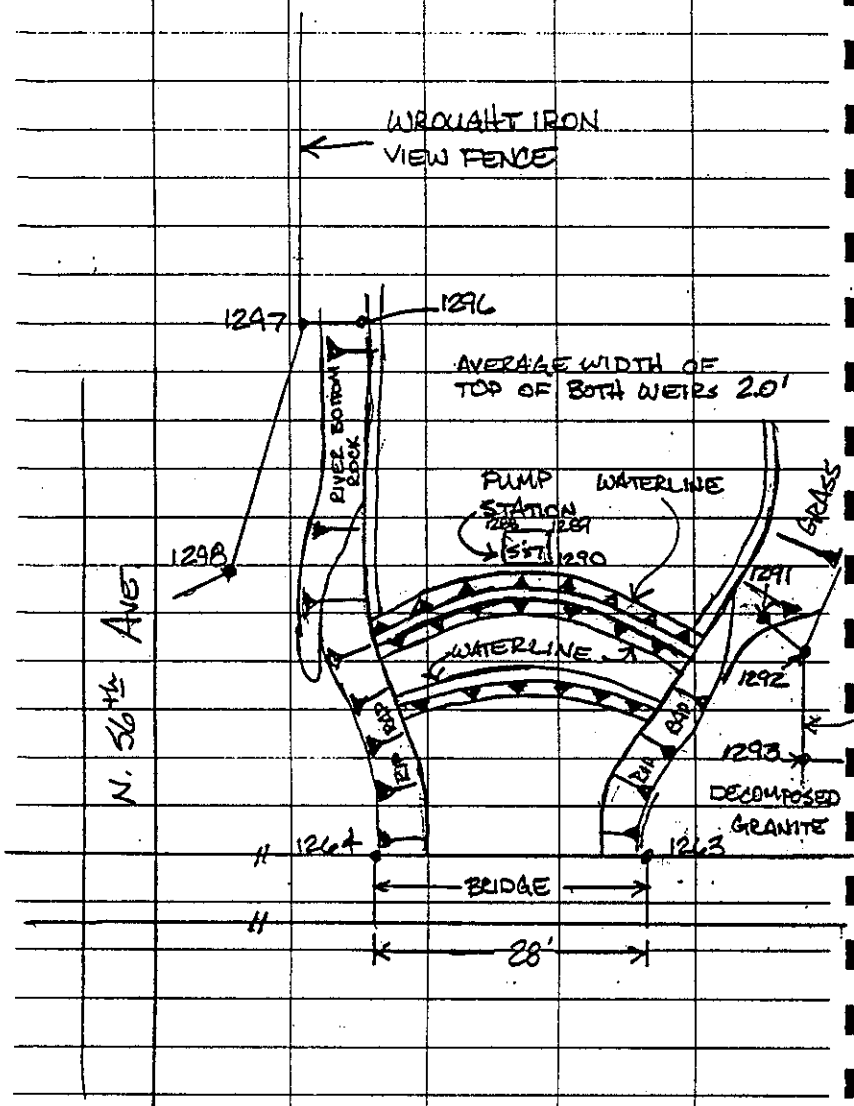

WROUGHT IRON VIEW FENCE
AVERAGE WIDTH OF TOP OF BOTH WEIRS 8.0'
ROCK BAR
1247
PUMP STATION
1234
1235
5x7
1236
WATERLINE
BLOCK WALL
1253
1255
1254
WATERLINE
WATERLINE
1261
WROUGHT IRON VIEW FENCE
1204
1203
1260
BRIDGE
47'

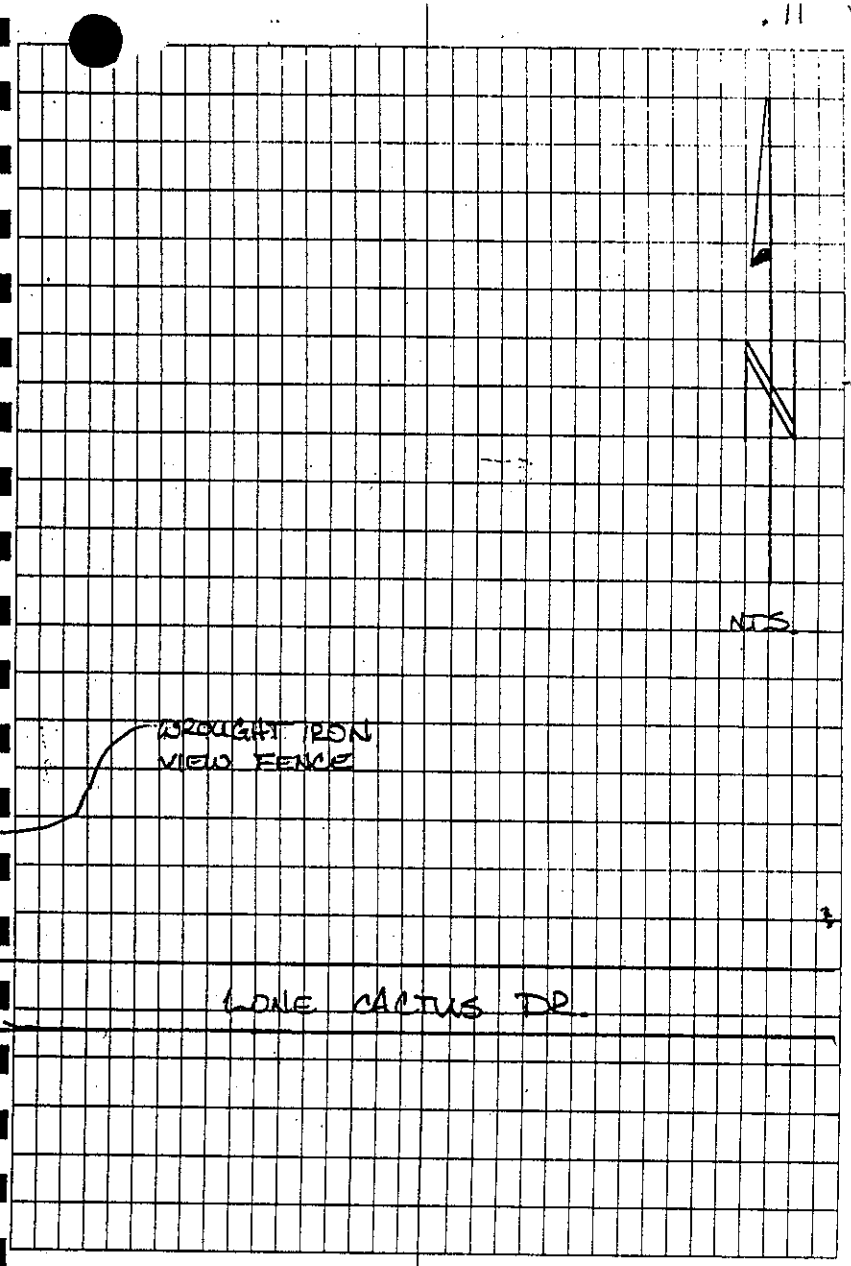

ARROWHEAD LAKES DR.
N 58th AVE.
N.T.S.

WEIR 520-4

PT #	DESCRIPTION
1263	FIRST SHOT
1265-1268	COR. OF WINGWALL
1288-1290	COR. OF PUMP STATION
1312	LAST SHOT

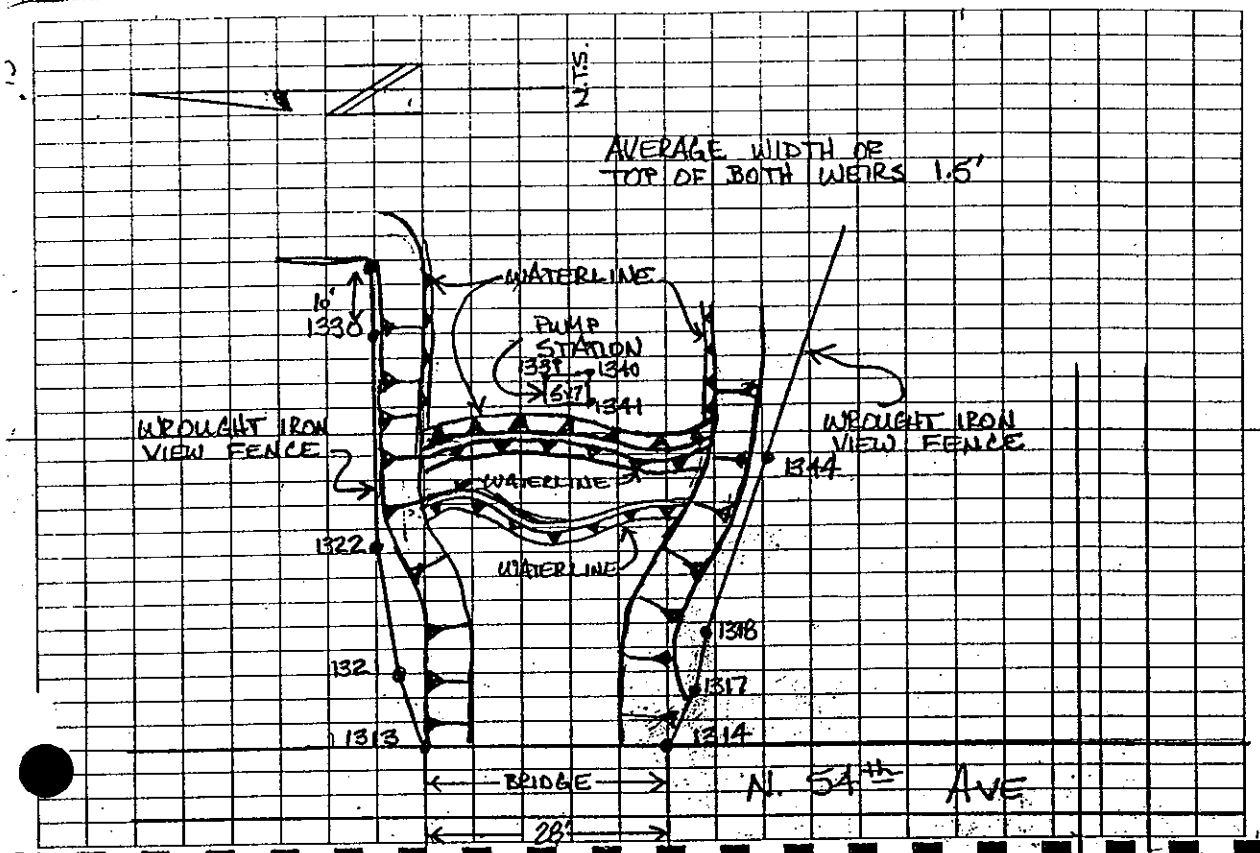
WEIR S20-4


WROUGHT IRON VIEW FENCE
1247
1296
AVERAGE WIDTH OF TOP OF BOTH WEIRS 2.0'
RIVER BOTTOM ROCK
PUMP STATION
WATERLINE
1289
1290
GRASS
1298
N. 56th AVE
1291
WATERLINE
1292
BAP
BAP
BAP
BAP
1293
DECOMPOSED GRANITE
1264
1263
BRIDGE
28'


WROUGHT IRON VIEW FENCE
NTS
LONE CACTUS DR.

JEIR 520-5

PT #	DESCRIPTION
1313	FIRST SHOT
1315 & 1316 1319 & 1320	COR. WINGWALL
1359	LAST SHOT



WEIR 520-15

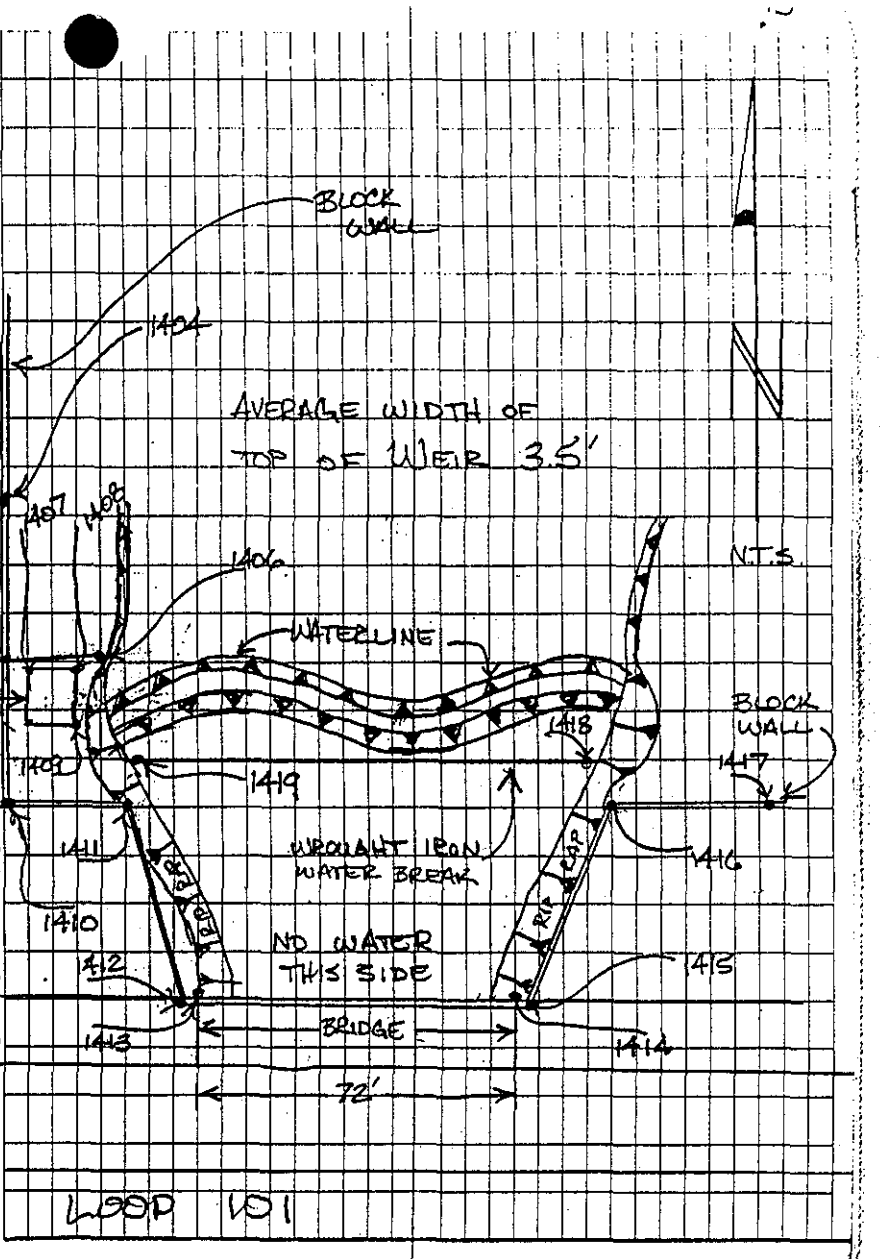
PONTIAC DR.

WEIR 520-6

PT #	DESCRIPTION
1360	FIRST SHOT
1420-1423	COR. OF WINGWALL
1418 & 1419	W. BREAK = WROUGHT IRON WATER BREAK
1434	LAST TOPO SHOT
1435	CHECK TO #99112 (#1001) C.O.G. BCFD @ ARROWHEAD LAKES DR. & ARROWHEAD MANOR ESTATES, N.E. OF MELINDA LN. 400'+/- @ S.W. END OF BULLNOSE HORIZ = +0.08 VERT. = +0.31

LAST SHOT

WEIR SCU-6


BLOCK WALL
1404
AVERAGE WIDTH OF TOP OF WEIR 3.5'
N
N.T.S.
1407
1408
1406
1405
ELEC. ENCL.
6' CLF
WATERLINE
1418
BLOCK WALL
1417
1409
1419
1411
WROUGHT IRON WATER BREAK
1416
RIP RAP
1410
NO WATER THIS SIDE
1412
1415
BEARDSLEY RD.
1413
BRIDGE
1414
72'
AGUA FRIA
LOOP 101

Points

X, Y, & Z
For Books 3, 6, & 7

Project name	50431128
Coordinate Units	International feet
Distance Units	International feet
Height Units	International feet
Date printed	5/24/01 10:34:38 AM
Coordinate System	Projection from data collector
Datum	(WGS 84)
Zone	Zone from data collector
Geoid model	Not selected

Coordinate units: International feet
Elevation units: International feet

Point listing

Name	Northing	Easting	Elevation	Feature Code
7203	975911.722	614383.809	1293.603	136
99095	973344.927	612671.835	1271.453	136
99913	980805.832	607967.136	1308.213	136
99084	970406.581	607594.645	1258.433	136
1000	976067.997	617780.002	1303.671	136
1001	975270.864	621708.840	1324.873	136
1002	971047.931	623143.855	1302.681	136
1003	970406.205	607594.419	1258.439	136
1004	980806.349	607966.865	1308.258	136
1005	973344.760	612671.992	1271.501	136
1006	975911.748	614384.150	1293.513	136
99112	975270.864	621708.840	1324.873	136
1007	975919.285	616656.116	1299.043	136
99111	971047.931	623143.855	1302.643	136
1010	976253.406	619718.371	1295.864	TWEIR
1011	976253.418	619718.366	1295.965	TWEIR
1012	976247.972	619717.379	1295.789	TWEIR
1013	976253.752	619697.624	1295.787	TWEIR
1014	976256.047	619698.617	1295.809	TWEIR
1015	976264.555	619677.620	1295.889	TWEIR
1016	976262.582	619677.106	1295.884	TWEIR
1017	976270.887	619656.663	1295.924	TWEIR
1018	976272.289	619656.973	1295.893	TWEIR
1019	976273.803	619633.756	1295.973	TWEIR
1020	976272.098	619633.674	1295.983	TWEIR
1021	976268.347	619611.226	1295.910	TWEIR
1022	976271.099	619610.240	1296.052	TWEIR
1023	976262.494	619588.241	1295.914	TWEIR
1024	976259.817	619589.555	1295.660	TWEIR
1025	976247.521	619565.430	1295.915	TWEIR
1026	976252.604	619564.912	1295.924	TWEIR
1027	976278.842	619608.390	1293.703	PIPE
1028	976263.298	619611.640	1293.779	PIPE
1029	976255.392	619565.994	1294.068	WL
1030	976243.853	619566.373	1292.480	WL
1031	976258.838	619591.892	1293.494	WL
1032	976265.920	619588.082	1294.001	WL
1033	976274.628	619612.309	1294.031	WL
1034	976264.848	619613.842	1293.492	WL
1035	976269.506	619634.404	1293.557	WL
1036	976277.809	619634.235	1293.946	WL

1037	976275.957	619654.465	1293.967	WL
1038	976267.103	619651.780	1293.510	WL
1039	976261.233	619674.625	1293.471	WL
1040	976269.104	619676.666	1293.971	WL
1041	976261.007	619696.446	1294.078	WL
1042	976251.838	619694.165	1293.554	WL
1043	976245.384	619714.879	1293.485	WL
1044	976258.513	619714.926	1294.108	WL
1045	976281.757	619554.506	1300.518	FM
1046	976281.197	619561.734	1298.086	TB
1047	976280.054	619564.344	1294.315	TS
1048	976280.427	619566.150	1294.061	WL
1049	976254.582	619561.745	1298.024	TB
1050	976225.024	619557.210	1303.142	SSMH
1051	976220.968	619557.974	1302.174	TB
1052	976226.430	619572.057	1293.662	TS
1053	976215.541	619567.041	1303.456	CONC
1054	976215.298	619555.723	1303.389	CONC
1055	976203.298	619555.529	1303.389	CONC
1056	976203.726	619567.340	1303.489	CONC
1057	976213.478	619567.904	1299.288	CONC
1058	976213.543	619571.142	1299.193	CONC
1059	976203.972	619571.377	1299.348	CONC
1060	976203.899	619568.481	1299.524	CONC
1061	976194.461	619591.590	1293.620	PIPE
1062	976194.261	619584.631	1294.450	PIPE
1063	976192.047	619585.582	1293.521	WL
1064	976189.885	619568.518	1302.051	TB
1065	976190.414	619565.459	1304.842	CONC
1066	976187.298	619568.580	1305.247	CONC
1067	976185.329	619555.036	1304.946	FM
1068	976185.332	619555.420	1304.990	CONC
1069	976187.072	619571.213	1305.281	COR BRIDGE
1070	976188.003	619712.414	1305.263	COR BRIDGE
1071	976193.475	619718.272	1302.658	FM
1072	976197.826	619717.052	1301.871	TB
1073	976199.490	619700.000	1293.501	WL
1074	976247.769	619727.964	1301.081	FM
1075	976280.818	619727.411	1299.359	FM
1076	976280.257	619721.034	1297.909	TB
1077	976280.186	619716.991	1294.014	WL
1078	976298.192	619717.278	1293.888	WL
1079	976299.145	619718.564	1297.517	FNC
1080	976299.202	619721.875	1297.927	TB
1081	976250.500	619720.663	1298.601	TB
1082	976187.481	619630.056	1305.496	BRIDGE
1083	975019.823	621178.248	1293.971	PUMP
1084	975024.203	621177.008	1294.130	PUMP
1085	975022.541	621170.450	1294.153	PUMP
1086	975015.437	621211.835	1293.520	WL
1087	975014.712	621211.714	1294.007	TWEIR
1088	975014.923	621194.246	1293.987	TWEIR
1089	975015.994	621194.275	1293.437	WL
1090	975016.264	621177.854	1293.528	WL
1091	975015.844	621177.699	1293.942	TWEIR
1092	975010.741	621159.404	1294.009	TWIER
1093	975011.492	621159.464	1293.517	WL
1094	974997.152	621143.801	1293.496	WL
1095	974996.562	621144.479	1293.891	TWIER
1096	974981.585	621139.660	1293.965	TWIER
1097	974981.611	621139.084	1293.532	WL
1098	974980.555	621150.961	1291.972	TWIER
1099	974978.675	621152.883	1291.252	WL
1100	974992.356	621160.151	1291.110	WL

1101	974993.967	621158.457	1291.983	TWIER
1102	975000.561	621167.884	1292.006	TWIER
1103	974998.415	621168.210	1291.158	WL
1104	975002.399	621184.044	1291.151	WL
1105	975004.483	621184.266	1291.956	TWIER
1106	975006.489	621201.233	1292.043	TWIER
1107	975006.311	621194.883	1292.177	BEES
1108	975005.291	621203.674	1291.176	WL
1109	975006.574	621209.022	1291.148	WL
1110	975008.293	621209.785	1292.028	TWIER
1111	975021.499	621247.114	1297.695	TB
1112	975027.385	621243.818	1295.185	TS
1113	975027.907	621243.686	1293.493	WL
1114	975018.964	621224.633	1293.552	WL
1115	975017.489	621224.126	1295.162	TS
1116	975011.738	621228.232	1298.227	TB
1117	974994.280	621222.872	1298.327	TB
1118	974998.258	621208.224	1291.202	WL
1119	974978.168	621204.915	1291.295	WL
1120	974978.977	621221.612	1298.445	TB
1121	974975.888	621220.665	1299.096	WGWL
1122	974968.603	621218.857	1300.271	WGWL
1123	974967.303	621217.082	1300.547	BRIDGE
1124	974943.361	621176.585	1300.655	BRIDGE
1125	974942.951	621175.305	1300.493	WGWL
1126	974944.433	621167.282	1299.326	WGWL
1127	974949.748	621160.322	1298.771	TB
1128	974960.738	621175.757	1291.285	WL
1129	974973.538	621157.841	1291.321	WL
1130	974961.200	621151.236	1297.803	TB
1131	974964.150	621134.605	1297.794	TB
1132	974970.515	621131.842	1294.658	TS
1133	974971.424	621131.398	1293.568	WL
1134	974961.321	621112.331	1293.604	WL
1135	974960.153	621111.744	1294.760	TS
1136	974953.885	621114.955	1297.820	TB
1137	974942.196	621091.116	1297.190	TB
1138	974945.644	621086.146	1294.874	TS
1139	974946.304	621085.541	1293.588	WL
1140	974920.616	621084.836	1296.829	TB
1141	974920.758	621068.636	1289.388	WL
1142	974899.052	621069.466	1289.416	WL
1143	974906.469	621088.391	1297.497	TB
1144	974901.312	621093.343	1299.279	WGWL
1145	974893.290	621090.744	1300.718	WGWL
1146	974892.751	621089.947	1300.768	BRIDGE
1147	974845.468	621008.680	1300.450	BRIDGE
1148	974844.836	621007.772	1300.411	WGWL
1149	974846.894	620999.666	1299.075	WGWL
1150	974851.663	620999.230	1299.342	TB
1151	974860.649	621011.482	1289.291	WL
1152	974865.191	621002.590	1289.343	WATERFALL
1153	974865.076	621002.517	1289.330	WATERFALL
1154	974869.846	620998.354	1289.317	WATERFALL
1155	974859.460	620984.847	1299.900	WATERFALL
1156	974859.451	620984.827	1299.894	WATERFALL
1157	974854.330	620989.633	1299.859	WATERFALL
1158	974879.739	620967.586	1299.867	WATERFALL
1159	974882.987	620983.297	1296.851	WATERFALL
1160	974886.581	620983.617	1296.830	WATERFALL
1161	974883.488	620995.621	1290.319	WATERFALL
1162	974887.963	620996.170	1289.717	WATERFALL
1163	974893.875	620980.114	1296.929	WATERFALL
1164	974903.185	620973.729	1296.909	WATERFALL

1165	974909.867	620971.616	1295.894	WATERFALL
1166	974923.884	620967.004	1295.932	WATERFALL
1167	974917.783	620955.734	1298.881	WATERFALL
1168	974909.574	620960.341	1298.834	WATERFALL
1169	974906.095	620953.068	1299.880	WATERFALL
1170	974894.786	620958.416	1299.805	WATERFALL
1171	974887.526	620962.867	1299.829	WATERFALL
1172	974895.247	620986.420	1293.946	TWIER
1173	974922.763	620988.829	1293.872	PUMP
1174	974926.154	620994.707	1293.880	PUMP
1175	974922.249	620996.960	1293.899	PUMP
1176	974953.715	621031.465	1293.923	PUMP
1177	974955.879	621037.910	1293.861	PUMP
1178	974951.622	621039.466	1293.854	PUMP
1179	974895.563	620985.864	1293.656	WL
1180	974911.138	620986.208	1293.573	WL
1181	974912.292	620988.239	1293.980	TWIER
1182	974921.975	621003.402	1293.919	TWIER
1183	974922.025	621002.526	1293.542	WL
1184	974935.339	621014.461	1293.547	WL
1185	974934.946	621015.173	1293.844	TWIER
1186	974945.652	621034.315	1293.995	TWIER
1187	974946.173	621034.206	1293.548	WL
1188	974947.093	621052.657	1293.536	WL
1189	974946.251	621052.462	1293.982	TWIER
1190	974943.545	621065.006	1293.991	TWIER
1191	974944.492	621065.081	1293.573	WL
1192	974941.810	621073.973	1293.558	WL
1193	974941.226	621072.996	1294.008	TWIER
1194	974933.041	621072.105	1292.034	TWIER
1195	974933.906	621057.638	1292.025	TWIER
1196	974935.069	621044.949	1291.999	TWIER
1197	974930.110	621030.329	1291.996	TWIER
1198	974921.442	621021.868	1291.987	TWIER
1199	974908.677	621006.030	1292.018	TWIER
1200	974899.924	620995.120	1291.982	TWIER
1201	974890.696	620992.111	1292.005	TWIER
1202	974888.649	620996.238	1289.247	WL
1203	975066.269	618435.896	1300.417	BRIDGE
1204	975051.316	618391.437	1300.473	BRIDGE
1205	975050.999	618390.066	1300.433	WGWL
1206	975054.491	618382.479	1298.901	WGWL
1207	975068.606	618438.448	1299.836	WGWL
1208	975073.822	618441.299	1298.836	WGWL
1209	975077.107	618446.518	1299.963	TB
1210	975077.776	618430.053	1291.424	WL
1211	975066.719	618427.959	1291.458	WL
1212	975114.335	618430.083	1291.437	WL
1213	975119.719	618440.813	1298.248	TB
1214	975133.225	618444.393	1297.313	TB
1215	975133.777	618439.971	1293.530	WL
1216	975126.309	618433.003	1293.893	TWIER
1217	975127.778	618433.086	1294.005	TWIER
1218	975128.113	618433.212	1293.522	WL
1219	975130.994	618413.596	1293.505	WL
1220	975130.644	618413.851	1293.985	TWIER
1221	975128.919	618414.140	1293.968	TWIER
1222	975121.539	618397.402	1294.020	TWIER
1223	975122.395	618396.816	1294.011	TWIER
1224	975123.080	618396.591	1293.574	WL
1225	975115.908	618381.040	1293.525	WL
1226	975115.515	618380.702	1293.965	TWIER
1227	975114.828	618381.146	1293.958	TWIER
1228	975105.624	618370.790	1293.880	TWIER

1229	975106.632	618369.429	1293.974	TWIER
1230	975107.074	618369.029	1293.527	WL
1231	975102.401	618364.573	1293.535	WL
1232	975101.687	618364.931	1293.949	TWIER
1233	975100.046	618365.968	1293.886	TWIER
1234	975126.332	618385.380	1294.206	PUMP
1235	975128.435	618391.879	1294.159	PUMP
1236	975124.100	618393.295	1294.136	PUMP
1237	975120.037	618430.604	1292.055	TWIER
1238	975118.225	618429.117	1291.322	WL
1239	975119.257	618420.260	1291.891	TWIER
1240	975118.390	618410.770	1291.989	TWIER
1241	975109.529	618399.752	1291.975	TWIER
1242	975102.009	618381.684	1292.019	TWIER
1243	975093.927	618368.412	1292.052	TWIER
1244	975092.510	618369.030	1291.411	WL
1245	975130.346	618330.262	1293.444	WL
1246	975134.884	618343.762	1293.376	WL
1247	975131.003	618352.023	1293.537	WL
1248	975121.345	618352.095	1293.544	WL
1249	975115.908	618350.870	1293.505	WL
1250	975105.166	618346.269	1298.059	TB
1251	975111.128	618353.448	1295.159	TS
1252	975111.969	618354.129	1293.500	WL
1253	975103.160	618360.255	1296.454	FNC
1254	975098.670	618353.256	1298.711	FNC
1255	975077.735	618320.911	1298.783	FNC
1256	975069.892	618369.277	1299.277	TB
1257	975079.303	618380.169	1291.422	WL
1258	975057.277	618397.296	1291.425	WL
1259	975053.019	618387.001	1297.938	TB
1260	975079.354	618463.155	1299.925	FNC
1261	975122.372	618443.724	1298.129	FNC
1262	975141.679	618453.315	1297.592	FNC
1263	974056.939	619830.109	1297.900	BRIDGE
1264	974048.401	619803.613	1297.864	BRIDGE
1265	974048.304	619802.440	1297.819	WGWL
1266	974051.847	619794.858	1296.291	WGWL
1267	974057.374	619831.444	1297.943	WGWL
1268	974064.457	619835.415	1296.044	WGWL
1269	974062.060	619833.874	1295.064	TB
1270	974059.612	619825.832	1289.340	WL
1271	974077.138	619826.389	1289.399	WL
1272	974077.893	619835.673	1295.410	TB
1273	974097.341	619844.083	1296.573	TB
1274	974117.346	619836.142	1291.503	WL
1275	974098.989	619832.221	1292.011	TWIER
1276	974101.315	619832.395	1291.964	TWIER
1277	974101.873	619832.655	1291.422	WL
1278	974102.406	619817.235	1291.421	WL
1279	974101.287	619816.386	1292.003	TWIER
1280	974099.413	619816.782	1291.923	TWIER
1281	974096.020	619801.892	1291.950	TWIER
1282	974098.245	619801.251	1291.976	TWIER
1283	974098.745	619801.187	1291.453	WL
1284	974091.408	619790.307	1291.368	WL
1285	974091.031	619791.414	1291.818	TWIER
1286	974089.907	619792.396	1291.800	TWIER
1287	974087.398	619783.499	1292.218	TWIER
1288	974105.220	619799.290	1292.041	PUMP
1289	974107.141	619805.931	1292.068	PUMP
1290	974102.877	619807.248	1292.010	PUMP
1291	974118.555	619837.269	1293.419	FNC
1292	974117.560	619844.420	1295.854	FNC

1293	974093.302	619850.257	1297.122	FNC
1294	974088.921	619782.310	1292.010	TWIER
1295	974089.253	619782.002	1291.521	WL
1296	974119.816	619765.755	1292.862	FNC
1297	974117.009	619760.510	1296.669	FNC
1298	974066.483	619772.210	1297.306	FNC
1299	974117.770	619766.933	1291.485	WL
1300	974084.762	619772.871	1296.614	TB
1301	974064.396	619780.572	1296.764	TB
1302	974050.572	619791.324	1297.232	TB
1303	974048.969	619801.363	1294.111	WL
1304	974052.419	619806.105	1289.384	WL
1305	974065.484	619797.463	1289.392	WL
1306	974079.210	619789.044	1289.347	WL
1307	974081.203	619787.578	1290.259	TWIER
1308	974084.817	619797.587	1290.277	TWIER
1309	974088.808	619814.048	1290.221	TWIER
1310	974090.988	619825.199	1290.185	TWIER
1311	974091.424	619830.391	1290.377	TWIER
1312	974089.202	619826.985	1289.263	WL
1313	971427.015	620939.695	1298.094	BRIDGE
1314	971399.181	620939.634	1298.098	BRIDGE
1315	971397.126	620939.395	1297.952	WGWL
1316	971392.705	620944.050	1297.079	WGWL
1317	971392.675	620944.731	1297.004	FNC
1318	971389.631	620952.745	1296.024	FNC
1319	971428.950	620939.217	1297.960	WGWL
1320	971433.429	620944.098	1297.087	WGWL
1321	971433.328	620944.582	1297.101	WGWL
1322	971437.862	620965.044	1296.318	WGWL
1323	971431.047	620943.407	1295.737	TB
1324	971422.807	620947.301	1289.342	WL
1325	971424.171	620961.917	1289.378	WL
1326	971435.436	620958.545	1296.122	TB
1327	971436.683	620972.945	1294.729	TB
1328	971428.424	620976.455	1289.451	WL
1329	971434.098	620997.954	1294.058	TB
1330	971433.859	621034.642	1295.985	FNC
1331	971430.853	621032.112	1293.832	TB
1332	971426.809	621031.723	1291.283	WL
1333	971424.604	621001.955	1291.252	WL
1334	971427.052	620999.247	1292.143	TWIER
1335	971409.976	620996.860	1292.099	TWIER
1336	971409.885	620997.871	1291.267	WL
1337	971392.346	620991.504	1291.252	WL
1338	971392.566	620990.161	1292.179	TWIER
1339	971405.949	620999.928	1291.982	PUMP
1340	971404.645	621004.293	1291.950	PUMP
1341	971398.052	621002.195	1291.949	PUMP
1342	971377.805	620985.189	1292.160	TWIER
1343	971377.239	620986.863	1291.218	WL
1344	971358.271	620987.913	1294.995	FNC
1345	971361.679	620990.746	1294.570	TB
1346	971364.271	620993.478	1291.277	WL
1347	971389.134	620970.423	1289.381	WL
1348	971383.556	620961.613	1295.644	TB
1349	971390.637	620952.495	1295.301	TB
1350	971402.157	620956.844	1289.309	WL
1351	971403.434	620943.287	1289.279	WL
1352	971394.974	620943.235	1296.289	TB
1353	971385.392	620977.891	1290.227	TWIER
1354	971398.491	620979.780	1290.180	TWIER
1355	971409.334	620981.904	1290.172	TWIER
1356	971414.897	620986.689	1290.168	TWIER

1357	971421.093	620990.510	1290.174	TWIER
1358	971426.860	620990.896	1290.141	TWIER
1359	971427.191	620986.799	1289.378	WL
1360	971110.716	620464.069	1290.259	TWIER
1361	971108.913	620465.220	1290.268	TWIER
1362	971111.549	620463.631	1289.378	WL
1363	971118.829	620484.326	1289.398	WL
1364	971116.672	620484.964	1290.142	TWIER
1365	971113.768	620484.923	1290.050	TWIER
1366	971107.130	620506.366	1290.165	TWIER
1367	971110.518	620506.994	1290.247	TWIER
1368	971112.475	620507.377	1289.347	WL
1369	971104.944	620526.392	1289.370	WL
1370	971103.297	620525.306	1290.162	TWIER
1371	971101.145	620524.739	1290.199	TWIER
1372	971104.387	620547.720	1290.329	TWIER
1373	971106.074	620547.694	1290.250	TWIER
1374	971107.852	620547.332	1289.395	WL
1375	971114.706	620569.972	1289.391	WL
1376	971113.687	620571.702	1290.233	TWIER
1377	971110.387	620571.896	1290.263	TWIER
1378	971104.077	620590.974	1290.221	TWIER
1379	971107.639	620593.209	1290.227	TWIER
1380	971108.466	620593.865	1289.357	WL
1381	971116.692	620617.064	1291.771	TB
1382	971119.828	620615.285	1290.864	TS
1383	971120.225	620614.894	1289.325	WL
1384	971109.808	620601.421	1289.384	WL
1385	971107.857	620602.582	1291.534	TS
1386	971104.034	620607.113	1293.092	TB
1387	971093.345	620599.413	1293.224	TB
1388	971090.268	620588.165	1290.506	TB
1389	971091.831	620582.523	1286.543	TS
1390	971078.678	620570.750	1286.212	TS
1391	971075.915	620572.446	1289.844	TB
1392	971078.860	620490.014	1285.978	TS
1393	971075.344	620482.733	1290.959	TB
1394	971091.915	620463.688	1292.062	TB
1395	971094.906	620455.543	1293.194	TB
1396	971109.909	620447.872	1292.876	TB
1397	971111.877	620451.694	1292.011	TS
1398	971112.800	620452.797	1289.347	WL
1399	971120.801	620445.690	1289.380	WL
1400	971120.664	620444.778	1290.678	TS
1401	971118.729	620440.407	1292.592	TB
1402	971152.626	620440.826	1289.311	WL
1403	971152.738	620440.231	1291.001	TS
1404	971148.872	620434.936	1291.715	FNC
1405	971108.525	620438.150	1294.185	FNC
1406	971111.250	620451.966	1292.224	FNC
1407	971107.664	620440.237	1293.591	FNC
1408	971108.332	620446.205	1293.612	FNC
1409	971098.214	620447.542	1293.521	FNC
1410	971089.792	620440.223	1294.184	FNC
1411	971089.870	620462.889	1292.882	FNC
1412	971066.139	620486.841	1291.095	FNC
1413	971067.005	620490.267	1290.924	BRIDGE
1414	971066.949	620561.964	1291.077	BRIDGE
1415	971065.962	620565.536	1290.971	FNC
1416	971089.590	620589.832	1292.862	FNC
1417	971089.526	620621.852	1293.953	FNC
1418	971094.009	620588.266	1289.489	WBREAK
1419	971094.490	620472.685	1289.447	WBREAK
1420	971076.036	620489.523	1288.482	WGWL

1421	971067.243	620490.679	1290.452	WGWL
1422	971075.451	620569.896	1289.009	WGWL
1423	971067.178	620561.651	1290.565	WGWL
1424	971100.287	620585.610	1286.435	TS
1425	971099.385	620558.080	1286.490	TS
1426	971095.818	620537.234	1286.413	TS
1427	971097.223	620510.382	1286.434	TS
1428	971107.195	620485.198	1286.414	TS
1429	971103.375	620471.909	1286.533	TS
1430	971096.103	620474.540	1286.486	TS
1431	971079.116	620490.622	1285.935	CONC
1432	971078.695	620513.957	1285.819	CONC
1433	971077.412	620538.046	1285.778	CONC
1434	971076.299	620562.743	1285.698	CONC
1435	975270.852	621708.761	1325.187	BCFD
1450	976200.828	617241.420	1306.951	TOP
1451	976205.502	617236.206	1307.276	TOP
1452	976209.153	617229.690	1304.093	TOP
1453	976209.146	617211.186	1303.504	TOP
1454	976204.310	617202.950	1307.072	TOP
1455	976199.641	617197.640	1307.231	TOP
1456	976194.395	617194.507	1307.090	TOP
1457	976181.955	617189.247	1307.099	TOP
1458	976167.671	617187.340	1307.422	TOP
1459	976163.875	617189.197	1307.729	TOP
1460	976162.509	617193.143	1307.847	TOP
1461	976169.892	617242.764	1307.928	TOP
1462	976175.287	617247.431	1307.384	TOP
1463	976182.462	617249.134	1307.020	TOP
1464	976189.484	617247.302	1304.363	TOE
1465	976179.505	617226.817	1299.917	TOE
1466	976175.037	617223.166	1298.674	TOE
1467	976169.983	617222.556	1297.547	TOE
1468	976170.922	617242.132	1305.907	TOE
1469	976195.807	617245.559	1304.743	TOE
1470	976184.748	617221.112	1299.594	TOE
1471	976178.253	617214.156	1298.643	TOE
1472	976168.372	617212.893	1297.423	TOE
1473	976163.673	617193.097	1305.525	TOE
1474	976163.376	617193.220	1306.933	HDWL
1475	976167.029	617217.463	1306.867	HDWL
1476	976170.700	617242.268	1306.962	HDWL
1477	976149.187	617185.821	1307.274	BC
1478	976154.319	617218.697	1307.353	BC
1479	976157.779	617246.152	1307.394	BC
1480	976133.898	617248.215	1307.946	BC
1481	976130.396	617221.324	1307.826	BC
1482	976125.193	617188.214	1307.778	BC
1483	976115.349	617190.039	1307.788	BC
1484	976120.563	617222.508	1307.785	BC
1485	976124.417	617254.643	1307.803	BC
1486	976100.522	617257.163	1307.462	BC
1487	976096.647	617225.006	1307.488	BC
1488	976092.761	617199.787	1307.395	BC
1489	976084.637	617204.632	1306.385	HDWL
1490	976088.417	617230.693	1306.394	HDWL
1491	976091.860	617253.949	1306.383	HDWL
1492	976092.661	617254.100	1307.044	TOP
1493	976092.486	617257.723	1307.535	TOP
1494	976089.039	617260.749	1307.231	TOP
1495	976078.472	617265.029	1306.804	TOP
1496	976060.413	617267.825	1306.290	TOP
1497	976031.416	617245.536	1306.042	TOP
1498	976044.040	617229.435	1303.054	TOP

1499	976046.847	617226.754	1300.856	TOP
1500	976054.601	617225.765	1300.697	TOP
1501	976058.882	617219.214	1300.427	TOP
1502	976058.154	617211.813	1300.649	TOP
1503	976054.013	617205.050	1300.573	TOP
1504	976055.467	617203.941	1302.326	TOP
1505	976072.551	617208.897	1304.926	TOP
1506	976084.930	617203.249	1306.871	TOP
1507	976084.330	617204.882	1305.556	TOE
1508	976084.449	617224.874	1297.143	TOE
1509	976073.264	617232.575	1299.026	TOE
1510	976059.561	617250.026	1302.855	TOE
1511	976052.292	617255.880	1304.508	TOE
1512	976058.088	617266.790	1304.908	TOE
1513	976066.325	617252.200	1302.325	TOE
1514	976076.178	617240.917	1299.375	TOE
1515	976086.590	617235.092	1296.963	TOE
1516	976091.682	617254.223	1305.889	TOE
1517	976083.728	617223.439	1296.703	DRY
1518	976057.439	617222.022	1299.959	WL
1519	976209.780	617220.080	1302.581	WL
1520	976473.808	616757.690	1305.212	BC
1521	976452.955	616779.383	1305.297	BC
1522	976424.843	616808.019	1305.201	BC
1523	976412.746	616793.241	1305.097	P
1524	976432.078	616774.793	1305.165	P
1525	976461.095	616744.185	1305.233	P
1526	976448.257	616732.379	1305.424	BC
1527	976426.836	616755.090	1305.374	BC
1528	976399.167	616782.736	1305.087	BC
1529	976401.296	616740.842	1299.662	WL
1530	976437.608	616847.925	1302.507	WL
1531	976434.095	616773.503	1305.122	BCFD
1532	975906.564	616379.813	1302.199	NG
1533	975899.692	616369.350	1303.549	TOP
1534	975892.472	616362.735	1301.567	TOP
1535	975881.769	616354.190	1301.228	TOP
1536	975879.921	616344.094	1301.572	TOP
1537	975874.869	616336.605	1301.356	TOP
1538	975872.462	616333.141	1302.797	TOP
1539	975873.059	616328.557	1302.295	NG
1540	975868.092	616308.332	1302.306	NG
1541	975870.771	616297.999	1302.304	TOP
1542	975871.654	616296.342	1301.388	TOP
1543	975876.111	616287.821	1301.444	TOP
1544	975881.619	616279.127	1301.147	TOP
1545	975885.646	616271.384	1302.912	TOP
1546	975892.543	616265.069	1303.426	NG
1547	975815.355	616217.041	1299.345	NG
1548	975777.031	616251.040	1298.419	NG
1549	975722.105	616294.985	1297.922	NG
1550	975739.642	616350.759	1297.477	NG
1551	975797.270	616413.510	1297.668	NG
1552	975854.161	616428.031	1299.429	NG
1553	975910.994	616361.459	1299.616	WL
1554	975851.930	616402.969	1293.820	WL
1555	975637.318	616307.933	1296.172	BCFD
1556	976396.228	615670.136	1302.968	NG
1557	976379.328	615672.492	1303.438	TOP
1558	976371.488	615673.585	1301.734	TOP
1559	976361.529	615672.854	1301.507	TOP
1560	976350.324	615673.197	1301.566	TOP
1561	976343.699	615671.265	1303.093	TOP
1562	976324.744	615671.929	1302.699	NG

1563	976337.684	615679.547	1299.630	WL
1564	976359.201	615629.605	1296.785	WL
1565	976338.114	615538.981	1296.682	WL
1566	976365.647	615567.350	1302.175	BC
1567	976345.451	615570.783	1302.242	BC
1568	976317.402	615577.549	1302.382	BC
1569	976323.722	615613.453	1302.424	BC
1570	976353.809	615605.683	1302.210	BC
1571	976382.050	615601.068	1302.271	BC
1572	976378.095	615583.139	1302.158	P
1573	976349.291	615588.317	1302.213	P
1574	976318.958	615596.317	1302.399	P
1575	976368.377	615584.836	1302.128	BCFD
1576	976280.903	614459.509	1296.868	NG
1577	976246.913	614455.907	1296.595	TOP
1578	976240.147	614456.606	1295.102	TOP
1579	976229.648	614458.668	1294.983	TOP
1580	976219.465	614455.401	1294.929	TOP
1581	976213.258	614451.081	1296.225	TOP
1582	976198.922	614446.537	1296.370	NG
1583	976223.478	614395.530	1291.796	HDWL
1584	976234.369	614395.584	1291.860	HDWL
1585	976242.791	614396.984	1292.570	HDWL
1586	976260.775	614366.398	1297.532	BC
1587	976235.077	614361.506	1296.394	BC
1588	976208.127	614358.303	1296.278	BC
1589	976209.856	614322.038	1296.310	BC
1590	976231.212	614324.658	1296.312	BC
1591	976254.355	614327.636	1296.557	BC
1592	976250.987	614344.873	1296.411	P
1593	976226.962	614342.062	1296.184	P
1594	976202.069	614338.666	1296.178	P
1595	976223.638	614303.979	1291.765	HDWL
1596	976235.476	614303.917	1291.735	HDWL
1598	976218.145	614297.936	1289.563	WL
1599	976215.425	614398.780	1289.565	WL
1600	976210.128	614455.591	1293.521	WL
1601	976275.234	614348.337	1296.679	BCFD
1602	975911.795	614384.188	1293.494	CHECK
1603	975812.100	614087.545	1293.721	NG
1604	975813.914	614098.982	1293.045	TOP
1605	975813.409	614105.006	1291.184	TOP
1606	975813.186	614106.229	1289.438	TOP
1607	975806.848	614132.444	1289.433	TOP
1608	975806.367	614134.367	1290.991	TOP
1609	975806.030	614141.778	1292.461	TOP
1610	975807.069	614146.044	1292.696	NG
1611	975714.263	614159.484	1292.385	TOP
1612	975735.393	614160.813	1293.671	TOP
1613	975747.862	614148.818	1291.760	TOP
1614	975740.799	614145.014	1290.041	TOP
1615	975735.685	614132.986	1286.625	TOP
1616	975736.426	614115.977	1286.927	TOP
1617	975739.855	614104.894	1289.569	TOP
1618	975752.007	614097.310	1291.467	TOP
1619	975739.394	614086.590	1293.054	TOP
1620	975731.478	614088.331	1292.891	TOP
1621	975719.953	614093.431	1292.595	TOP
1622	975706.969	614100.246	1292.880	TOP
1623	975707.622	614109.144	1292.777	TOP
1624	975722.543	614093.167	1291.272	TOE
1625	975725.188	614111.684	1286.402	TOE
1626	975714.586	614127.697	1282.447	TOE
1627	975708.050	614100.863	1292.411	TOE

1628	975729.036	614090.060	1291.717	TOE
1629	975730.939	614121.014	1284.793	TOE
1630	975715.613	614137.798	1282.195	TOE
1631	975714.384	614158.489	1291.630	TOE
1632	975713.395	614157.528	1291.503	HDWL
1633	975711.064	614133.220	1291.505	HDWL
1634	975708.452	614109.345	1291.547	HDWL
1635	975703.401	614170.507	1291.762	BC
1636	975699.039	614133.607	1290.519	BC
1637	975695.127	614093.777	1290.249	BC
1638	975681.008	614187.232	1291.037	BC
1639	975671.982	614158.903	1290.831	BC
1640	975669.716	614156.739	1291.507	BC
1641	975668.001	614159.533	1291.007	BC
1642	975672.107	614189.413	1291.110	BC
1643	975650.813	614209.842	1290.678	BC
1644	975645.114	614169.879	1290.604	BC
1645	975641.352	614140.079	1291.471	BC
1646	975665.416	614094.286	1291.206	P
1647	975669.556	614147.342	1291.268	P
1648	975632.184	614146.351	1290.937	HDWL
1649	975634.381	614167.621	1290.950	HDWL
1650	975636.973	614191.680	1290.974	HDWL
1651	975637.132	614191.950	1292.386	TOP
1652	975638.832	614208.912	1293.248	TOP
1653	975631.502	614211.967	1293.312	TOP
1654	975619.513	614208.560	1289.777	TOP
1655	975607.934	614205.106	1290.241	TOP
1656	975605.572	614198.543	1289.036	TOP
1657	975607.713	614183.834	1286.537	TOP
1658	975608.428	614172.423	1286.530	TOP
1659	975606.872	614156.431	1290.489	TOP
1660	975632.025	614151.359	1290.279	TOP
1661	975633.329	614161.684	1287.584	TOP
1662	975609.658	614166.379	1288.271	TOP
1663	975629.570	614163.635	1281.827	TOE
1664	975619.809	614172.717	1282.446	TOE
1665	975614.118	614187.997	1284.655	TOE
1666	975610.803	614206.049	1288.550	TOE
1667	975617.292	614208.014	1288.529	TOE
1668	975621.239	614188.886	1284.235	TOE
1669	975628.129	614176.419	1281.456	TOE
1670	973257.278	612944.357	1270.425	TOP
1671	973253.309	612956.042	1270.330	TOP
1672	973248.032	612968.622	1268.263	TOP
1673	973244.369	612977.762	1267.476	TOP
1674	973239.429	612997.971	1267.481	TOP
1675	973241.306	613000.803	1268.414	TOP
1676	973239.303	613007.679	1270.914	TOP
1677	973255.467	613008.424	1270.174	TOP
1678	973270.228	613001.653	1270.780	TOP
1679	973289.643	612978.407	1271.405	TOP
1680	973298.318	612957.449	1271.734	TOP
1681	973294.397	612952.678	1272.151	HDWL
1682	973285.221	612943.148	1272.166	HDWL
1683	973258.461	612943.393	1272.144	HDWL
1684	973240.755	612954.676	1271.576	HDWL
1685	973200.223	612956.421	1271.299	HDWL
1686	973159.906	612957.984	1270.942	HDWL
1687	973137.387	612946.222	1271.515	HDWL
1688	973150.360	612968.279	1265.426	TOE
1689	973185.316	612968.058	1265.352	TOE
1690	973225.934	612966.826	1265.046	TOE
1691	973226.268	612959.647	1264.759	TOE

1692	973240.530	612960.572	1264.850	TOE
1693	973239.781	612972.705	1264.785	TOE
1694	973240.188	612976.331	1265.433	TOE
1695	973232.516	613009.851	1265.402	TOE
1696	973241.226	612997.236	1267.715	TOE
1697	973267.802	612984.595	1267.097	TOE
1698	973283.293	612952.511	1265.318	TOE
1699	973269.014	612952.603	1265.207	TOE
1700	973261.935	612966.274	1266.481	TOE
1701	973246.780	612975.252	1267.551	TOE
1702	973238.292	612964.796	1264.786	GRATE
1703	973238.457	612962.308	1264.761	GRATE
1704	973228.039	612961.559	1264.745	GRATE
1705	973282.762	612950.707	1265.117	GRATE
1706	973269.497	612947.409	1265.060	GRATE
1707	973282.667	612947.414	1265.082	GRATE
1708	973301.107	612946.648	1272.817	NG
1709	973291.180	612988.111	1273.148	NG
1710	973242.309	613010.997	1270.976	NG
1711	973325.520	612925.561	1272.981	BC
1712	973269.358	612920.286	1272.584	BC
1713	973135.373	612921.802	1271.258	BC
1714	973136.117	612894.812	1271.953	BC
1715	973167.749	612894.682	1272.281	BC
1716	973316.858	612892.228	1273.412	BC
1717	973239.333	612976.994	1264.273	WL
1718	973691.130	613989.885	1276.344	NG
1719	973686.913	614008.794	1275.451	TOP
1720	973686.152	614014.295	1272.702	TOP
1721	973677.552	614058.391	1272.691	TOP
1722	973674.099	614064.631	1275.326	TOP
1723	973666.403	614078.104	1275.627	NG
1724	973650.424	614046.188	1268.023	HDWL
1725	973653.859	614027.452	1267.900	HDWL
1726	973657.455	614007.897	1267.913	HDWL
1727	973611.338	614060.358	1273.712	NG
1728	973618.617	614030.239	1273.305	NG
1729	973631.104	613994.691	1273.247	NG
1730	973643.824	613973.712	1275.697	NG
1731	973591.698	614035.145	1267.896	HDWL
1732	973595.508	614014.797	1267.886	HDWL
1733	973598.777	613996.016	1267.942	HDWL
1734	973596.404	614000.781	1264.255	WL
1735	973664.552	614014.747	1264.282	WL
1736	973698.155	614009.456	1272.574	WL
1737	973378.053	613907.803	1267.860	HDWL
1738	973394.395	613898.278	1267.849	HDWL
1739	973408.224	613890.282	1267.766	HDWL
1740	973504.556	613848.822	1274.352	CONC
1741	973457.067	613845.322	1272.756	CONC
1742	973404.136	613852.892	1272.095	CONC
1743	973314.175	613868.737	1271.902	CONC
1744	973268.109	613862.677	1272.577	CONC
1745	973372.096	613819.155	1267.773	HDWL
1746	973355.037	613829.007	1267.802	HDWL
1747	973336.658	613839.790	1267.811	HDWL
1748	973340.396	613833.892	1264.249	WL
1749	973385.356	613909.228	1264.214	WL
1750	974016.840	613966.129	1280.397	NG
1751	974016.387	613973.413	1280.208	TOP
1752	974015.951	613978.111	1279.131	TOP
1753	974013.801	613993.955	1279.129	TOP
1754	974013.581	613994.183	1277.174	TOP
1755	974009.812	614002.234	1277.119	TOP

1756	974009.778	614002.314	1276.866	TOP
1757	974009.161	614008.401	1276.854	TOP
1758	974009.126	614008.474	1277.131	TOP
1759	974010.496	614017.341	1277.134	TOP
1760	974010.516	614017.619	1279.133	TOP
1761	974008.956	614033.720	1279.148	TOP
1762	974008.485	614038.267	1280.121	TOP
1763	974007.832	614043.964	1280.528	NG
1764	974014.871	614058.686	1280.661	CONC
1765	974017.390	614041.775	1280.596	CONC
1766	974021.795	614008.241	1282.267	CONC
1767	974026.770	613972.221	1280.540	CONC
1768	974034.003	613947.728	1280.941	CONC
1769	974057.648	613911.751	1280.263	CONC
1770	974039.078	613978.453	1276.817	WL
1771	973994.223	613962.333	1272.617	WL
1772	974550.938	616583.122	1286.644	WL
1773	974551.384	616574.782	1288.882	HDWL
1774	974542.158	616571.468	1288.848	HDWL
1775	974527.739	616566.285	1288.758	HDWL
1776	974493.959	616530.164	1289.284	BC
1777	974547.933	616551.744	1289.802	BC
1778	974634.292	616578.964	1290.574	BC
1779	974724.527	616598.460	1291.424	BC
1780	974810.827	616608.921	1292.218	BC
1781	974878.479	616611.808	1292.802	BC
1782	974898.714	616611.901	1292.927	BC
1783	974886.023	616632.828	1290.894	HDWL
1784	974877.937	616632.862	1290.862	HDWL
1785	974870.186	616632.883	1290.904	HDWL
1786	974871.300	616640.240	1288.394	WL
1787	974903.606	616576.807	1293.463	BC
1788	974890.628	616577.125	1293.375	BC
1789	974878.355	616578.144	1293.248	BC
1790	974816.383	616575.476	1292.750	BC
1791	974796.588	616573.704	1292.574	BC
1792	974756.251	616568.817	1292.169	BC
1793	974667.267	616552.211	1291.281	BC
1794	974608.929	616536.553	1290.845	BC
1795	974580.904	616532.503	1290.682	BC
1796	974551.016	616526.958	1290.257	BC
1797	974537.824	616523.046	1290.171	BC
1798	974528.543	616519.601	1290.081	BC
1799	974550.903	616527.185	1290.316	BC
1800	974582.312	616538.524	1290.377	BC
1801	974637.943	616555.179	1291.015	BC
1802	974725.789	616574.494	1291.713	BC
1803	974813.116	616585.305	1292.651	BC
1804	974853.439	616585.746	1293.106	BC
1805	974865.752	616583.227	1293.089	BC
1806	974878.386	616578.144	1293.238	BC
1807	974899.875	616554.015	1293.173	BC
1808	974820.148	616551.720	1292.386	BC
1809	974740.877	616542.418	1291.446	BC
1810	974681.932	616531.064	1290.864	BC
1811	974645.918	616522.050	1290.522	BC
1812	974641.380	616520.612	1290.531	BC
1813	974630.493	616512.101	1290.273	BC
1814	974628.943	616495.798	1291.089	BC
1815	974596.868	616483.213	1291.132	BC
1816	974586.816	616497.494	1290.194	BC
1817	974572.350	616498.907	1289.933	BC
1818	974516.585	616476.737	1289.257	BC
1819	974680.365	616876.676	1291.496	NG

1820	974674.464	616883.661	1291.525	TOP
1821	974673.056	616903.994	1289.363	TOP
1822	974677.188	616923.713	1289.527	TOP
1823	974680.089	616940.676	1291.354	TOP
1824	974682.836	616950.618	1291.219	NG
1825	974545.178	616976.776	1289.216	NG
1826	974613.423	616960.122	1290.723	NG
1827	974666.795	616937.431	1291.312	NG
1828	974661.449	616895.582	1290.848	NG
1829	974613.820	616914.532	1290.365	NG
1830	974552.266	616930.477	1289.984	NG
1831	974552.534	616943.381	1287.669	TOE
1832	974611.838	616926.427	1288.244	TOE
1833	974663.936	616907.584	1288.822	TOE
1834	974666.074	616922.717	1288.841	TOE
1835	974623.311	616941.798	1288.146	TOE
1836	974550.975	616962.689	1287.613	TOE
1837	974545.240	616962.120	1286.643	WL
1838	974679.371	616914.536	1288.396	WL
1839	972598.696	616508.985	1274.422	NG
1840	972596.035	616518.162	1273.981	TOP
1841	972594.492	616522.730	1272.985	TOP
1842	972589.339	616552.735	1273.024	TOP
1843	972588.937	616557.775	1273.887	TOP
1844	972586.985	616567.189	1274.298	NG
1845	972577.955	616582.097	1274.337	CONC
1846	972583.568	616557.281	1275.017	CONC
1847	972587.407	616535.770	1276.102	CONC
1848	972590.716	616514.616	1275.006	CONC
1849	972594.148	616482.503	1274.573	CONC
1850	972605.470	616522.298	1271.819	WL
1851	972564.343	616490.161	1267.974	WL
1852	973323.540	617042.042	1278.084	NG
1853	973315.402	617056.206	1279.658	TOP
1854	973312.259	617061.293	1277.763	TOP
1855	973302.345	617070.035	1277.864	TOP
1856	973293.691	617081.339	1277.739	TOP
1857	973288.912	617089.041	1278.985	TOP
1858	973282.558	617097.122	1278.778	NG
1859	973273.815	617110.887	1278.653	CONC
1860	973285.237	617082.336	1279.311	CONC
1861	973296.720	617067.448	1280.224	CONC
1862	973307.657	617052.595	1279.325	CONC
1863	973322.925	617032.179	1278.501	CONC
1864	973326.645	617067.804	1276.306	WL
1865	973290.180	617042.771	1274.735	WL
1866	972981.696	616717.045	1277.710	TOP
1867	972985.960	616711.514	1276.146	TOP
1868	972993.911	616700.384	1276.246	TOP
1869	973001.651	616691.868	1276.460	TOP
1870	972988.351	616711.344	1274.675	WL
1871	972975.512	616699.578	1271.750	WL
1872	975667.363	612796.355	1293.480	RB
2000	975225.932	611654.183	1288.767	BC
2001	975226.348	611718.902	1288.813	BC
2002	975226.560	611776.908	1288.804	BC
2003	975220.942	611791.733	1287.943	BC
2004	975203.826	611797.931	1287.873	BC
2005	975135.520	611798.511	1287.654	BC
2006	975040.242	611799.236	1287.173	BC
2007	975046.274	611817.070	1287.221	P
2008	975137.175	611816.314	1287.494	P
2009	975244.685	611815.565	1288.057	P
2010	975244.327	611800.178	1287.750	P

2011	975244.244	611795.889	1287.850	P
2012	975244.493	611773.999	1288.717	P
2013	975244.619	611716.079	1288.689	P
2014	975243.681	611654.286	1288.466	P
2015	975089.346	611662.907	1286.403	NG
2016	975099.741	611683.971	1286.017	NG
2017	975120.046	611694.438	1285.876	NG
2018	975165.127	611693.312	1286.868	NG
2019	975190.658	611702.370	1287.801	NG
2020	975205.258	611728.251	1288.366	NG
2021	975204.499	611756.764	1287.868	NG
2022	975194.564	611773.528	1287.453	NG
2023	975172.700	611775.524	1287.245	NG
2024	975127.080	611775.610	1286.412	NG
2025	975073.611	611772.599	1285.636	NG
2026	975039.123	611781.361	1286.917	NG
2027	975090.936	611737.622	1281.496	NG
2028	975140.164	611737.677	1281.903	NG
2029	975243.647	611640.779	1288.442	BCFL
2030	974893.274	611155.433	1285.513	BC
2031	974899.782	611189.279	1285.392	BC
2032	974914.937	611214.397	1285.418	BC
2033	974953.026	611224.948	1285.295	BC
2034	974962.688	611222.038	1285.516	BC
2035	974971.318	611219.998	1285.669	BC
2036	975016.839	611210.980	1286.030	BC
2037	975054.092	611203.695	1286.497	BC
2038	975051.496	611166.223	1286.400	BC
2039	974995.926	611176.315	1285.814	BC
2040	974956.086	611183.502	1285.436	BC
2041	974940.211	611180.615	1285.047	BC
2042	974931.772	611166.714	1285.450	BC
2043	974937.245	611189.058	1284.872	VG
2044	974939.739	611203.817	1284.844	VG
2045	974943.237	611223.427	1284.746	VG
2046	974951.637	611224.604	1284.581	SCUP
2047	974939.127	611224.554	1284.536	SCUP
2048	974924.511	611219.773	1284.550	SCUP
2049	974940.992	611289.551	1280.560	NG
2050	975000.181	611278.547	1280.566	NG
2051	975052.026	611185.188	1286.256	P
2052	974929.107	611198.201	1285.064	P
2053	974910.607	611150.130	1285.477	P
2054	974864.543	610130.300	1287.660	P
2055	974793.366	610287.084	1285.847	VG
2056	974808.467	610292.088	1285.873	VG
2057	974823.258	610296.966	1285.877	VG
2058	974823.744	610300.862	1285.874	VG
2059	974818.752	610316.129	1285.994	VG
2060	974814.166	610330.527	1286.053	VG
2061	974787.257	610300.342	1285.900	SCUP
2062	974791.942	610286.684	1285.760	SCUP
2063	974795.975	610274.544	1285.944	SCUP
2064	974765.703	610279.166	1285.391	NG
2065	974774.927	610188.376	1288.332	NG
2066	974738.845	610180.246	1287.927	NG
2067	974691.636	610167.653	1287.639	NG
2068	974802.244	610309.852	1286.065	BCFL
2069	974666.712	611455.374	1284.347	NG
2070	974655.954	611418.022	1283.000	NG
2071	974643.917	611375.988	1283.206	NG
2072	974626.637	611303.351	1283.399	NG
2073	974628.702	611253.046	1285.897	NG
2074	974655.458	611315.004	1280.484	NG

2075	974663.351	611370.181	1279.988	NG
2076	974675.293	611423.555	1280.736	NG
2077	974652.975	611373.097	1279.990	FL
2078	974587.019	611387.003	1278.268	FL
2079	974572.691	611405.109	1278.272	NG
2080	974565.109	611354.876	1278.517	NG
2081	974298.850	611408.010	1277.620	NG
2082	974294.069	611455.245	1277.294	NG
2083	974282.424	611487.834	1281.213	NG
2084	974252.327	611462.149	1280.744	NG
2085	974261.396	611412.750	1281.100	NG
2086	974282.199	611367.925	1280.782	NG
2087	974274.736	611438.186	1277.362	FL
2088	974215.264	611434.645	1273.808	FL
2089	974204.891	611413.889	1274.318	NG
2090	974201.793	611472.195	1274.318	NG
2091	974080.473	611433.269	1273.883	NG
2092	974073.499	611470.859	1273.576	NG
2093	974044.881	611485.409	1277.447	NG
2094	974050.750	611446.703	1277.038	NG
2095	974055.686	611404.462	1277.220	NG
2096	974062.069	611456.847	1274.039	FL
2097	974024.268	611443.084	1274.546	FL
2098	974008.627	611446.109	1274.296	NG
2099	974004.769	611434.484	1274.445	NG
2100	973937.581	611421.469	1273.947	DRY
2101	973846.231	611381.450	1278.007	NG
2102	973864.947	611409.901	1277.919	NG
2103	973869.846	611439.874	1276.884	NG
2104	973869.661	611443.405	1276.078	NG
2105	973868.303	611456.089	1275.906	NG
2106	973867.745	611460.202	1276.793	NG
2107	973855.978	611491.323	1277.411	NG
2108	973821.541	611539.283	1278.427	NG
2109	973799.944	611556.633	1278.736	NG
2110	973808.346	611518.906	1275.166	TOE
2111	973839.488	611496.041	1275.187	TOE
2112	973852.541	611455.935	1275.163	TOE
2113	973855.156	611440.908	1275.156	TOE
2114	973849.234	611415.407	1275.170	TOE
2115	973827.889	611384.288	1275.311	TOE
2116	973853.952	611447.710	1274.948	WL
2117	974782.524	611408.778	1280.994	NG
2118	974793.315	611350.337	1280.794	NG
2119	974786.129	611306.228	1281.082	NG
2120	974809.536	611350.124	1280.152	FL
2121	974843.748	611345.898	1279.610	FL
2122	974828.111	611402.166	1283.810	NG
2123	974832.672	611365.368	1283.190	NG
2124	974834.388	611304.254	1283.885	NG
2125	974814.605	611234.511	1285.930	NG
2126	974859.796	611345.752	1280.071	NG
2127	974983.001	611342.787	1280.429	NG
2128	973610.889	611493.601	1276.988	CONC
2129	973590.697	611469.829	1276.751	CONC
2130	973582.279	611438.470	1277.106	CONC
2131	973580.736	611426.114	1276.280	CONC
2132	973578.848	611412.975	1276.275	CONC
2133	973576.527	611398.925	1277.335	CONC
2134	973565.404	611362.436	1276.786	CONC
2135	973547.025	611337.899	1276.382	CONC
2136	973585.313	611422.764	1274.892	PIPE
2137	973584.606	611418.953	1274.886	PIPE
2138	973584.228	611414.500	1274.904	PIPE

2139	973573.923	611416.307	1274.851	PIPE
2140	973574.649	611420.290	1274.926	PIPE
2141	973575.293	611424.210	1274.954	PIPE
2142	973597.253	611446.369	1274.938	WL
2143	973560.083	611445.001	1270.954	WL
2144	973164.911	611538.996	1273.013	NG
2145	973173.369	611502.967	1272.334	CONC
2146	973177.931	611473.432	1272.432	CONC
2147	973178.798	611461.600	1271.702	CONC
2148	973178.800	611448.916	1271.697	CONC
2149	973178.967	611436.426	1272.353	CONC
2150	973178.427	611422.314	1272.038	CONC
2151	973193.613	611396.253	1272.250	NG
2152	973183.644	611458.596	1270.973	PIPE
2153	973183.696	611454.431	1270.992	PIPE
2154	973183.642	611450.721	1270.878	PIPE
2155	973173.735	611450.413	1270.972	PIPE
2156	973173.812	611454.618	1270.902	PIPE
2157	973173.946	611458.633	1270.988	PIPE
2158	973165.563	611470.275	1270.864	TOP
2159	973168.462	611441.463	1270.691	TOP
2160	973158.384	611418.804	1265.094	WL
2161	973191.019	611422.086	1270.884	WL
2162	973568.628	611434.056	1274.596	TOP
2163	973567.590	611409.440	1274.696	TOP
2164	972913.943	611804.773	1270.013	BC
2165	972927.147	611769.381	1269.931	BC
2166	972941.926	611737.703	1269.811	BC
2167	972944.121	611733.334	1269.889	BC
2168	972955.845	611721.490	1269.603	BC
2169	972973.501	611725.643	1270.119	BC
2170	973015.412	611750.020	1271.238	BC
2171	973085.681	611778.616	1272.117	BC
2172	973125.500	611788.221	1272.375	BC
2173	973131.084	611752.974	1272.431	BC
2174	973070.110	611735.293	1272.006	BC
2175	973003.933	611702.762	1270.559	BC
2176	972957.788	611674.353	1269.268	BC
2177	972896.729	611799.566	1269.985	P
2178	972928.630	611724.928	1269.401	P
2179	972948.975	611689.994	1269.251	P
2180	973001.459	611722.188	1270.358	P
2181	973129.066	611770.568	1272.273	P
2182	973028.168	611776.082	1267.582	TOP
2183	973022.417	611779.416	1267.567	TOP
2184	973008.426	611777.461	1267.490	TOP
2185	972996.734	611772.662	1267.490	TOP
2186	972990.331	611767.158	1267.618	TOP
2187	972991.043	611759.632	1267.614	TOP
2188	972993.754	611754.185	1267.677	TOP
2189	973021.167	611698.073	1270.319	TOP
2190	972980.641	611746.420	1270.362	HDWL
2191	972994.972	611754.425	1270.300	HDWL
2192	973009.376	611762.137	1270.348	HDWL
2193	973010.637	611692.295	1270.297	HDWL
2194	973024.981	611700.137	1270.415	HDWL
2195	973039.240	611708.068	1270.525	HDWL
2196	973031.831	611702.485	1266.212	CONC
2197	973038.588	611697.128	1266.192	CONC
2198	973048.881	611697.786	1266.096	CONC
2199	973062.420	611701.083	1266.211	CONC
2200	973071.864	611695.762	1266.244	CONC
2201	973019.604	611695.549	1266.071	CONC
2202	973021.505	611686.693	1266.151	CONC

2203	973020.422	611682.321	1266.187	CONC
2204	973017.203	611678.658	1266.193	CONC
2205	973010.455	611673.645	1266.152	CONC
2206	973004.995	611668.403	1266.131	CONC
2207	973001.976	611758.743	1268.857	CONC
2208	973007.780	611767.291	1268.327	CONC
2209	973032.345	611777.516	1268.236	CONC
2210	972986.379	611751.035	1268.006	CONC
2211	972978.244	611752.866	1268.209	CONC
2212	972967.801	611752.073	1268.249	CONC
2213	972964.163	611754.377	1267.632	WL
2214	973056.979	611699.888	1264.874	WL
2215	972948.284	611689.477	1269.294	BCFL
2216	972359.141	611606.396	1267.667	BC
2217	972313.744	611606.755	1267.443	BC
2218	972292.817	611609.638	1267.395	BC
2219	972232.512	611622.800	1267.862	BC
2220	972205.346	611627.111	1267.903	BC
2221	972184.291	611628.731	1267.585	BC
2222	972170.092	611622.632	1266.785	BC
2223	972164.291	611608.297	1266.896	BC
2224	972164.391	611551.876	1266.813	BC
2225	972164.268	611502.356	1266.738	BC
2226	972163.784	611456.762	1266.780	BC
2227	972111.634	611454.116	1266.806	BC
2228	972106.428	611517.437	1266.660	BC
2229	972106.298	611608.539	1266.876	BC
2230	972137.999	611457.053	1266.924	P
2231	972135.049	611645.875	1267.038	P
2232	972162.127	611646.579	1266.575	P
2233	972186.352	611646.537	1267.301	P
2234	972361.815	611624.855	1267.543	P
2235	972305.687	611578.408	1266.258	CONC
2236	972265.379	611589.548	1266.191	CONC
2237	972235.346	611587.609	1266.206	CONC
2238	972201.613	611577.960	1266.219	CONC
2239	972189.392	611567.779	1266.311	CONC
2240	972191.092	611512.168	1266.138	CONC
2241	972200.611	611493.441	1266.127	CONC
2242	972215.551	611473.495	1266.174	CONC
2243	972194.031	611514.058	1265.685	TOP
2244	972216.912	611530.108	1265.655	TOP
2245	972224.925	611541.336	1265.687	TOP
2246	972217.317	611549.049	1265.712	TOP
2247	972191.577	611566.445	1265.661	TOP
2248	972190.025	611557.906	1266.578	HDWL
2249	972180.802	611548.426	1266.547	HDWL
2250	972180.660	611548.242	1267.065	HDWL
2251	972180.567	611531.479	1267.071	HDWL
2252	972180.748	611531.281	1266.546	HDWL
2253	972189.857	611521.405	1266.588	HDWL
2254	972081.337	611521.642	1266.405	HDWL
2255	972090.307	611530.855	1266.377	HDWL
2256	972090.442	611531.150	1266.859	HDWL
2257	972090.434	611548.213	1266.891	HDWL
2258	972090.238	611548.530	1266.436	HDWL
2259	972080.726	611558.443	1266.387	HDWL
2260	972085.848	611539.740	1259.165	FL
2261	972186.004	611539.667	1259.909	FL
2262	972067.034	611539.343	1259.092	NG
2263	971979.097	611554.557	1257.477	NG
2264	972225.314	611541.525	1264.861	WL
2265	972135.390	611646.681	1266.989	BCFL
2266	971328.323	611130.756	1257.973	BC

2267	971368.035	611088.862	1258.732	BC
2268	971401.489	611040.260	1258.853	BC
2269	971370.546	611021.401	1259.148	BC
2270	971340.575	611065.260	1258.806	BC
2271	971301.470	611106.300	1257.857	BC
2272	971313.152	611120.243	1257.802	P
2273	971360.490	611070.389	1258.639	P
2274	971389.706	611025.480	1258.878	P
2275	971377.456	611095.743	1258.302	HDWL
2276	971384.216	611086.693	1258.124	HDWL
2277	971390.655	611078.139	1258.127	HDWL
2278	971344.873	611043.100	1257.952	HDWL
2279	971337.985	611052.117	1257.902	HDWL
2280	971331.274	611060.712	1257.857	HDWL
2281	971330.676	611045.641	1253.261	FL
2282	971388.302	611090.843	1253.813	FL
2283	971447.401	611107.387	1258.865	NG
2284	971431.537	611127.842	1254.283	NG
2285	971415.683	611150.243	1258.370	NG
2286	971320.266	611037.547	1252.967	NG
2287	971291.856	610985.832	1253.558	NG
2288	971271.482	611151.464	1257.245	BCFL
2289	971014.488	610979.719	1253.579	NG
2290	971014.500	611028.468	1252.376	NG
2291	971016.156	611044.775	1254.101	NG
2292	970935.958	611045.063	1253.134	NG
2293	970933.848	611014.266	1252.267	NG
2294	970934.170	610976.880	1253.745	NG
2295	970902.202	610977.596	1253.479	TOE
2296	970902.876	611010.500	1252.453	TOE
2297	970903.163	611042.468	1253.149	TOE
2298	970888.935	611042.789	1257.052	TOP
2299	970888.128	611010.219	1257.039	TOP
2300	970888.062	610978.181	1257.299	TOP
2301	970899.544	611009.920	1252.284	FL
2302	970861.573	611009.604	1250.136	FL
2303	970871.390	611042.875	1256.239	TOP
2304	970870.992	611009.274	1256.172	TOP
2305	970870.782	610977.515	1256.165	TOP
2306	970857.206	610977.309	1249.639	TOE
2307	970857.589	611009.462	1249.631	TOE
2308	970857.468	611042.743	1249.643	TOE
2309	972584.817	610304.775	1269.929	CONC
2310	972609.957	610315.370	1269.644	CONC
2311	972638.308	610312.113	1268.950	CONC
2312	972673.259	610310.558	1268.496	CONC
2313	972709.918	610327.290	1268.632	CONC
2314	972760.869	610367.055	1269.411	CONC
2315	972801.631	610394.195	1270.087	CONC
2316	972682.209	610338.635	1266.062	TOP
2317	972708.564	610348.221	1266.128	TOP
2318	972731.959	610371.066	1266.152	TOP
2319	972741.476	610399.393	1266.179	TOP
2320	972740.573	610421.091	1266.198	TOP
2321	972757.732	610322.826	1266.289	TOP
2322	972730.279	610322.212	1266.220	TOP
2323	972714.214	610311.345	1266.174	TOP
2324	972704.555	610289.096	1266.140	TOP
2325	972727.154	610316.653	1266.080	PIPE
2326	972705.845	610348.570	1266.042	PIPE
2327	972741.225	610401.568	1266.772	PIPE
2328	972739.597	610396.247	1264.817	WL
2329	972734.242	610322.647	1264.851	WL
2330	972566.736	610267.381	1269.977	BCFL

2331	973312.900	608454.306	1270.056	BC
2332	973291.733	608473.599	1270.205	BC
2333	973265.730	608478.118	1270.226	BC
2334	973256.899	608477.913	1270.303	BC
2335	973247.606	608478.946	1270.353	BC
2336	973162.310	608495.585	1270.177	BC
2337	973151.429	608503.000	1269.461	BC
2338	973149.385	608518.969	1269.587	BC
2339	973154.895	608546.319	1269.594	BC
2340	973160.985	608581.357	1269.650	BC
2341	973165.863	608616.604	1269.815	BC
2342	973092.509	608530.089	1269.569	BC
2343	973084.386	608516.864	1269.298	BC
2344	973069.152	608513.837	1269.950	BC
2345	973019.830	608523.246	1270.303	BC
2346	973014.659	608487.906	1270.305	BC
2347	973062.179	608478.601	1269.740	BC
2348	973074.758	608470.246	1269.406	BC
2349	973077.867	608455.114	1269.330	BC
2350	973072.419	608426.375	1269.324	BC
2351	973129.633	608417.968	1269.263	BC
2352	973135.922	608448.757	1269.408	BC
2353	973143.043	608457.321	1269.389	BC
2354	973158.132	608459.882	1270.103	BC
2355	973208.155	608449.998	1270.468	BC
2356	973259.993	608439.752	1270.214	BC
2357	973272.800	608431.372	1269.913	BC
2358	973275.335	608416.182	1270.300	BC
2359	973295.201	608436.761	1269.895	P
2360	973287.111	608450.684	1269.647	P
2361	973208.254	608468.205	1270.286	P
2362	973162.571	608477.090	1269.863	P
2363	973141.373	608481.272	1268.994	P
2364	973114.191	608488.484	1269.617	P
2365	973138.943	608633.594	1269.968	P
2366	973085.718	608492.386	1269.037	P
2367	973017.277	608505.517	1270.095	P
2368	972983.231	608512.717	1269.728	P
2369	973102.932	608419.097	1269.955	BC
2370	973108.681	608448.664	1269.996	BC
2371	973111.071	608450.336	1269.889	BC
2372	973112.677	608447.905	1269.997	BC
2373	973106.975	608418.187	1269.886	BC
2374	973111.158	608451.051	1269.482	PK
2375	973242.454	608552.392	1268.077	NG
2376	973287.589	608531.937	1267.731	NG
2377	973227.947	608574.765	1267.657	NG
2378	973051.848	608437.887	1263.394	FL
2379	972987.870	608454.078	1263.086	FL
2380	972706.385	608511.050	1261.633	FL
2381	972745.145	608555.318	1267.194	BCFL
2382	971848.423	608362.953	1256.018	NG
2383	971885.125	608411.571	1256.036	NG
2384	971820.896	608420.603	1255.647	FL
2385	971817.914	608418.100	1255.628	FL
2386	971814.699	608415.651	1255.697	FL
2387	971765.244	608473.706	1255.324	FL
2388	971768.104	608476.160	1255.336	FL
2389	971771.051	608478.647	1255.325	FL
2390	971847.926	608464.933	1261.448	NG
2391	971791.233	608461.653	1261.320	NG
2392	971749.218	608458.487	1260.932	NG
2393	971787.136	608541.984	1260.330	NG
2394	971770.803	608542.693	1255.019	FL

2395	971804.859	608640.415	1255.414	FL
2396	971725.747	608524.558	1255.113	FL
2397	971725.750	608520.840	1255.100	FL
2398	971725.720	608517.317	1255.103	FL
2399	971506.614	608516.557	1254.921	FL
2400	971506.506	608520.417	1254.753	FL
2401	971506.414	608523.826	1254.583	FL
2402	971662.173	608578.730	1260.339	BC
2403	971672.212	608566.097	1260.286	BC
2404	971679.304	608560.450	1260.170	BC
2405	971697.498	608531.087	1259.622	BC
2406	971674.792	608484.918	1259.984	BC
2407	971660.709	608466.211	1260.465	BC
2408	971622.801	608472.391	1260.151	BC
2409	971622.057	608489.761	1260.383	BC
2410	971616.986	608503.299	1260.287	BC
2411	971612.092	608522.546	1260.193	BC
2412	971618.327	608548.796	1260.366	BC
2413	971622.188	608562.720	1260.055	BC
2414	971621.855	608580.215	1260.302	BC
2415	971639.474	608531.182	1260.395	BC
2416	971652.933	608541.331	1260.319	BC
2417	971670.233	608531.883	1260.347	BC
2418	971655.530	608531.508	1260.351	BC
2419	971656.175	608522.623	1260.353	BC
2420	971671.769	608523.053	1260.264	BC
2421	971655.146	608508.085	1260.310	BC
2422	971638.289	608522.162	1260.329	BC
2423	971573.531	608543.500	1261.652	NG
2424	971570.292	608510.889	1261.488	NG
2425	971108.577	608493.253	1259.676	NG
2426	971108.305	608512.490	1254.404	NG
2427	971108.146	608531.046	1258.015	NG
2428	971107.989	608542.449	1258.353	NG
2429	971108.010	608542.899	1260.221	WALL
2430	971017.911	608542.428	1260.186	WALL
2431	971005.370	608551.277	1258.020	NG
2432	971003.813	608526.018	1258.054	NG
2433	971003.551	608488.648	1258.864	NG
2434	971019.776	608512.523	1254.787	FL
2435	970962.884	608522.079	1253.131	FL
2436	970908.664	608531.318	1256.040	TOP
2437	970926.557	608538.311	1257.734	TOP
2438	970970.719	608543.240	1257.280	TOP
2439	970980.349	608538.679	1257.588	TOP
2440	970987.215	608530.762	1257.591	TOP
2441	970987.622	608493.195	1258.852	TOP
2442	970929.781	608502.615	1258.236	TOP
2443	970911.026	608505.053	1256.346	TOP
2444	970910.846	608506.244	1255.599	TOE
2445	970929.061	608507.690	1255.728	TOE
2446	970954.338	608521.405	1252.579	TOE
2447	970953.899	608523.992	1252.570	TOE
2448	970925.864	608532.567	1255.803	TOE
2449	970908.396	608530.162	1255.277	TOE
2450	970903.923	608574.664	1255.794	TOP
2451	970913.072	608486.435	1256.387	TOP
2452	970895.120	608485.243	1247.479	TOE
2453	970892.410	608516.003	1247.465	TOE
2454	970888.022	608573.757	1247.433	TOE
2455	970895.065	608516.317	1248.317	FL
2456	970954.497	608522.665	1248.373	FL
2457	973344.767	612671.983	1271.430	CHECK
2458	973319.677	612727.306	1271.634	BC

2459	973320.072	612818.106	1273.165	BC
2460	973314.266	612834.124	1272.435	BC
2461	973299.089	612840.485	1272.519	BC
2462	973232.432	612841.873	1271.979	BC
2463	973232.113	612879.660	1272.904	BC
2464	973281.613	612878.684	1273.321	BC
2465	973328.732	612877.926	1273.600	BC
2466	973256.216	612841.941	1271.551	CB
2467	973248.073	612841.996	1271.492	CB
2468	973256.862	612812.513	1270.726	HDWL
2469	973277.630	612812.259	1270.727	HDWL
2470	973297.439	612812.543	1270.716	HDWL
2471	973296.573	612810.958	1268.254	TOP
2472	973290.483	612778.953	1268.162	TOP
2473	973288.641	612774.377	1268.213	TOP
2474	973276.604	612769.362	1268.265	TOP
2475	973262.137	612764.990	1268.276	TOP
2476	973235.309	612762.415	1268.187	TOP
2477	973222.287	612751.290	1268.291	TOP
2478	973258.215	612811.672	1268.301	TOP
2479	973255.621	612803.668	1268.249	TOP
2480	973248.500	612799.969	1268.275	TOP
2481	973241.468	612800.623	1268.358	TOP
2482	973265.594	612811.342	1267.875	TOP
2483	973264.147	612803.258	1267.875	TOP
2484	973256.863	612796.167	1267.919	TOP
2485	973249.450	612784.791	1267.831	TOP
2486	973255.014	612776.206	1267.876	TOP
2487	973265.107	612775.274	1267.884	TOP
2488	973278.476	612782.205	1267.859	TOP
2489	973284.983	612791.787	1267.839	TOP
2490	973288.445	612811.701	1267.897	TOP
2491	973277.152	612810.034	1265.752	FL
2492	973250.147	612780.083	1267.426	WL
2500	971618.961	612477.259	1261.659	SW
2501	971615.574	612462.155	1261.387	SW
2502	971617.360	612449.559	1260.935	SW
2503	971620.811	612436.422	1260.939	SW
2504	971625.549	612423.400	1260.813	SW
2505	971628.904	612403.693	1261.109	SW
2506	971644.353	612376.381	1261.558	SW
2507	971651.356	612364.088	1261.961	SW
2508	971653.206	612357.734	1262.065	SW
2509	971638.997	612386.064	1261.155	SW
2510	971627.843	612379.129	1263.597	SW
2511	971620.912	612378.955	1263.710	SW
2512	971621.568	612371.203	1263.673	NG
2513	971635.985	612367.340	1263.447	NG
2514	971627.175	612395.537	1261.354	NG
2515	971633.667	612415.160	1260.661	NG
2516	971628.838	612477.010	1260.418	TOP
2517	971626.547	612460.391	1260.413	TOP
2518	971626.825	612451.223	1260.421	TOP
2519	971631.734	612438.717	1260.384	TOP
2520	971654.619	612406.229	1260.419	TOP
2521	971664.560	612383.512	1260.397	TOP
2522	971662.102	612355.438	1260.359	TOP
2523	971637.585	612430.133	1259.694	WL
2524	971600.492	612391.690	1260.311	TOP
2525	971613.123	612408.719	1260.241	TOP
2526	971614.102	612429.649	1260.291	TOP
2527	971604.613	612456.640	1260.304	TOP
2528	971587.348	612468.114	1260.732	TOP
2529	971611.390	612438.997	1259.710	WL

2530	971214.551	612348.795	1260.355	TOP
2531	971194.676	612340.127	1260.392	TOP
2532	971183.783	612324.638	1260.358	TOP
2533	971183.528	612320.287	1260.329	TOP
2534	971194.435	612303.685	1260.407	TOP
2535	971223.324	612299.354	1260.386	TOP
2536	971183.833	612320.745	1260.825	TOP
2537	971184.211	612324.101	1260.761	TOP
2538	971181.681	612324.377	1260.793	TOP
2539	971181.319	612321.022	1260.815	TOP
2540	971171.378	612284.759	1261.431	NG
2541	971171.740	612310.407	1261.227	NG
2542	971169.910	612333.942	1261.121	NG
2543	971170.905	612355.547	1261.454	NG
2544	971172.192	612373.131	1261.403	NG
2545	971170.996	612372.651	1261.752	BC
2546	971170.585	612353.300	1261.557	BC
2547	971155.085	612353.806	1261.151	BC
2548	971153.264	612353.117	1261.142	BC
2549	971152.501	612351.193	1261.149	BC
2550	971152.732	612309.403	1261.150	BC
2551	971153.889	612306.327	1261.196	BC
2552	971156.823	612305.037	1261.239	BC
2553	971171.003	612304.650	1261.519	BC
2554	971170.433	612286.137	1261.651	BC
2555	971142.104	612322.907	1260.202	SD
2556	971142.209	612326.431	1260.192	SD
2557	971139.658	612326.481	1260.192	SD
2558	971139.493	612323.217	1260.234	SD
2559	971108.994	612287.310	1261.661	BC
2560	971108.603	612322.891	1261.775	BC
2561	971108.592	612327.703	1261.729	BC
2562	971109.549	612388.132	1261.701	BC
2563	971141.298	612383.615	1260.531	P
2564	971140.830	612330.905	1260.282	P
2565	971141.172	612316.977	1260.322	P
2566	971140.034	612284.384	1260.620	P
2567	971093.440	612283.334	1260.347	NG
2568	971093.954	612313.758	1259.656	NG
2569	971094.086	612339.893	1260.288	NG
2570	971094.318	612384.381	1260.562	NG
2571	971108.460	612328.169	1261.189	CONC
2572	971093.916	612328.319	1258.820	CONC
2573	971093.894	612322.440	1258.877	CONC
2574	971108.301	612322.295	1261.034	CONC
2575	971101.588	612325.281	1259.711	SDMH
2576	971100.331	612244.066	1260.790	SDMH
2577	971093.821	612325.203	1258.344	FL
2578	971092.215	612364.289	1258.746	NG
2579	971091.654	612322.594	1258.741	NG
2580	971091.398	612276.238	1258.481	NG
2581	971030.045	612285.363	1259.477	NG
2582	971029.178	612327.965	1259.396	NG
2583	971034.523	612439.512	1258.621	NG
2584	970999.925	612497.473	1257.868	NG
2585	970993.430	612430.237	1257.605	NG
2586	970984.641	612340.643	1257.831	NG
2587	970979.724	612295.986	1257.825	NG
2588	970976.175	612238.993	1258.825	NG
2589	970957.074	612239.626	1256.497	TOP
2590	970966.438	612338.515	1256.535	TOP
2591	970975.406	612431.773	1256.556	TOP
2592	970963.085	612430.295	1250.896	TOE
2593	970951.611	612312.548	1250.712	TOE

2594	970944.684	612238.949	1250.606	TOE
2595	970949.432	612246.621	1252.490	FL
2600	971183.100	608135.999	1260.055	TOP
2601	971165.925	608123.353	1260.168	TOP
2602	971162.488	608109.468	1260.114	TOP
2603	971162.435	608104.187	1260.037	TOP
2604	971181.068	608073.557	1260.080	TOP
2605	971203.952	608066.977	1260.102	TOP
2606	971162.843	608104.806	1260.546	CONC
2607	971162.801	608108.722	1260.583	CONC
2608	971159.804	608108.701	1260.602	CONC
2609	971159.933	608104.699	1260.587	CONC
2610	971171.598	608066.374	1261.636	SW
2611	971160.011	608084.450	1261.174	SW
2612	971156.621	608096.111	1261.180	SW
2613	971153.875	608107.969	1261.097	SW
2614	971150.386	608126.970	1261.708	SW
2615	971150.377	608103.601	1260.766	P
2616	971088.781	608087.696	1260.985	P
2617	971013.518	608118.199	1261.170	P
2618	971019.228	608070.791	1261.418	P
2619	971020.776	608056.981	1261.414	P
2620	971021.857	608046.078	1261.507	P
2621	971083.235	608074.667	1261.008	P
2622	971086.489	608065.041	1261.137	P
2623	971155.136	608082.558	1260.408	P
2624	971152.425	608093.072	1260.494	P
2625	971023.093	608017.224	1258.948	P
2626	970991.115	608046.045	1261.407	BC
2627	970990.147	608054.421	1261.419	BC
2628	970985.660	608095.513	1260.875	BC
2629	970985.434	608098.634	1261.123	BC
2630	970984.105	608113.478	1260.792	BC
2631	970968.506	608125.780	1257.600	NG
2632	970970.444	608106.192	1257.651	NG
2633	970970.859	608102.360	1257.644	NG
2634	970971.303	608097.739	1257.601	NG
2635	970971.806	608092.463	1257.597	NG
2636	970972.195	608088.411	1257.609	NG
2637	970975.022	608060.224	1257.620	NG
2638	970975.995	608095.113	1258.408	SD
2639	970975.328	608098.356	1258.329	SD
2640	970973.101	608098.307	1258.270	SD
2641	970973.203	608095.097	1258.407	SD
2642	970954.211	608067.383	1257.792	TOP
2643	970949.392	608113.306	1257.972	TOP
2644	970944.539	608161.473	1257.523	TOP
2645	970923.493	608161.739	1247.298	TOE
2646	970926.885	608117.096	1247.053	TOE
2647	970929.591	608075.076	1246.832	TOE
2648	970940.727	608094.203	1252.190	FL
2650	971255.818	608046.524	1260.013	TOP
2651	971248.250	608032.217	1260.088	TOP
2652	971238.717	608024.948	1260.006	TOP
2653	971229.359	608032.461	1260.112	TOP
2654	971228.690	608042.339	1260.014	TOP
2655	971221.760	608055.506	1259.995	TOP
2656	971221.700	608056.215	1259.283	WL
2657	971213.143	608051.061	1261.590	SW
2658	971221.586	608031.693	1261.878	SW
2659	971220.559	608003.456	1261.856	SW
2660	971214.369	607985.760	1261.979	SW
2661	971223.322	608013.899	1261.780	SW
2662	971240.325	608015.811	1261.582	SW

2663	971259.103	608009.381	1261.877	SW
2664	971269.001	607991.581	1261.956	SW
2665	971251.770	608014.727	1261.894	SW
2666	971254.478	608026.846	1261.636	SW
2667	971264.999	608041.835	1261.408	SW
2668	971257.787	607979.033	1260.108	TOP
2669	971251.462	607991.461	1260.088	TOP
2670	971240.531	607997.441	1260.074	TOP
2671	971230.849	607990.106	1260.235	TOP
2672	971229.376	607982.643	1260.107	TOP
2673	971229.817	607982.436	1259.394	WL

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BOOK 6 OF [redacted]

SOKKIA™

ECONOMY FIELD BOOK

ADMP UPDATE

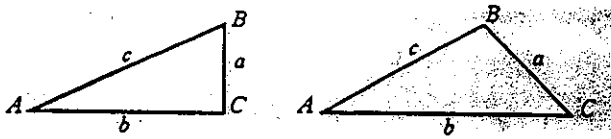
ARROWHEAD LAKES

SEC. 19 WEIRS

BOOK 6

No. 8152-05

FORMULAE FOR SOLVING RIGHT TRIANGLES



$\text{Sin } A = \frac{a}{c} = \text{Cos } B \qquad \text{Cot } A = \frac{b}{a} = \text{Tan } B$

$\text{Cos } A = \frac{b}{c} = \text{Sin } B \qquad \text{Sec } A = \frac{c}{b} = \text{Cosec } B$

$\text{Tan } A = \frac{a}{b} = \text{Cot } B \qquad \text{Cosec } A = \frac{c}{a} = \text{Sec } B$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2}$

FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C, c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

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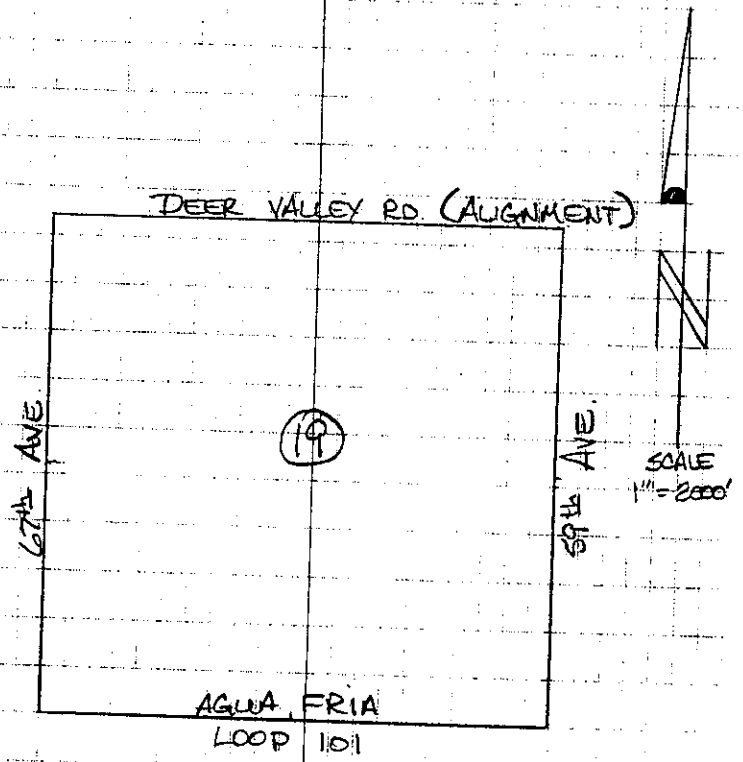
ADMP UPDATE - ARROWHEAD LAKES
WEIR SURVEY FOR SEC 19

THIS SURVEY IS A PORTION OF
SEC 19, T4N, R2E



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DESCRIPTION	PG #	GPS/CONV.	CREW	DATE
CALIBRATION PT'S	1	GPS	R. ROMAN, J. FARNSWORTH	10-27-2000
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WEIR S19-15	18			
BASE PT #1872	19			

K. KOMAN

J. FA[illegible] TH. CLOUDY & RAINING 65° 1

CALIBRATION PTS

GRID #99913
GPS #1004 HORIZ & VERT.

GRID #99084
GPS #1003 HORIZ & VERT.

GRID #99095
GPS #1005 HORIZ ONLY

GRID #99112
GPS #1001 VERT. ONLY

GRID #7203
GPS #1006 HORIZ & VERT.

GRID #99111
GPS #1002 VERT. ONLY

** SEE BOOK 3, PG. 1-3 FOR **
* CALIBRATION PT. LOCATIONS *

R 1 10-27-2000

J. FRANSWORTH

70° 2

S 19, WEIR TOPOS

BASE @ # 1000 #4RB (1/2") @ S.W COR OF 59th AVE & DEER VALLEY RD. @ 25'± S. OF B/C ON DEER VALLEY & 40'± W. OF B/C ON 59th AVE

GRND TO ANT = 5.10 (HOOK TAPE)
(WEIR S19-1)

PT #	DESCRIPTION
1450	FIRST SHOT
1450-1460	TOP OF WEIR (TOP)
1461-1463	(RIP-RAP AREA)
1464-1468	TOE OF WEIR (TOE)
1469-1473	(RIP-RAP AREA) (EDGE OF GOLF CART PATH)
1474-1476	TOP OF HEADWALL (HDWL) ℄ FACE (1' WIDE)
1477-1479	B/C-T/C, 6" ROLL, 24" (BC)
1480-1482, 1483-1485, 1486-1488	

CONT.

PT #	DESCRIPTION
1488-1491	TOP OF HEADWALL @ FACE (HDWL) (1' THICK)
1492-1496	TOP OF WEIR (TOP)
1497-1506	(RIP-RAP AREA)
1507-1511	TOE OF WEIR (TOE)
1512-1516	(RIP-RAP AREA) (EDGE OF GOLF CART PATH)
1517	DRYWELL (DRY)
1518-1519	WATERLINE ELEV (WL)
1519	LAST SHOT

(WEIR S19-2)

PT #	DESCRIPTION
1520	FIRST SHOT
1520-1522	B/C-T/C, 6" ROLL, 24" (BC)
1523-1525	PAV. @ ℄ (P)
1526-1528	B/C-T/C, 6" ROLL, 24" (BC)
1529 & 1530	WATERLINE FLEX (WL)
1531	FD. BC SPINDLE @ P.T. ON 61ST AVE 200'+/- S. OF INT. OF 61ST AVE & DONALD DR.
1531	LAST SHOT

(WEIR S19-3)

PT #	DESCRIPTION
1532	FIRST SHOT
1532	NAT. GRND @ FENCE (NG)
1533 - 1538	TOP OF WEIR (TOP) (1533 & 1538 @ EDGE NG & RIP-RAP)
1539 & 1540	NAT. GRND @ EDGE OF WATERFALL
1541 - 1545	TOP OF WEIR (TOP) (1541 & 1545 @ EDGE NG & RIP-RAP)
1546	NAT GRND @ FENCE (NG)
1547 - 1552	NAT. GRND @ TOP OF SWALE AROUND POND (NG)
1553 & 1554	WATERLINE ELEV (WL)
1555	FD. C.O.G. BC FLUSH @ INT. OF DEER VALLEY RD & ARROWHEAD LOOP
1555	LAST SHOT

WEIR S19-4

PT #	DESCRIPTION
1556	FIRST SHOT
1556	NAT GRND @ FENCE (NG)
1557-1561	TOP OF WEIR (TOP) (1557 & 1561 @ EDGE NG & RIP-RAP)
1562	NAT GRND @ FENCE (NG)
1563-1565	WATERLINE ELEV (WL)
1566-1568	B/C - T/C, 6" BOLL, 24" (BC)
1569-1571	
1572-1574	PAV. @ ℄ (P)
1575	FD. C.O.G. BC FLUSH @ P.T ON 63RD AVE, 200'+/- S OF INT OF 63RD AVE & DONALD DR.
1575	LAST SHOT

(WEIR S19-5)

PT #	DESCRIPTION
1576	FIRST SHOT
1576	NAT. GRND @ FENCE (NG)
1577-1581	TOP OF WEIR (TOP) (1577 & 1581 @ EDGE NG & RIP-RAP)
1582	NAT GRND @ FENCE (NG)
1583-1585	TOP OF HEADWALL (HDWL)
1586-1588 1589-1591	B/C-B/C, 6" V.C, 24" (BC)
1592-1594	PAV. @ ℄ (P)
1595-1597	TOP OF HEADWALL (HDWL)
	*NOTE #1597 IS 12' FROM #1596 ON SAME LINE AS [illegible]
1598-1600	WATERLINE ELEV. (WL)
1601	FD. C.O.G BC. FLUSH @ P.C. ON 64th AVE. 400'± N OF 64th AVE & LOUISE DR.
1601	LAST SHOT.

(WEIR S19-6)

PT #	DESCRIPTION	
1602	CHECK SHOT (#1006)(7203)	HORIZ = +0.061 VERT = +0.019
1603	NAT. GRND. (NG)	
1604-1609	TOP OF WEIR (TOP) (1604 & 1609 @ EDGE NG & RIP-RAP)	** ALL SHOTS THIS PG. ** ** ON N. SIDE OF ST. **
1610	NAT. GRND. (TOP)	
1611-1620	TOP @ EDGE OF RIP-RAP (TOP)	
1621-1623		
1624-1627	TOE @ EDGE OF RIP-RAP & GOLF	
1628-1631	CART PATH (TOE)	
1632-1634	TOP OF HEADWALL @ FACE (HDWL)	
1634	LAST SHOT	* LIGHTNING & RAIN STARTED *

R. [illegible]IAN 11-3-2000

J. FAR NORTH P. CLOUDY & COOL 65° 9

(SEE PG #2)

SR 19, WEIR TOPO'S

BASE @ #1000 #4RB(½") @ S.W. COR. OF 59th Ave & DEER VALLEY RD.

GRND TO ANT = 5.13' (HOOK TAPE)

(WEIR SR19-6)

PT #	DESCRIPTION
1635	FIRST SHOT
1635-1637	B/C - P/C, 6" ROLL, 24" (BC)
1638-1642, 1643-1645	(1638-1642 ISLAND)
1646 & 1647	PAV. @ ℄ (P)
1648-1650	TOP OF HEADWALL @ FACE (HDWL)
1651-1654	TOP @ EDGE OF RIP-RAP (TOP)
1655-1662	
1663-1666	TOE @ EDGE OF RIP-RAP/GOLF CART
1667-1669	PATH (TOE)
1669	LAST SHOT

WEIR S19-7

PT #	DESCRIPTION
1670	FIRST SHOT
1670 - 1680	TOP OF WEIR (TOP)
1681 - 1687	TOP OF HEADWALL @ FACE (HDWL)
1688 - 1695 1696 - 1698, 1699 - 1701	TOE OF WEIR (TOE)
1702 - 1704 1705 - 1707	COR STORM DRAIN GRATE (GRATE) (1704 & 1707 CLOSE)
1708 - 1710	MISC NAT GRND (NG)
1711 - 1713 1714 - 1716	B/C - T/C, 6" V.C, 24" (BC)
1717	WATERLINE ELEV. (WL)
1717	LAST SHOT

** THIS WEIR WILL ALSO **
* BE PART OF WEIR *
* TOPO FOR SEC 24 *
** FOR HANNAN W/ENTELLUS **
* (WEIR S24-) *

(WEIR S19-9)

PT #	DESCRIPTION
1718	FIRST SHOT
1718	NAT GRND @ EDGE OF GOLF CART PATH (NG)
1719-1722	TOP OF WEIR (TOP) (1719 & 1722 @ EDGE OF RIP-RAP)
1723	NAT GRND @ FENCE (NG)
1724-1726	TOP OF HEADWALL @ FACE (HDWL)
1727-1730	℄ 15' WIDE DIRT RD (?) (NG)
1731-1733	TOP OF HEADWALL @ FACE (HDWL)
1734-1736	WATERLINE ELEV. (WL)
1736	LAST SHOT

(WEIR S19-8)

PT #	DESCRIPTION
1737	FIRST SHOT
1737-1739	TOP OF HEADWALL @ FACE (HDWL)
1740-1744	℄ 10' WIDE GOLF CART PATH (CONC)
1745-1747	TOP OF HEADWALL @ FACE (HDWL)
1748 & 1749	WATERLINE ELEV. (WL)
1749	LAST SHOT

(WEIR S19-10)

PT #	DESCRIPTION
1750	FIRST SHOT
1750	NAT. GRND. (NG)
1751-1762	TOP OF WEIR (TOP) (1751 & 1762 @ EDGE OF NG & RIP-RAP)
1763	NAT. GRND (NG)
1764-1769	℄ GOLF CART PATH & BRIDGE (CONC) (1765-1767 WOODEN BRIDGE)
1770 & 1771	WATERLINE ELEV (WL)
1771	LAST SHOT

(WEIR S19-1D)

PT #	DESCRIPTION
1772	FIRST SHOT
1772	WATERLINE ELEV. (WL)
1773 - 1775	TOP OF HEADWALL @ FACE (HDWL)
1776 - 1782	B/C - T/C, 6" ROLL, 24" (BC)
1783 - 1785	COR OF HEADWALL @ FACE (HDWL)
1786	WATERLINE ELEV. (WL)
1787 & 1788	℄ 2' WIDE CURB, 6" HIGH V.C. (BC)
1789 - 1796	B/C - T/C, 6" ROLL, 24" (BC)
1797 & 1798	℄ 2' WIDE CURB, 6" V.C (BC)
1799 - 1806	B/C - T/C, 6" ROLL, 24" (BC)
1807 - 1814, 1815 - 1818	
	(1812-1814 RETURN, 6" VC, 24")
	(1815-1817 RETURN, 6" VC, 24")
1818	LAST SHOT

(WEIR S19-12)

PT #	DESCRIPTION
1819	FIRST SHOT
1819	NAT GRND. (NG)
1820-1823	TOP OF WEIR (TOP)
1824	NAT GRND (NG)
1825-1827 1828-1830	MISC NAT GRND/TOP (NG)
1831-1833 1834-1836	TOE @ NAT GRND (TOE)
1837-1838	WATERLINE ELEV (WL)

(WEIR S19-13)

PT #	DESCRIPTION
1839	FIRST SHOT
1839	NAT GRND (NG)
1840-1843	TOP OF WEIR (TOP)
1844	NAT GRND. (NG)
1845-1849	& 10' WIDE CONC FOOT PATH/BRIDGE (CONC) (1846-1848 BRIDGE)
1850 & 1851	WATERLINE ELEV. (WL)
1851	LAST SHOT

(WEIR S19-14)

PT #	DESCRIPTION
1852	FIRST SHOT
1852 -	NAT GRND. (NG)
1853-1857	TOP OF WEIR (TOP)
1858	NAT GRND (NG)
1859-1863	℄ 10' WIDE CONC FOOTPATH/BRIDGE (CONC) (1860-1862 BRIDGE)
1864 & 1865	WATERLINE ELEV. (WL)
1865	LAST SHOT

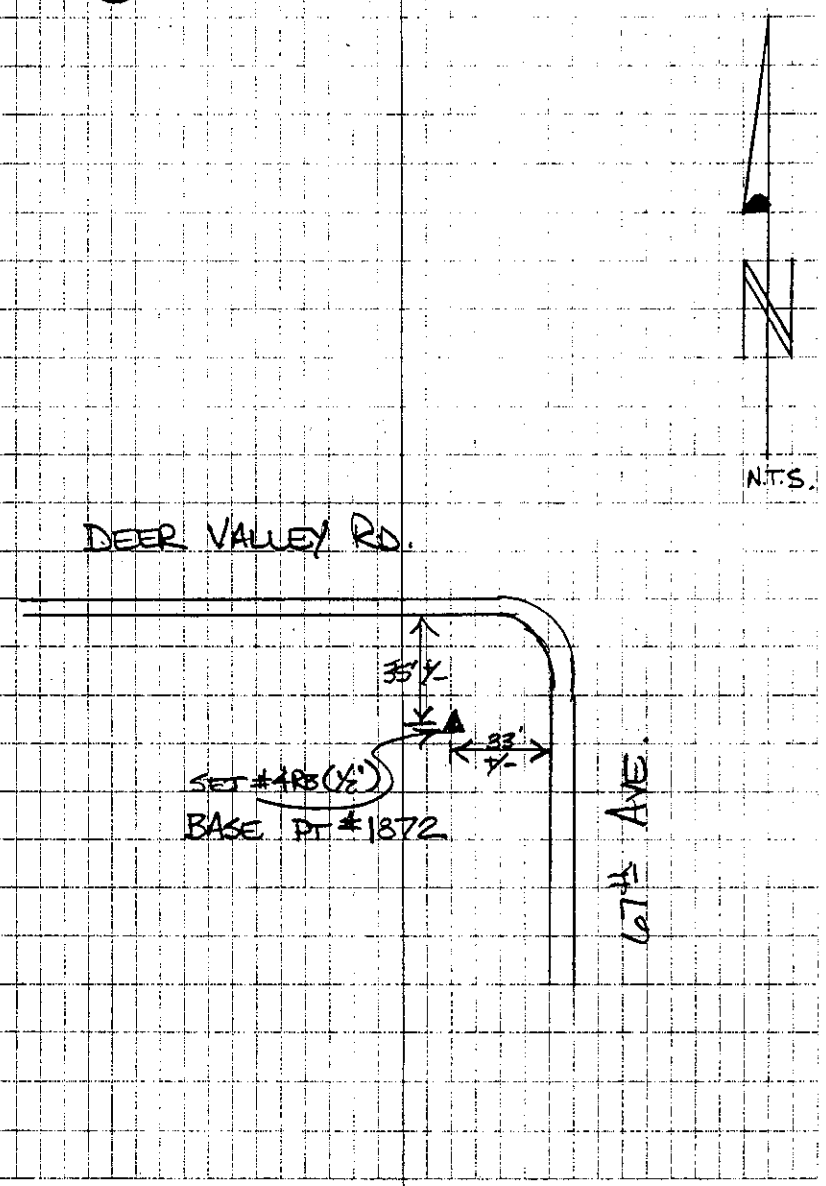
WEIR S19-15

PT #	DESCRIPTION
1866	FIRST SHOT
1866-1869	TOP OF WEIR (TOP)
1870 & 1871	WATERLINE ELEV. (WL)
1871	LAST SHOT

(TOP OF RIP-RAP ON W SIDE OF WEIR IS 5' WEST & UP 3' IN ELEV, UNABLE TO SHOOT PRIVATE PROPERTY (DOGS))

Pt #	DESCRIPTION
1872	SET #4 RB (1/2") @ S.W. COR OF 67th AVE & DEER VALLEY RD. 35'+/- S. OF B/C ON DEER VALLEY RD. 33'+/- W. OF B/C ON 67th AVE

** LOCATED IN 10 MIN **
* SESSION *



SOKKIA™

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BOOK 7 OF

[redacted]

SOKKIA™

ECONOMY FIELD BOOK

ADMP UPDATE

ARROWHEAD LAKES

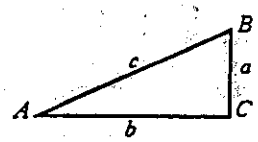
SEC. 24 WEIRS

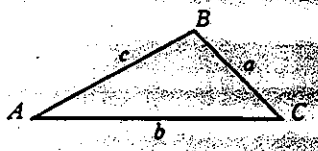
5043 0001

BOOK 7 OF

No. 8152-05

FORMULAE FOR SOLVING RIGHT TRIANGLES





$\text{Sin } A = \frac{a}{c} = \text{Cos } B \qquad \text{Cot } A = \frac{b}{a} = \text{Tan } B$

$\text{Cos } A = \frac{b}{c} = \text{Sin } B \qquad \text{Sec } A = \frac{c}{b} = \text{Cosec } B$

$\text{Tan } A = \frac{a}{b} = \text{Cot } B \qquad \text{Cosec } A = \frac{c}{a} = \text{Sec } B$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A.$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}.$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}.$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2}$

FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C, c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

MADE IN USA

5043.0001

ABMP UPDATE - ARROWHEAD LAKES

WEIR SURVEY FOR SEC 24

THIS SURVEY IS A PORTION OF SEC 24, T4N, R2E

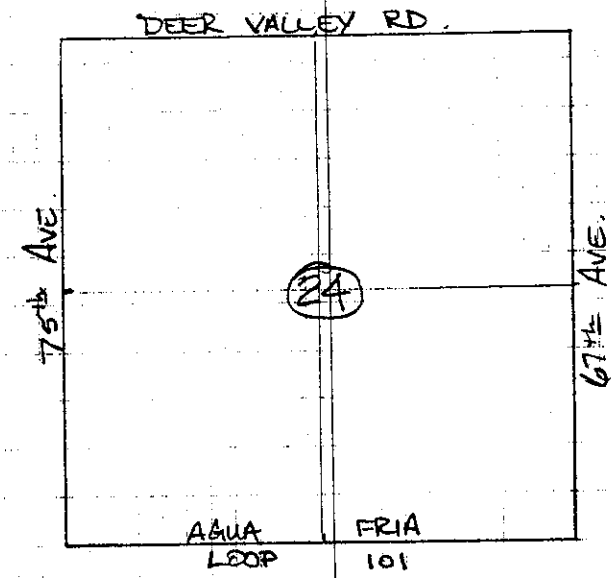


TABLE OF CONTENTS

DESCRIPTION	PG. #	GPS/CONV.	CREW	DATE
CALIBRATION PT'S	1	GPS	R ROMAN, J FARNSWORTH	11-6-2000
SEC 24, WEIR TOPO'S	—	GPS	R. ROMAN, J. FARNSWORTH	11-6-2000
WEIR S24-1	2			
WEIR S24-2	3			
WEIR S24-3	4-5			
WEIR S24-4	6			
WEIR S24-5	7			
WEIR S24-6	8-9	GPS	R. ROMAN, J. FARNSWORTH	11-8-2000
WEIR S24-7	10			
WEIR S24-8	11			
WEIR S24-9	12			
WEIR S24-10	13			
WEIR S24-11	14			
WEIR S24-12	15			
WEIR S24-13	16			
WEIR S24-14	17			
WEIR S24-15	18		R. ROMAN, J. FARNSWORTH	11-22-2000
WEIR S24-16	19-20			
WEIR S24-17	21-22			
WEIR S24-18	23			

CALIBRATION PT'S

GRID	#99913	
GPS	#1004	HORIZ & VERT.
GRID	#99084	
GPS	#1003	HORIZ & VERT
GRID	#99095	
GPS	#1005	HORIZ ONLY
GRID	#99112	
GPS	#1001	VERT. ONLY
GRID	#7203	
GPS	#1006	HORIZ & VERT.
GRID	#99111	
GPS	#1002	VERT ONLY

** SEE BOOK 3, PG 1-3 FOR **
* CALIBRATION PT LOCATIONS *

S[illegible] 24, WEIR TOPOS

J. FA[illegible]RTH cloudy & cool 65° 2

BASE @ #1872 #4RB(1/2") @ S.W. COR. OF 67th AVE & DEER VALLEY RD. (SEE BOOK 6, PG. 19)

GRND TO ANT = 5.14 (HOOK TAPE)

(S24-1)

PT #	DESCRIPTION
2000	FIRST SHOT
2000 - 2007	B/C. T/C, 6" V.C, 24" (BC) (2002-2004 RETURN)
2008 - 2014	MISC. PAV. @ ℄ (P)
2015 - 2026	MISC NAT. GRND @ TOP (NG)
2022 & 2023	MISC NAT. GRND / LOW SPOT (NG)
2029	FD. C.O.G BC FLUSH @ INT. OF MORNING DOVE DR & 69th DR.
2029	LAST SHOT

(S24-2)

PT #	DESCRIPTION
2030	FIRST SHOT
2030 - 2037 2038 - 2042	B/C - T/C, 6" V.C., 24" (BC)
2043 - 2045	℄ & ⊥ 7' V.G (V.G)
2046 - 2048	⊥ SCUPPER @ GUTTERLINE (SCUP)
2049 & 2050	MISC. NAT. GRND. / LOW SPOT (NG)
2051 - 2054	MISC PAV. @ ℄ (P)
2055 - 2057	℄ & ⊥ 7' V.G. (VG)
2058 - 2060	℄ & ⊥ 3' V.G. (V.G)
2061 - 2063	⊥ SCUPPER @ GUTTERLINE (SCUP)
2064 - 2067	MISC NAT. GRND (NG)
2068	FD. C.O.G BC FLUSH @ INT. OF LONE CACTUS DR & 70th DR.
2068	LAST SHOT

(524-3)

PT #	DESCRIPTION
2069	FIRST SHOT
2069 - 2073	MISC NAT. GRND. TOP (NG)
2074 - 2076	MISC NAT. GRND./LOW SPOT (NG)
2077 & 2078	℄ & ℄ 2, 8" PVC PIPES (FL)
2079 & 2080	MISC. NAT. GRND/LOW SPOT (NG)
2081 & 2082	
2083 - 2086	MISC. NAT. GRND/TOP (NG)
2087 & 2088	℄ & ℄ 2, 8" PVC PIPES (FL)
2089 & 2090	MISC. NAT. GRND./LOW SPOT (NG)
2091 & 2092	
2093 - 2095	MISC. NAT GRND./TOP (NG)
2096 & 2097	℄ & ℄ 2, 8" PVC PIPES (FL)

CONT.

(S24-3)

PT #	DESCRIPTION
2098-2099	MISC NAT. GRND. / LOW SPOT (NG)
2100	℄ GRATE OF DRYWELL (DRY)
2101-2109	MISC NAT. GRND. / TOP (NG)
2110-2115	EDGE OF LAKE / TOE (TOE)
2116	WATERLINE ELEV. (WL)
2117-2119	MISC NAT. GRND / LOW SPOT (NG)
2120 & 2121	℄ & ℄ 1, 8" PVC PIPE (FL)
2122-2125	MISC NAT. GRND / TOP (NG)
2126 & 2127	MISC NAT. GRND. / LOW SPOT (NG)
2127	LAST SHOT

(S24-4)

PT #	DESCRIPTION
2128	FIRST SHOT
2128 - 2135	℄ 10' WIDE SIDEWALK (CONC)
2136 - 2141	℄ @ TOP OF 8" PVC PIPE (PIPE)
2142 & 2143	WATERLINE ELEV. (WL)
~~2143~~	~~LAST SHOT~~
2162 & 2163	TOP OF WEIR (TOP)
2163	LAST SHOT

(524-5)

PT #	DESCRIPTION
2144	FIRST SHOT
2144-	MISC NAT. GRND (NG)
2145-2150	℄ 10' SIDEWALK (CONC)
2152-2157	℄ @ TOP OF 8" PVC PIPE (PIPE)
2151	MISC NAT GRND (NG)
2158 & 2159	TOP OF WEIR (TOP)
2160 & 2161	WATERLINE ELEV. (WL)
2161	LAST SHOT

R. Ro[illegible] 11-8-2000 65° 8

J. F[illegible]SWORTH SUNNY & COOL

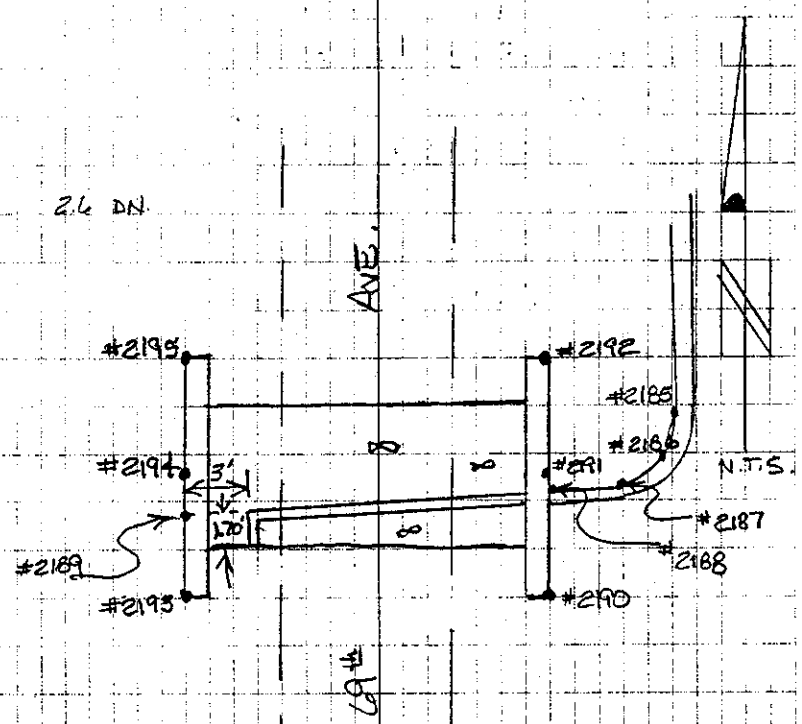
SEC 4, WEIR TOPO'S

BASE @ #1872 #4 RB (1/2") @ S.W. COR OF 67th AVE & DEER VALLEY RD. (SEE BOOK 6, PG 9)

GRND TO ANT = 5.30 (HOOK TAPE) (S24-6)

PT #	DESCRIPTION
2164	FIRST SHOT
2164-2166	B/C - T/C, 6" ROLL, 24" (BC)
2167-2172	B/C - T/C, 6" V.C. 24" (BC)
2173-2176	(2167-2169 RETURN)
2177-2181	MISC PAV. @ ℄ (P)
2182-2189	TOP OF WEIR (TOP) (NOTE @ PT. N.W. COR OF WEIR IS 3' E & 2.60' DOWN FROM PT #2189, IT IS ALSO ON SAME LINE AS #2187-2188)
2190-2192	TOP OF HEADWALL @ FACE (HDWL)
2193-2195	

CONT.



(524-6)

PT #	DESCRIPTION
2196-2200	EDGE OF LAKE (CONC)
2201-2206, 2207-2209, 2210-2212	
2213 & 2214	WATERLINE ELEV. (WL)
2215	FD. C.O.G. BC FLUSH @ INT. OF 69th AVE & SKYLARK
2215	LAST SHOT

(S24-7)

PT #	DESCRIPTION	
2216	FIRST SHOT	
2216-2226	B/C-T/C, 6" V.C, 24" (BC)	
2227-2229	(2221-2223 RETURN)	
2230-2234	MISC. PAV @ ℄ (P)	
2235-2239	EDGE OF LAKE/TOP (CONC)	
2240-2242		
2243-2247	TOP OF WEIR (TOP)	
2248-2253	TOP OF HEADWALL @ FACE (HDWL)	
2254-2259		
2260-2261	FLOWLINE @ FACE OF BOX CULV. (FL)	(5' FROM FACE OF BOX CULV.)
2262-2263	MISC. NAT. GRND @ BOTTOM OF RET. (NG)	
2264	WATERLINE ELEV. (WL)	
2265	FD. C.O.G. BC FLUSH @ INT. OF 69th AVE & ARROWHEAD LOOP	
2265	LAST SHOT	

(524-8)

PT. #	DESCRIPTION
2266	FIRST SHOT
2266-2268	B/C-T/C, 6" V.C., 24" (BC)
2269-2271	
2272-2274	MISC. PAV. @ ℄ (P)
2275-2277	TOP OF HEADWALL @ FACE (HDWL)
2278-2280	
2281 & 2282	FL @ 5' FROM FACE OF HEADWALL (FL)
2283-2287	MISC NAT. GRND. (NG)
2288	FD. COG BC FLUSH @ INT. OF 69th LANE & BLACKHAWK DR.
2288	LAST SHOT

(S24-9)

Pt #	Description
2289	First Shot
2289-2294	Misc Nat. Grnd/Bott. of Ret. (NG)
2295-2297	Toe of Weir/Edge Rip-Rap (TOE)
2298-2300	Top of Weir/℄ 2' high weep holes (TOP)
2301-2302	℄ 24" RCP (℄)
2303-2305	Top of Conc. Channel (TOP)
2306-2308	Toe of Conc. Channel (TOE)
2308	Last Shot

(S24-10)

PT #	DESCRIPTION
2309	FIRST SHOT
2309-2315	℄ 20' WIDE CONC. SIDEWALK (CONC)
2316-2320	TOP EDGE OF LAKE (TOP)
2321-2324	
2325-2327	TOP OF 36" RCP ℄ (PIPE)
2328 & 2329	WATERLINE ELEV.
2330	FD. COG BC FLUSH @ INT OF ARROWHEAD LOOP & 71ST AVE
2330	LAST SHOT

- COULDN'T GET TO ℄, UNDERWATER

(S24-11)

PT #	DESCRIPTION
2331	FIRST SHOT
2331-2341 2342-2345, 2346-2350, 2351-2358	B/C-T/C, 6" V.C., 24" (BC)
2359-2368	MISC PAV. @ ℄ (P)
2369-2373	B/C-T/C, 6" V.C., 6" (BC)
2374	FD. P.K. W/SHINER @ BULLNOSE OF ISLAND @ INT OF 74th AVE & ROSE GARDEN LN. #88409
2375-2377	MISC NAT. GRND. (NG)
2378-2380	℄ & ⊕ 36" RCP @ FACE OF HEADWALL (FL)
2381	FD COG. BC FLUSH @ INT OF 74th AVE & MONONA DR.
2381	LAST SHOT

2378 FROM CATCH BASIN IN ST
2379-2380 CONNECTED

88409

(S24-12)

PT #	DESCRIPTION
2382	FIRST SHOT
2382 & 2383	MISC NAT GRND/LOW SPOT (NG)
2384-2389	℄ & ⊕ 24" RCP @ FACE OF HEADWALL (FL)
2390-2393	MISC NAT. GRND./TOP (NG)
2394 & 2395	℄ & ⊕ 10" PVC @ HEADWALL (FL)
2396-2401	℄ & ⊕ 24" RCP @ HEADWALL (FL)
2402-2407	B/C-T/C, 6" V.C, 24" (BC)
2408-2414, 2415-2418, 2419-2422	(2415-2418 ISLAND) (2419-2422 ISLAND)
2423 & 2424	MISC NAT GRND./TOP (NG)
2424	LAST SHOT

(2384-2389) (2385-2388) (2386-2387)

(2396-2401) (2397-2400) (2398-2399)

(S24-13)

PT #	DESCRIPTION	
2425	FIRST SHOT	
2425-2428	MISC. NAT. GROD (NG)	TOP, TOE (℄), TOP, TOP
2429-2430	TOP OF LOW WALL (WALL)	
2431-2433	MISC NAT GRND/TOP (NG)	
2434 & 2435	℄ & ℄ 8" PVC PIPE (FL)	
2436-2443	TOP OF CONC APRON (TOP)	
2444-2449	TOE OF CONC APRON (TOE)	
	(2446 & 2447 COR OF STORM DRAIN GRATE)	
2450 & 2451	TOP OF CONC. CHANNEL (TOP)	
2452-2454	TOE OF CONC. CHANNEL (TOE)	
2455 & 2456	℄ & ℄ 24" RCP (FL)	
2456	LAST SHOT	

(S24-14)

PT #	DESCRIPTION
2457	FIRST SHOT
2457	CHECK SHOT #1005 (#99095)
2458 - 2462	B/C - T/C, 6" V.C, 24" (BC) (2459 - 2461 RETURN)
2463 - 2465	B/C - T/C, 6" V.C, 6" (BC)
2466 - 2467	COR CATCH BASIN @ GUTTERLINE (CB)
2468 - 2470	TOP OF HEADWALL @ FACE (HDWL)
2471 - 2477 2478 - 2481	TOP EDGE OF LAKE (TOP)
2482 - 2490	TOP OF WEIR (TOP)
2491	FL OF BOX CULV @ FACE OF HEADWALL (FL)
2492	WATERLINE ELEV. (WL)
2492	LAST SHOT

HORIZ = +0.011 VERT = +0.071

[redacted]

2595 LAST SHOT

2500 FIRST SHOT

2500-2508 ℄ 5' MEANDERING SIDEWALK (SW)
2509-2511

2512-2515 MISC. NAT. GRND (NG)

2516-2522 EDGE OF LAKE @ TOP OF CONC. (TOP)

2523 WATERLINE ELEV. (WL)

2524-2528 EDGE OF LAKE @ TOP OF CONC. (TOP)

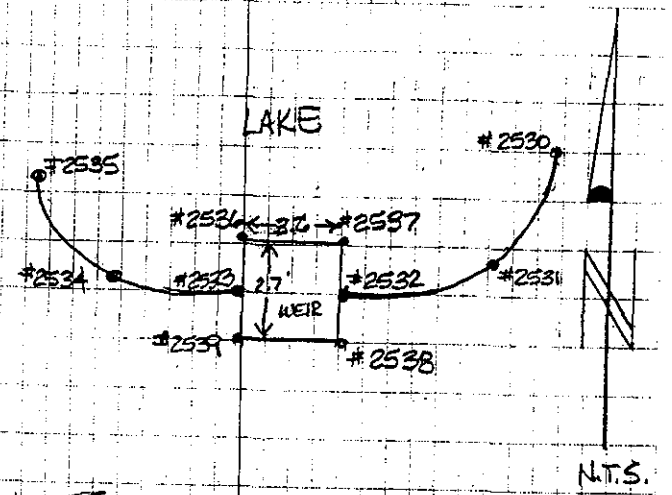
2529 WATERLINE ELEV. (WL)

2529 LAST SHOT

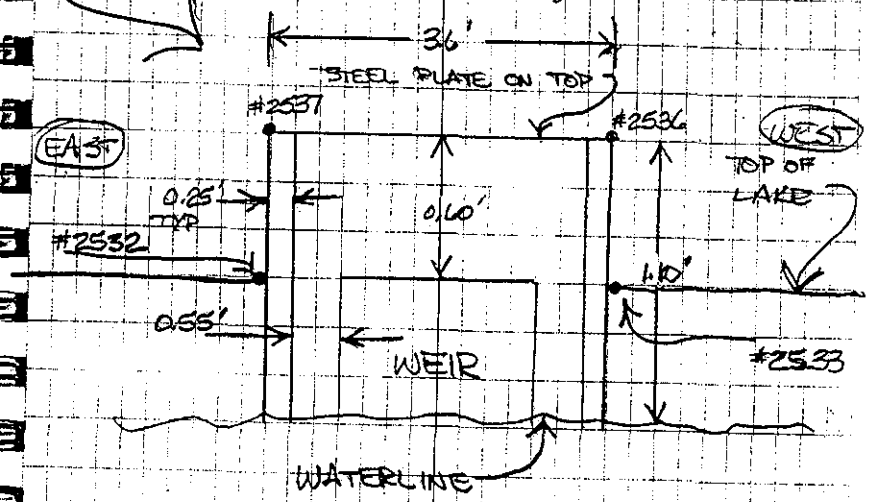
(524-16)

PT #	DESCRIPTION
2530	FIRST SHOT
2530-2532	EDGE OF LAKE @ TOP OF CONC.
2533-2535	(TOP)
2536-2539	COR OF BOX WEIR (CONC)
2540-2544	MISC. NAT. GRND (NG)
2545-2554	B/C-T/C, 6" V.C, 6" (BC)
2555-2558	COR OF S/D GRATE (SD) (DN TO ℄ = 5.30)
2559-2560	B/C-T/C, 6" V.C, 6" (BC)
2561-2562	(CURB OPENING BETWEEN 2560 & 2561)
2563-2566	MISC. DAM @ ℄ (P)
2567-2568	NAT. GRND @ FACE OF RET WALL (NG)
2569-2570	
2571-2574	COR CONC PAD (CONC)

CONT'



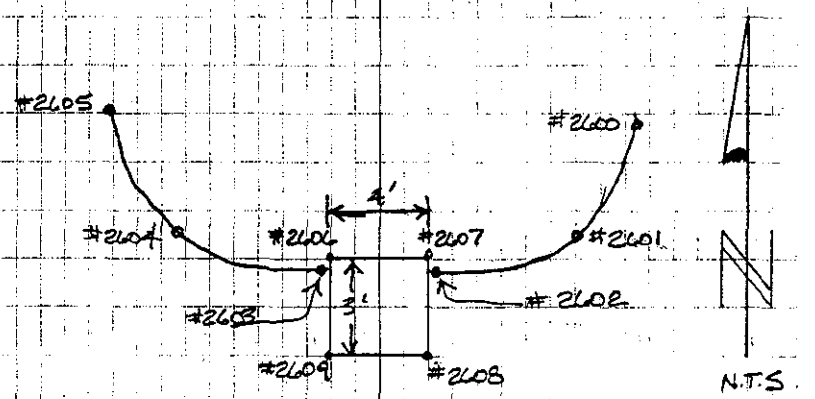
LOOKING SOUTH @ WEIR FROM LAKE (NORTH FACE OF WEIR)



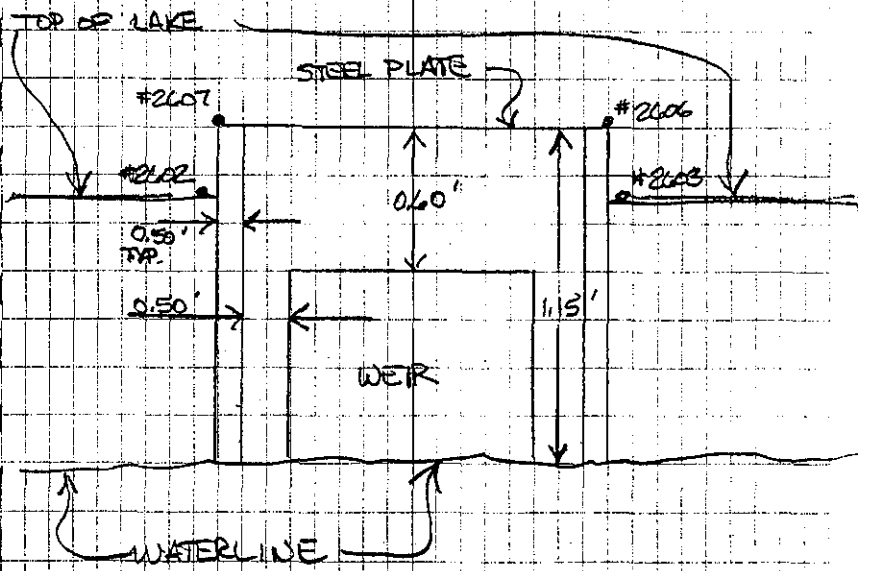
(524-17)

PT #	DESCRIPTION
2600	FIRST SHOT
2600-2602	EDGE OF LAKE @ TOP OF CONC (TOP)
2603-2605	
2606-2609	COR OF BOX WEIR (CONC)
2610-2614	℄ 4' SIDEWALK (SW)
2615-2625	MISC. PAV. (P)
2626-2628	B/C-T/C, 6" V.C., 6" (BC)
2629-2630	(CURB OPENING 2628-2629)
2631-2637	MISC NAT. GRND @ FACE OF RET. WALL (NG)
	(2632 WEEP HOLE UP 2.5')
	(2633 WEEP HOLE UP 2.5')
	(2634 " " " 2.5')
	(2635 " " " 2.5')
	(2636 " " " 2.5')

CONT.'



LOOKING SOUTH @ NORTH FACE OF WEIR



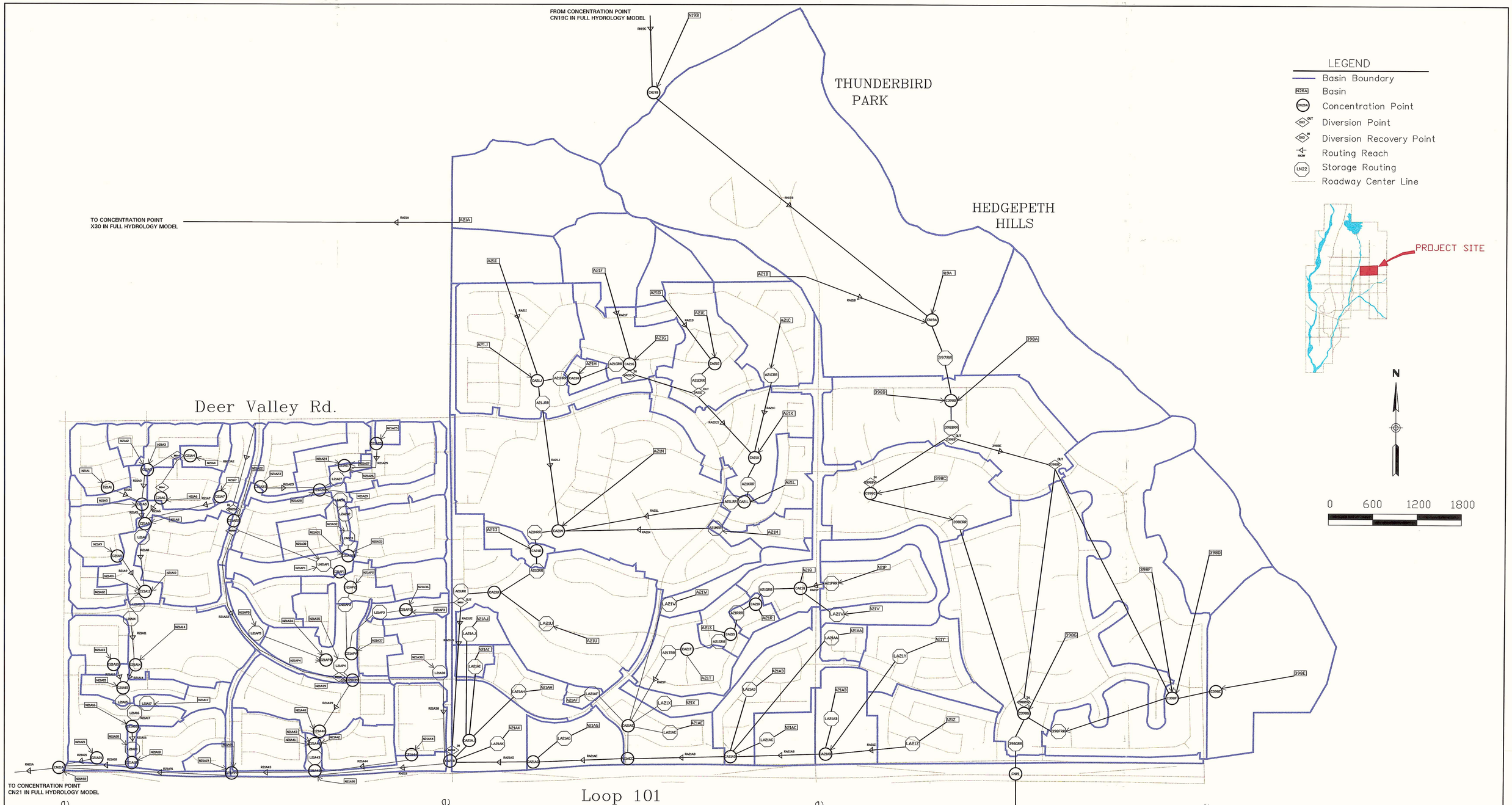
PT #	DESCRIPTION
2638-2641	COR. OF STORM DRAIN GRATE (SD) (DIN TO ft = 6.00')
2642-2644	TOP OF CONC. CHANNEL (TOP)
2645-2647	TOE OF CONC. CHANNEL (TOE)
2648	℄ & ft. 12" PVC PIPE (FL)
2648	LAST SHOT

(524-18)

PT #	DESCRIPTION
2650	FIRST SHOT
2650-2655	EDGE OF LAKE @ TOP OF CONC. (TOP)
2656	WATERLINE ELEV. (WL)
2657-2660	℄ 5' SIDEWALK (SW)
2661-2664, 2665-2667	
2668-2672	EDGE OF LAKE @ TOP OF CONC (TOP)
2673	WATERLINE ELEV. (WL)
2673	LAST SHOT

PT #	DESCRIPTION

APPENDIX B. PLATES



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GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

IN ASSOCIATION WITH:

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ARIZONA
Civil Engineering Construction Administration
Land Surveying Planning ADA Consulting
2255 No. 44th St., SUITE 255 Phoenix, AZ 85008
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PLATE AL-1
ARROWHEAD LAKES
HEC-1 SCHEMATIC

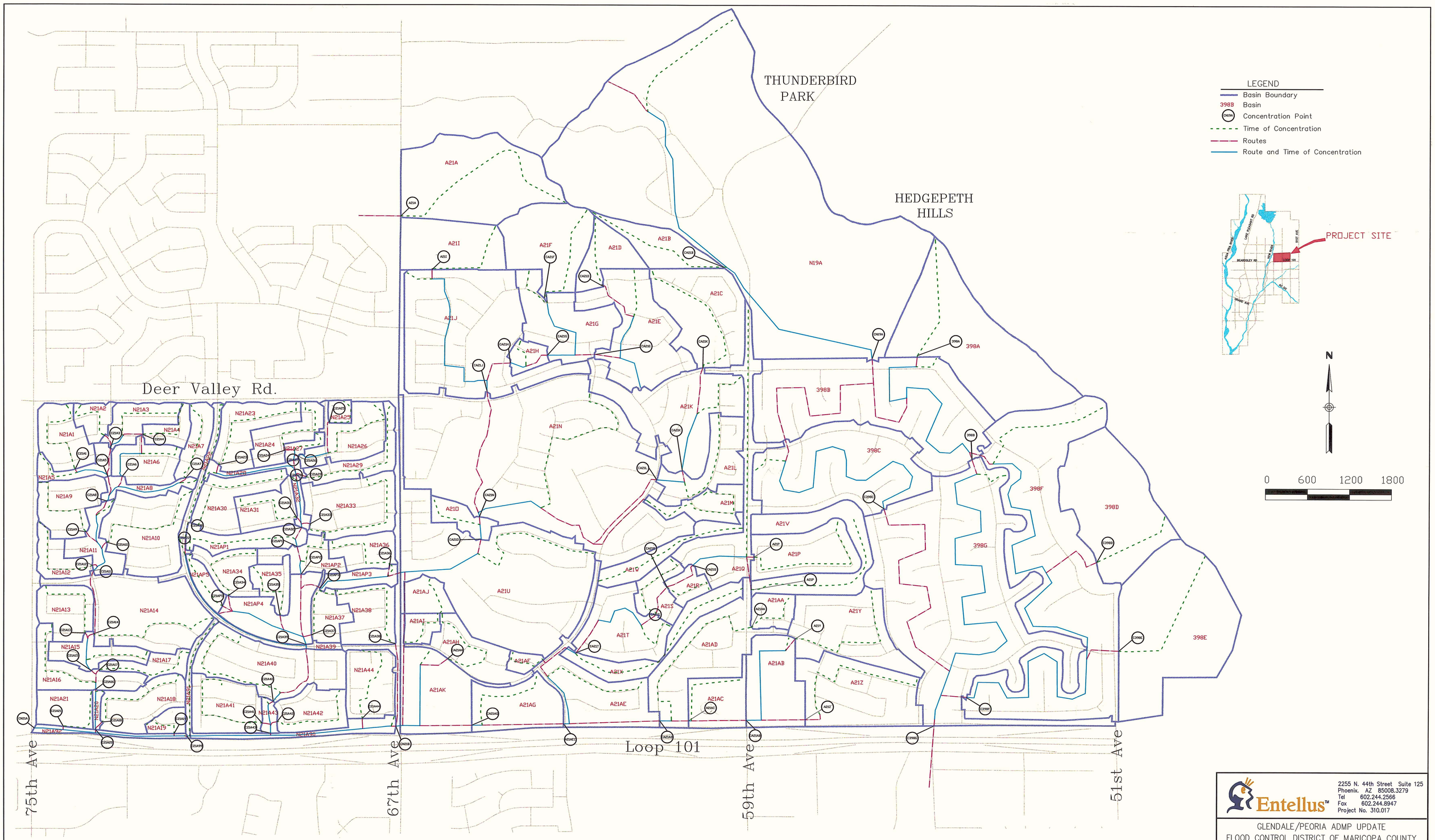

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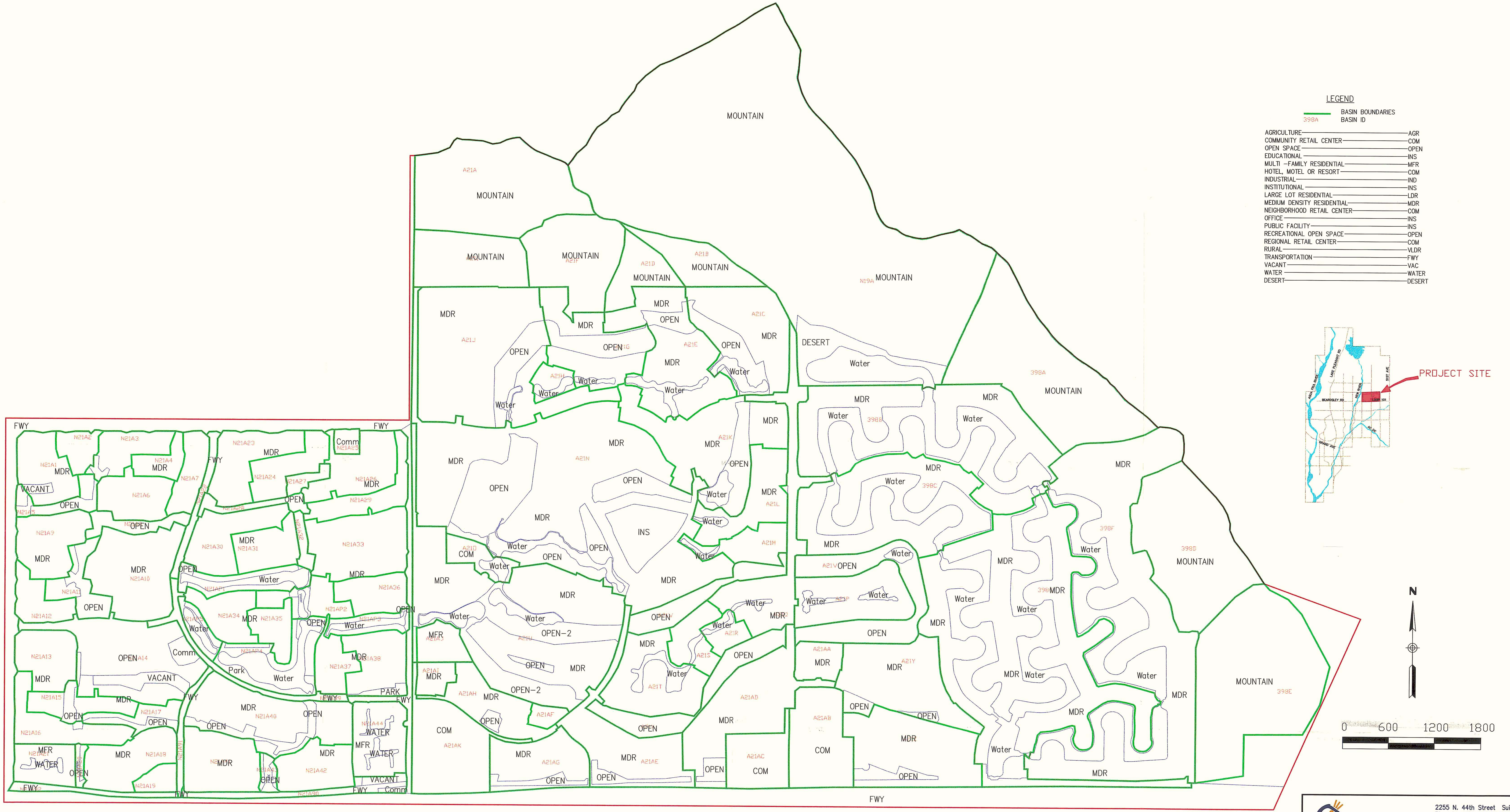
PLATE AL-2
ARROWHEAD LAKES
HYDROLOGY MAP



LEGEND

BASIN BOUNDARIES
398A BASIN ID

AGRICULTURE	AGR
COMMUNITY RETAIL CENTER	COM
OPEN SPACE	OPEN
EDUCATIONAL	INS
MULTI –FAMILY RESIDENTIAL	MFR
HOTEL, MOTEL OR RESORT	COM
INDUSTRIAL	IND
INSTITUTIONAL	INS
LARGE LOT RESIDENTIAL	LDR
MEDIUM DENSITY RESIDENTIAL	MDR
NEIGHBORHOOD RETAIL CENTER	COM
OFFICE	INS
PUBLIC FACILITY	INS
RECREATIONAL OPEN SPACE	OPEN
REGIONAL RETAIL CENTER	COM
RURAL	VLDR
TRANSPORTATION	FWY
VACANT	VAC
WATER	WATER
DESERT	DESERT

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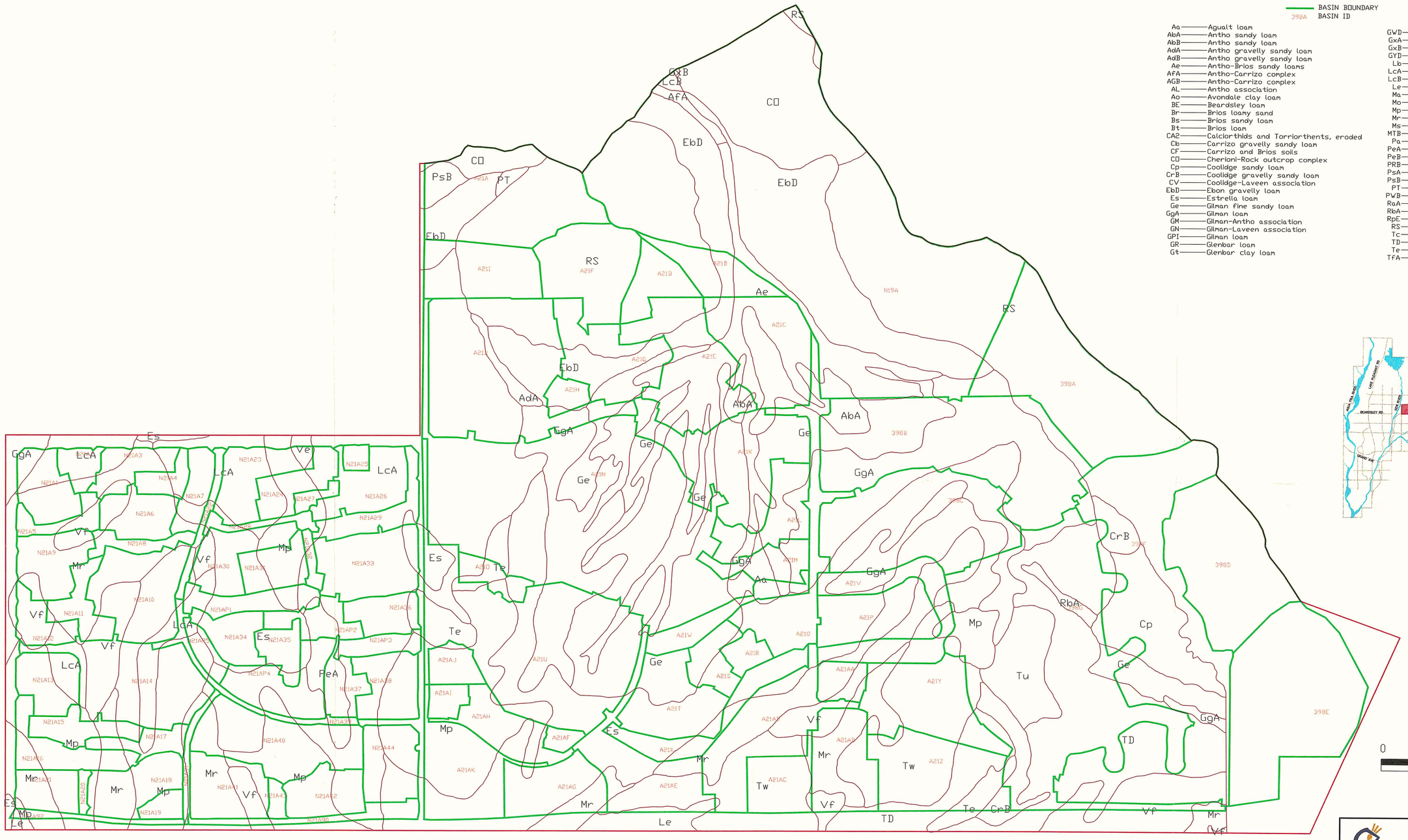
PLATE AL-3
ARROWHEAD LAKES
EXISTING LANDUSE



LEGEND

BASIN BOUNDARY
398A BASIN ID

Aa — Agualt loam
AbA — Antho sandy loam
AbB — Antho sandy loam
AdA — Antho gravelly sandy loam
AdB — Antho gravelly sandy loam
Ae — Antho-Brios sandy loams
AfA — Antho-Carrizo complex
AGB — Antho-Carrizo complex
AL — Antho association
Ao — Avondale clay loam
BE — Beardsley loam
Br — Brios loamy sand
Bs — Brios sandy loam
Bt — Brios loam
CA2 — Calciorthids and Torriorthents, eroded
Cb — Carrizo gravelly sandy loam
CF — Carrizo and Brios soils
CO — Cherioni-Rock outcrop complex
Cp — Coolidge sandy loam
CrB — Coolidge gravelly sandy loam
CV — Coolidge-Laveen association
EbD — Ebon gravelly loam
Es — Estrella loam
Ge — Gilman fine sandy loam
GgA — Gilman loam
GM — Gilman-Antho association
GN — Gilman-Laveen association
GPI — Gilman loam
GR — Glenbar loam
Gt — Glenbar clay loam
GWD — Gunsight-Pinal complex
GxA — Gunsight-Rillito complex
GxB — Gunsight-Rillito complex
GYD — Gunsight-Rillito complex
Lb — Laveen sandy loam
LcA — Laveen loam
LcB — Laveen loam
Le — Laveen clay loam
Ma — Maripo sandy loam
Mo — Mohall sandy loam
Mp — Mohall loam
Mr — Mohall clay loam
Ms — Mohall clay
MTB — Mohall-Tremant complex
Pa — Perryville sandy loam
PeA — Perryville gravelly loam
PeB — Perryville gravelly loam
PRB — Perryville-Rillito complex
PsA — Pinal loam
PsB — Pinal loam
PT — Pinal gravelly loam
PWB — Pinal-Suncity complex
RaA — Rillito sandy loam
RbA — Rillito loam
RpE — Rillito-Perryville complex
RS — Rock outcrop-Cherioni complex
Tc — Torriorthents
TD — Torripsamments and Torrifluvents
Te — Tremant loam
TFA — Tremant gravelly loam

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TELEPHONE (602) 681-9272 FAX (602) 681-9339

PLATE AL-4
ARROWHEAD LAKES
SOILS

APPENDIX C. COMPUTER CD

APPENDIX D. HYDROLOGIC ANALYSIS SUPPORTING DOCUMENTATION

APPENDIX D. HYDROLOGIC ANALYSIS SUPPORTING DOCUMENTATION

D.1. PRECIPITATION DATA

D.1. PRECIPITATION DATA

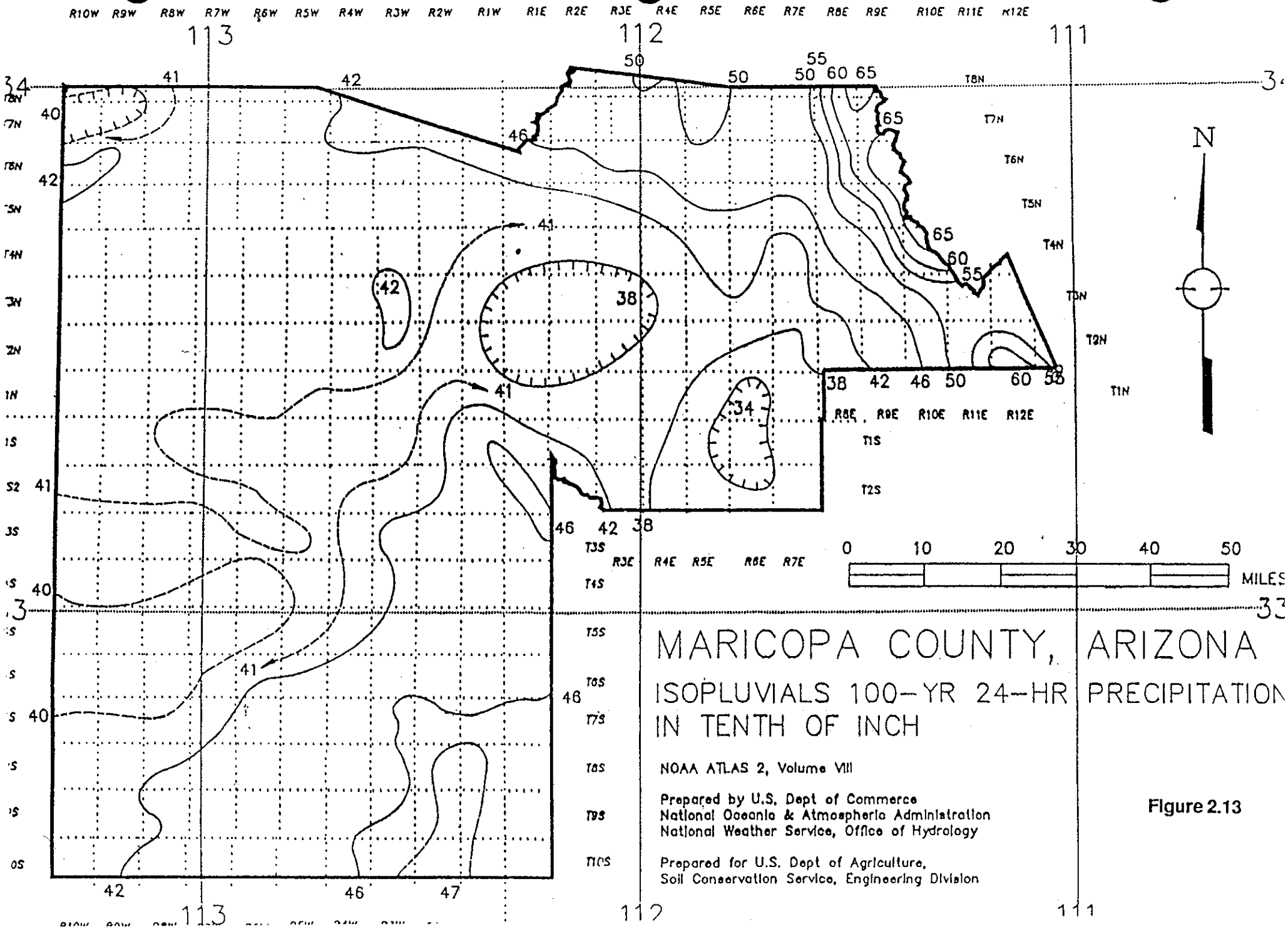
MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 100-YR 24-HR PRECIPITATION
IN TENTH OF INCH
NOAA ATLAS 2, Volume VIII
Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division
N
MILES
0 10 20 30 40 50
R10W R9W R8W R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E R9E R10E R11E R12E
T8N T7N T6N T5N T4N T3N T2N T1N T1S T2S T3S T4S T5S T6S T7S T8S T9S T10S
113 112 111
34 33

Figure 2.13

Flood Control District of Maricopa County
AL - Arrowhead Lakes

Rainfall Data

Primary Zone Number: **7** Latitude: **0.0** Elevation: **0**

Short Duration Zone Number: **8** Longitude: **0.0**

	Point Values (in)					
Duration	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
5 MIN	0.33	0.42	0.49	0.58	0.66	0.73
10 MIN	0.49	0.64	0.74	0.89	1.00	1.12
15 MIN	0.59	0.80	0.94	1.13	1.28	1.43
30 MIN	0.79	1.07	1.26	1.53	1.74	1.94
1 HOUR	0.96	1.32	1.57	1.90	2.17	2.43
2 HOUR	1.04	1.45	1.73	2.10	2.40	2.69
3 HOUR	1.10	1.54	1.83	2.24	2.55	2.87
6 HOUR	1.20	1.70	2.03	2.49	2.85	3.20
12 HOUR	1.30	1.88	2.26	2.79	3.20	3.60
24 HOUR	1.40	2.06	2.49	3.09	3.54	4.00

D.2. PHYSICAL PARAMETER CALCULATIONS

D.2. PHYSICAL PARAMETER CALCULATIONS

SUBBASIN INFORMATION

Sub Basin Data

 6/5/2001

Basin: 01 Storms: Multiple Duration: 6 Hour Loss Method: Green-Ampt Unit Hydrograph: Clark

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period (Years): 2	5	10	25	50	100
398A	0.10	0.34	582.4	315.0	Natural	0.105	0.15	0.35	4.00	0.45 *	61	Tc (hrs)	0.31	0.24	0.22	0.20	0.19	0.18
												R (hrs)	0.16	0.12	0.11	0.10	0.09	0.09
398B	0.14	0.93	30.1	30.1	Urban	0.048	0.17	0.17	4.65	0.39 *	63	Tc (hrs)	0.88	0.71	0.63	0.55	0.51	0.48
												R (hrs)	0.95	0.74	0.66	0.57	0.51	0.48
398C	0.09	0.87	9.2	9.2	Urban	0.050	0.17	0.16	6.20	0.20 *	59	Tc (hrs)	1.48	1.16	1.02	0.90	0.83	0.77
												R (hrs)	1.96	1.51	1.30	1.13	1.03	0.95
398D	0.08	0.24	291.7	315.0	Natural	0.082	0.15	0.35	3.95	0.47 *	65	Tc (hrs)	0.21	0.18	0.16	0.15	0.14	0.13
												R (hrs)	0.09	0.07	0.07	0.06	0.06	0.05
398E	0.11	0.38	573.7	315.0	Natural	0.096	0.20	0.35	4.60	0.33 *	49	Tc (hrs)	0.33	0.25	0.23	0.20	0.19	0.18
												R (hrs)	0.17	0.13	0.11	0.10	0.10	0.09
398F	0.20	2.05	72.2	72.2	Urban	0.046	0.18	0.17 *	4.35	0.48 *	77	Tc (hrs)	0.96	0.78	0.71	0.63	0.58	0.54
												R (hrs)	1.55	1.24	1.11	0.97	0.89	0.82
398G	0.22	1.21	5.8	5.8	Urban	0.046	0.18	0.18	3.60	0.72 *	57	Tc (hrs)	1.50	1.50	1.50	1.44	1.31	1.21
												R (hrs)	1.60	1.60	1.60	1.53	1.38	1.26
A21A	0.08	0.58	302.1	263.0	Natural	0.037	0.15	0.35	4.60	0.33 *	38	Tc (hrs)	0.25	0.20	0.18	0.17	0.15	0.15
												R (hrs)	0.22	0.17	0.15	0.14	0.12	0.12
A21AA	0.01	0.13	31.0	31.0	Urban	0.030	0.24	0.14	10.10	0.04	37	Tc (hrs)	0.18	0.15	0.14	0.13	0.13	0.12
												R (hrs)	0.14	0.12	0.11	0.10	0.09	0.09
A21AB	0.04	0.26	12.0	12.0	Urban	0.015	0.10	0.15 *	9.70	0.07	78 *	Tc (hrs)	0.23	0.20	0.18	0.17	0.16	0.15
												R (hrs)	0.16	0.14	0.13	0.12	0.11	0.11
A21AC	0.02	0.20	30.0	30.0	Urban	0.017	0.10	0.16	8.80	0.07 *	72	Tc (hrs)	0.16	0.14	0.13	0.12	0.11	0.11
												R (hrs)	0.12	0.10	0.09	0.09	0.08	0.08
A21AD	0.05	0.41	15.0	15.0	Urban	0.021	0.24	0.16	8.80	0.07	37 *	Tc (hrs)	0.37	0.29	0.27	0.24	0.23	0.22
												R (hrs)	0.32	0.25	0.22	0.20	0.19	0.18
A21AE	0.05	0.24	29.0	29.0	Urban	0.021	0.23	0.18	7.00	0.13	34	Tc (hrs)	0.21	0.18	0.17	0.15	0.15	0.14
												R (hrs)	0.12	0.10	0.09	0.08	0.08	0.08

* Non default value

Sub Basin Data

Basin: 01 Storms: Multiple Duration: 6 Hour Loss Method: Green-Ampt Unit Hydrograph: Clark

	Sub Basin Parameters						Rainfall Losses						Return Period (Years)					
Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2	5	10	25	50	100
A21AF	0.00	0.10	40.0	40.0	Urban	0.035	0.24	0.26	4.80	0.35 *	37	Tc (hrs)	0.18	0.14	0.13	0.12	0.11	0.11
												R (hrs)	0.20	0.16	0.14	0.13	0.12	0.12
A21AG	0.03	0.23	30.0	30.0	Urban	0.023	0.23	0.27	5.60	0.24	35	Tc (hrs)	0.23	0.19	0.17	0.16	0.15	0.14
												R (hrs)	0.16	0.13	0.12	0.11	0.10	0.10
A21AH	0.03	0.21	33.0	33.0	Urban	0.025	0.23	0.26	4.90 *	0.33 *	36	Tc (hrs)	0.23	0.18	0.17	0.15	0.15	0.14
												R (hrs)	0.17	0.13	0.12	0.11	0.10	0.10
A21AI	0.01	0.12	33.0	33.0	Urban	0.032	0.24	0.26	4.80	0.35 *	37	Tc (hrs)	0.20	0.16	0.15	0.13	0.13	0.12
												R (hrs)	0.19	0.15	0.14	0.12	0.11	0.11
A21AJ	0.01	0.23	35.0	35.0	Urban	0.030	0.10 *	0.25 *	4.80	0.39 *	76 *	Tc (hrs)	0.23	0.20	0.18	0.17	0.16	0.15
												R (hrs)	0.29	0.25	0.23	0.21	0.19	0.18
A21AK	0.04	0.28	16.4	16.4	Urban	0.015	0.10	0.26	4.80	0.41	73	Tc (hrs)	0.23	0.19	0.18	0.16	0.15	0.15
												R (hrs)	0.15	0.13	0.12	0.11	0.10	0.10
A21B	0.02	0.40	887.5	315.0	Natural	0.121	0.15	0.35	4.50 *	0.35 *		Tc (hrs)	0.68	0.37	0.30	0.25	0.23	0.22
												R (hrs)	1.02	0.52	0.41	0.34	0.31	0.29
A21C	0.05	0.51	90.0	90.0	Urban	0.021	0.22	0.23	4.30	0.56 *	36	Tc (hrs)	0.27	0.20	0.18	0.16	0.15	0.15
												R (hrs)	0.27	0.19	0.17	0.15	0.14	0.14
A21D	0.02	0.19	315.0	268.0	Natural	0.053	0.15	0.35	3.95	0.47 *	65	Tc (hrs)	0.16	0.13	0.12	0.11	0.10	0.10
												R (hrs)	0.12	0.10	0.09	0.08	0.08	0.07
A21E	0.06	0.32	150.0	150.0	Urban	0.021	0.23	0.23	4.45	0.47 *	56 *	Tc (hrs)	0.15	0.13	0.12	0.11	0.10	0.10
												R (hrs)	0.09	0.08	0.07	0.06	0.06	0.06
A21F	0.05	0.30	315.0	268.0	Natural	0.043	0.15	0.35	3.95	0.47 *	65	Tc (hrs)	0.18	0.15	0.14	0.13	0.12	0.11
												R (hrs)	0.12	0.10	0.09	0.08	0.08	0.07
A21G	0.04	0.38	132.0	132.0	Urban	0.022	0.23	0.24	5.10	0.37 *	54	Tc (hrs)	0.18	0.15	0.14	0.13	0.12	0.11
												R (hrs)	0.16	0.13	0.12	0.11	0.10	0.09
A21H	0.01	0.12	67.0	67.0	Urban	0.031	0.19	0.13	6.80	0.16 *	55	Tc (hrs)	0.14	0.12	0.11	0.10	0.10	0.09
												R (hrs)	0.13	0.11	0.10	0.09	0.09	0.08

Sub Basin Data

Basin: 01 Storms: Multiple Duration: 6 Hour Loss Method: Green-Ampt Unit Hydrograph: Clark

	Sub Basin Parameters						Rainfall Losses						Return Period (Years)					
Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2	5	10	25	50	100
A21I	0.04	0.26	315.0	268.0	Natural	0.045	0.15	0.35	4.45	0.36 *	44	Tc (hrs)	0.18	0.15	0.13	0.12	0.11	0.11
												R (hrs)	0.12	0.10	0.09	0.08	0.07	0.07
A21J	0.11	0.50	36.0	36.0	Urban	0.017	0.24	0.25	4.90	0.37 *	46	Tc (hrs)	0.30	0.23	0.21	0.19	0.18	0.17
												R (hrs)	0.19	0.14	0.13	0.12	0.11	0.10
A21K	0.07	0.35	31.0	31.0	Urban	0.020	0.22	0.23	4.50	0.48 *	37	Tc (hrs)	0.30	0.22	0.20	0.18	0.17	0.16
												R (hrs)	0.19	0.14	0.12	0.11	0.10	0.10
A21L	0.03	0.36	25.0	25.0	Urban	0.025	0.23	0.24	4.70	0.39 *	39	Tc (hrs)	0.38	0.27	0.24	0.22	0.21	0.20
												R (hrs)	0.42	0.29	0.26	0.24	0.22	0.21
A21M	0.02	0.41	7.0	7.0	Urban	0.028	0.23	0.23	4.70	0.38 *	44	Tc (hrs)	0.74	0.55	0.49	0.42	0.38	0.36
												R (hrs)	1.37	0.99	0.86	0.73	0.66	0.61
A21N	0.26	0.71	28.0	28.0	Urban	0.013	0.22	0.24	4.65	0.44 *	36	Tc (hrs)	0.38	0.27	0.24	0.21	0.20	0.19
												R (hrs)	0.21	0.14	0.12	0.11	0.10	0.10
A21O	0.01	0.16	12.0	12.0	Urban	0.019	0.08	0.19 *	4.80	0.42 *	76	Tc (hrs)	0.21	0.18	0.17	0.15	0.15	0.14
												R (hrs)	0.20	0.17	0.15	0.14	0.13	0.12
A21P	0.04	0.40	12.0	12.0	Urban	0.023	0.22	0.14 *	7.60	0.12 *	46	Tc (hrs)	0.43	0.34	0.30	0.28	0.25	0.24
												R (hrs)	0.47	0.36	0.32	0.29	0.26	0.25
A21Q	0.04	0.82	43.0	43.0	Urban	0.022	0.24	0.24	4.70 *	0.38 *	41	Tc (hrs)	0.47	0.35	0.30	0.27	0.25	0.23
												R (hrs)	0.82	0.58	0.51	0.44	0.40	0.38
A21R	0.01	0.15	20.0	20.0	Urban	0.031	0.22	0.22	4.80	0.36 *	48	Tc (hrs)	0.25	0.20	0.18	0.17	0.16	0.15
												R (hrs)	0.27	0.21	0.19	0.17	0.16	0.16
A21S	0.02	0.23	22.0	22.0	Urban	0.028	0.23	0.23	4.70	0.38 *	44	Tc (hrs)	0.30	0.23	0.21	0.19	0.18	0.17
												R (hrs)	0.33	0.25	0.23	0.20	0.19	0.18
A21T	0.04	0.31	23.0	23.0	Urban	0.022	0.21	0.22	4.90	0.33 *	48	Tc (hrs)	0.29	0.23	0.21	0.19	0.18	0.18
												R (hrs)	0.23	0.18	0.17	0.15	0.14	0.14
A21U	0.15	0.62	16.0	16.0	Urban	0.016	0.22	0.23	4.70	0.42 *	35 *	Tc (hrs)	0.50	0.36	0.31	0.27	0.25	0.24
												R (hrs)	0.35	0.24	0.21	0.18	0.16	0.15

Sub Basin Data

6/5/2001

Basin: 01 Storms: Multiple Duration: 6 Hour Loss Method: Green-Ampt Unit Hydrograph: Clark

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period (Years): 2	5	10	25	50	100
A21V	0.04	0.31	26.0	26.0	Urban	0.014	0.19	0.14	8.40 *	0.12 *	7	Tc (hrs)	0.20	0.17	0.16	0.15	0.14	0.13
												R (hrs)	0.16	0.13	0.12	0.11	0.11	0.10
A21W	0.02	0.41	22.0	22.0	Urban	0.016	0.20	0.25	4.70	0.51 *	2	Tc (hrs)	0.60	0.28	0.23	0.20	0.19	0.18
												R (hrs)	1.02	0.43	0.36	0.31	0.29	0.27
A21X	0.02	0.56	29.0	29.0	Urban	0.015	0.20	0.25	5.70	0.33 *	2	Tc (hrs)	0.47	0.27	0.23	0.21	0.19	0.18
												R (hrs)	0.84	0.45	0.39	0.34	0.31	0.30
A21Y	0.05	0.39	38.0	38.0	Urban	0.027	0.23	0.16	8.00	0.10	32	Tc (hrs)	0.29	0.24	0.22	0.20	0.19	0.18
												R (hrs)	0.25	0.19	0.18	0.17	0.15	0.15
A21Z	0.07	0.44	34.0	34.0	Urban	0.020	0.22	0.26	6.20	0.18	32	Tc (hrs)	0.30	0.23	0.21	0.19	0.18	0.18
												R (hrs)	0.24	0.18	0.16	0.15	0.14	0.13
N19A	0.47	1.16	101.7	101.7	Natural	0.086	0.16	0.34	4.90	0.28 *	32	Tc (hrs)	1.18	0.87	0.75	0.64	0.58	0.53
												R (hrs)	0.78	0.55	0.47	0.39	0.35	0.32
N21A1	0.02	0.29	29.1	29.1	Urban	0.063	0.24	0.37	5.30	0.28	28	Tc (hrs)	0.67	0.46	0.39	0.33	0.30	0.28
												R (hrs)	0.78	0.51	0.43	0.36	0.32	0.30
N21A10	0.05	0.33	27.9	27.9	Urban	0.060	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.85	0.68	0.55	0.44	0.38	0.35
												R (hrs)	0.75	0.59	0.46	0.36	0.31	0.28
N21A11	0.02	0.24	39.3	39.3	Urban	0.112	0.22	0.35	2.65	1.74	10	Tc (hrs)	1.50	1.38	1.00	0.65	0.53	0.45
												R (hrs)	2.04	1.86	1.30	0.81	0.64	0.54
N21A12	0.01	0.26	20.3	20.3	Urban	0.067	0.25	0.35	2.65	1.40	30	Tc (hrs)	1.55	0.71	0.58	0.46	0.41	0.37
												R (hrs)	2.45	1.03	0.82	0.64	0.56	0.49
N21A13	0.02	0.23	23.5	23.5	Urban	0.065	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.75	0.60	0.49	0.39	0.34	0.31
												R (hrs)	0.76	0.59	0.47	0.36	0.31	0.28
N21A14	0.06	0.36	18.6	18.6	Urban	0.094	0.19	0.35	2.65	1.72	9	Tc (hrs)	1.50	1.50	1.50	1.10	0.89	0.77
												R (hrs)	1.25	1.25	1.25	0.89	0.70	0.60
N21A15	0.02	0.22	35.7	35.7	Urban	0.083	0.24	0.35	2.65	1.50	24	Tc (hrs)	0.82	0.66	0.52	0.40	0.35	0.31
												R (hrs)	0.98	0.78	0.59	0.44	0.38	0.33

* Non default value

Sub Basin Data

6/5/2001

Basin: 01 Storms: Multiple Duration: 6 Hour Loss Method: Green-Ampt Unit Hydrograph: Clark

	Sub Basin Parameters						Rainfall Losses						Return Period (Years)					
Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2	5	10	25	50	100
N21A16	0.02	0.31	22.2	22.2	Urban	0.064	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.93	1.56	0.61	0.48	0.43	0.39
												R (hrs)	1.16	2.07	0.73	0.56	0.49	0.44
N21A17	0.01	0.28	32.7	32.7	Urban	0.100	0.23	0.35	2.65	1.61	18	Tc (hrs)	1.35	1.09	0.85	0.63	0.53	0.47
												R (hrs)	2.46	1.94	1.48	1.05	0.86	0.76
N21A18	0.03	0.29	17.1	17.1	Urban	0.063	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.98	0.79	0.65	0.51	0.45	0.41
												R (hrs)	1.08	0.85	0.68	0.53	0.46	0.41
N21A19	0.01	0.11	14.3	14.3	Urban	0.072	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.60	0.48	0.39	0.31	0.27	0.25
												R (hrs)	0.64	0.50	0.40	0.31	0.26	0.24
N21A2	0.01	0.17	18.0	18.0	Urban	0.070	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.72	1.57	0.47	0.37	0.33	0.29
												R (hrs)	0.90	2.14	0.56	0.43	0.37	0.33
N21A20	0.00	0.13	33.3	33.3	Urban	0.121	0.22	0.35	2.65	1.69	13	Tc (hrs)	1.05	0.87	1.57	0.44	0.36	0.32
												R (hrs)	2.04	1.66	3.19	0.78	0.63	0.54
N21A21	0.02	0.17	13.3	13.3	Urban	0.064	0.22	0.35	2.65	1.36	51	Tc (hrs)	0.59	0.48	0.41	0.35	0.32	0.29
												R (hrs)	0.51	0.41	0.35	0.29	0.26	0.24
N21A22	0.01	0.39	42.6	42.6	Urban	0.071	0.05	0.35	2.65	1.80	95	Tc (hrs)	0.49	0.42	0.38	0.34	0.32	0.30
												R (hrs)	1.33	1.11	1.00	0.89	0.83	0.77
N21A23	0.03	0.33	21.3	21.3	Urban	0.063	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.98	0.79	0.64	0.51	0.45	0.41
												R (hrs)	1.18	0.93	0.74	0.58	0.50	0.45
N21A24	0.02	0.24	35.0	35.0	Urban	0.066	4.00 *	0.35	2.65	1.40	30	Tc (hrs)	0.66	0.55	0.50	0.45	0.43	0.40
												R (hrs)	0.74	0.61	0.55	0.49	0.46	0.43
N21A25	0.00	0.12	51.7	51.7	Urban	0.038	0.10	0.35	2.65	1.70	80	Tc (hrs)	0.17	0.15	0.14	0.13	0.12	0.11
												R (hrs)	0.22	0.19	0.18	0.16	0.15	0.14
N21A26	0.03	0.35	24.0	24.0	Urban	0.063	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.96	0.78	0.64	0.50	0.45	0.40
												R (hrs)	1.23	0.97	0.78	0.60	0.52	0.47
N21A27	0.00	0.14	65.7	65.7	Urban	0.140	0.20	0.29	2.65	1.90		Tc (hrs)	1.00	1.00	1.10	0.48	0.36	0.30
												R (hrs)	1.76	1.76	1.96	0.78	0.57	0.46

* Non default value

Sub Basin Data

Basin: 01 Storms: Multiple Duration: 6 Hour Loss Method: Green-Ampt Unit Hydrograph: Clark

	Sub Basin Parameters						Rainfall Losses						Return Period (Years)					
Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2	5	10	25	50	100
N21A28	0.01	0.28	15.7	15.7	Urban	0.135	0.20	0.35	2.65	1.90		Tc (hrs)	1.50	1.50	1.50	1.50	1.35	1.10
												R (hrs)	3.88	3.88	3.88	3.88	3.44	2.74
N21A29	0.02	0.38	26.5	26.5	Urban	0.066	0.25	0.35	2.65	1.40	30	Tc (hrs)	1.01	0.82	0.67	0.53	0.47	0.43
												R (hrs)	1.76	1.39	1.11	0.86	0.75	0.68
N21A3	0.02	0.29	35.3	35.3	Urban	0.068	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.77	0.61	0.50	0.40	0.35	0.31
												R (hrs)	1.09	0.85	0.67	0.52	0.45	0.40
N21A30	0.02	0.33	27.4	27.4	Urban	0.064	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.89	0.72	0.58	0.46	0.41	0.37
												R (hrs)	1.12	0.88	0.70	0.54	0.47	0.42
N21A31	0.02	0.22	29.8	29.8	Urban	0.066	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.67	0.53	0.43	0.34	0.30	0.27
												R (hrs)	0.71	0.55	0.44	0.34	0.29	0.26
N21A32	0.00	0.15	61.6	61.6	Urban	0.140	0.20	0.35	2.65	1.90		Tc (hrs)	1.50	1.50	1.50	0.59	0.43	0.34
												R (hrs)	2.90	2.90	2.90	1.03	0.72	0.56
N21A33	0.04	0.41	20.6	20.6	Urban	0.059	0.24	0.35	2.65	1.38	28	Tc (hrs)	1.15	0.90	0.74	0.58	0.51	0.46
												R (hrs)	1.35	1.03	0.83	0.64	0.55	0.49
N21A34	0.02	0.24	35.7	35.7	Urban	0.066	0.25	0.29	2.65	1.40	30	Tc (hrs)	0.66	0.50	0.41	0.33	0.29	0.26
												R (hrs)	0.79	0.59	0.46	0.36	0.31	0.28
N21A35	0.01	0.19	41.4	41.4	Urban	0.068	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.54	0.43	0.35	0.27	0.24	0.23
												R (hrs)	0.62	0.48	0.38	0.29	0.25	0.23
N21A36	0.02	0.23	29.7	29.7	Urban	0.066	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.69	0.55	0.45	0.35	0.31	0.28
												R (hrs)	0.80	0.62	0.49	0.38	0.33	0.29
N21A37	0.01	0.19	23.3	23.3	Urban	0.067	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.68	0.54	0.44	0.35	0.30	0.28
												R (hrs)	0.76	0.59	0.46	0.36	0.31	0.28
N21A38	0.02	0.31	31.7	31.7	Urban	0.074	0.24	0.35	2.65	1.46	27	Tc (hrs)	0.93	0.76	0.61	0.48	0.42	0.38
												R (hrs)	1.15	0.91	0.72	0.55	0.48	0.42
N21A39	0.01	0.51	20.2	20.2	Urban	0.069	0.05	0.35	2.65	1.80	95	Tc (hrs)	0.79	0.66	0.60	0.54	0.50	1.58
												R (hrs)	2.29	1.88	1.69	1.49	1.37	4.90

Sub Basin Data

Basin: 01 Storms: Multiple Duration: 6 Hour Loss Method: Green-Ampt Unit Hydrograph: Clark

	Sub Basin Parameters						Rainfall Losses						Return Period (Years)					
Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2	5	10	25	50	100
N21A4	0.01	0.18	31.3	31.3	Urban	0.070	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.60	0.48	0.38	0.30	0.27	0.24
												R (hrs)	0.77	0.60	0.47	0.37	0.32	0.28
N21A40	0.05	0.44	29.4	29.4	Urban	0.072	0.24	0.35	2.65	1.48	25	Tc (hrs)	1.28	1.01	0.82	0.64	0.55	0.50
												R (hrs)	1.35	1.04	0.83	0.62	0.53	0.48
N21A41	0.03	0.33	18.4	18.4	Urban	0.063	0.25	0.35	2.65	1.40	30	Tc (hrs)	1.04	0.84	0.69	0.55	0.48	0.43
												R (hrs)	1.21	0.95	0.77	0.59	0.51	0.46
N21A42	0.02	0.26	13.2	13.2	Urban	0.065	0.25	0.35	2.65	1.40	30	Tc (hrs)	1.04	0.84	0.69	0.55	0.48	0.43
												R (hrs)	1.18	0.93	0.75	0.58	0.50	0.45
N21A43	0.00	0.10	59.8	59.8	Urban	0.120	0.22	0.35	2.65	1.70	12	Tc (hrs)	0.71	0.60	0.43	0.28	0.23	0.21
												R (hrs)	0.95	0.78	0.54	0.34	0.28	0.25
N21A44	0.03	0.26	15.4	15.4	Urban	0.060	0.21	0.35	2.65	1.34	53	Tc (hrs)	0.69	0.56	0.48	0.42	0.38	0.35
												R (hrs)	0.68	0.54	0.46	0.39	0.35	0.32
N21A5	0.01	0.23	21.6	21.6	Urban	0.103	0.20	0.35	2.65	1.62	11	Tc (hrs)	1.50	1.50	1.06	0.73	0.60	0.53
												R (hrs)	2.49	2.49	1.70	1.12	0.91	0.78
N21A6	0.02	0.24	34.5	34.5	Urban	0.065	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.66	0.53	0.43	0.34	0.30	0.27
												R (hrs)	0.68	0.53	0.42	0.32	0.28	0.25
N21A7	0.01	0.23	48.7	48.7	Urban	0.067	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.57	0.45	0.37	0.29	0.25	0.23
												R (hrs)	0.71	0.56	0.44	0.34	0.29	0.27
N21A8	0.01	0.28	25.5	25.5	Urban	0.131	5.00 *	0.35	2.65	1.90		Tc (hrs)	1.50	1.50	1.50	1.50	1.00	1.00
												R (hrs)	3.03	3.03	3.03	3.03	1.93	1.93
N21A9	0.03	0.25	23.1	23.1	Urban	0.064	0.25	0.35	2.65	1.40	30	Tc (hrs)	0.79	0.63	0.51	0.41	0.36	0.33
												R (hrs)	0.77	0.60	0.48	0.38	0.32	0.29
N21A90	0.01	0.58	17.4	17.4	Urban	0.064	0.07	0.35	2.65	1.65	75	Tc (hrs)	0.98	0.82	0.74	0.65	0.60	0.56
												R (hrs)	2.89	2.38	2.11	1.84	1.68	1.55
N21A91	0.01	0.34	32.3	32.3	Urban	0.073	0.05	0.35	2.65	1.80	95	Tc (hrs)	0.51	0.43	0.40	0.36	0.33	0.31
												R (hrs)	1.53	1.27	1.15	1.03	0.95	0.88

* Non default value

Sub Basin Data

Basin: 01 Storms: Multiple Duration: 6 Hour Loss Method: Green-Ampt Unit Hydrograph: Clark

	Sub Basin Parameters						Rainfall Losses						Return Period (Years)					
Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2	5	10	25	50	100
N21A92	0.01	0.42	24.0	24.0	Urban	0.069	0.06	0.35	2.65	1.71	83	Tc (hrs)	0.69	0.58	0.52	0.46	0.43	0.40
												R (hrs)	2.26	1.85	1.65	1.44	1.34	1.24
N21AP1	0.02	0.34	2.7	2.7	Urban	0.063	0.14	0.35	2.65	1.28	57	Tc (hrs)	1.50	1.43	1.24	1.06	0.97	0.90
												R (hrs)	2.49	2.36	2.02	1.70	1.53	1.41
N21AP2	0.02	0.17	18.1	18.1	Urban	0.074	0.23	0.35	2.65	1.42	32	Tc (hrs)	0.73	0.58	0.48	0.38	0.34	0.30
												R (hrs)	0.69	0.54	0.43	0.34	0.30	0.26
N21AP3	0.01	0.23	21.2	21.2	Urban	0.069	0.16	0.35	2.65	1.31	52	Tc (hrs)	0.62	0.50	0.43	0.37	0.33	0.31
												R (hrs)	0.98	0.77	0.66	0.55	0.50	0.45
N21AP4	0.03	0.27	13.9	13.9	Urban	0.073	0.12	0.35	2.65	1.38	52	Tc (hrs)	0.85	0.70	0.60	0.51	0.47	0.43
												R (hrs)	0.81	0.65	0.55	0.46	0.42	0.38
N21AP5	0.01	0.18	57.4	57.4	Urban	0.091	0.14	0.35	2.65	1.46	42	Tc (hrs)	0.47	0.38	0.32	0.26	0.24	0.23
												R (hrs)	0.62	0.50	0.41	0.33	0.30	0.28

LANDUSE INFORMATION

Appendix D.2

Land Use Data

Area Id	Land Use Code	Area	Area Pct (%)	DTHETA Condition	Vegetation Cover (%)	RTIMP (%)	IA (in)	Kn	Kb Type	Kb
398A	Mountain	0.102	100.0	Dry	25.0		0.15	0.070	Hi	0.105
398B	MHDR	0.092	68.0	Normal	50.0	40	0.25	0.050	Low	0.056
	WATER	0.043	32.0	Wet		100		0.001	Min	0.031
398C	MHDR	0.064	68.3	Normal	50.0	40	0.25	0.050	Low	0.058
	WATER	0.030	31.7	Wet		100		0.001	Min	0.032
398D	Mountain	0.837	100.0	Dry	25.0		0.15	0.070	Hi	0.082
398E	Desert	0.028	25.3	Dry	25.0		0.35		Low	0.063
	Mountain	0.084	74.7	Dry	25.0		0.15	0.070	Hi	0.107
398F	MHDR	0.143	70.1	Normal	50.0	40	0.25	0.050	Low	0.053
	WATER	0.061	29.9	Wet		100		0.001	Min	0.030
398G	MHDR	0.157	71.0	Normal	50.0	40	0.25	0.050	Low	0.052
	WATER	0.064	29.0	Wet		100		0.001	Min	0.030
A21A	Mountain	53.120	100.0	Dry	25.0		0.15	0.070	Hi	0.037
A21AA	OPEN	0.450	6.5	Dry	10.0		0.10		Min	0.025
	MHDR	6.470	93.5	Normal	50.0	40	0.25	0.050	Low	0.030
A21AB	OPEN	1.780	7.7	Dry	10.0		0.10		Min	0.021
	Comm	21.230	92.3	Normal	75.0	80	0.10	0.020	Min	0.014
A21AC	OPEN	1.390	9.7	Dry	10.0		0.10		Min	0.022
	Comm	12.880	90.3	Normal	75.0	80	0.10	0.020	Min	0.016
A21AD	OPEN	3.270	9.7	Dry	10.0		0.10		Min	0.019
	MHDR	30.370	90.3	Normal	50.0	40	0.25	0.050	Low	0.021
A21AE	OPEN	4.520	15.0	Dry	10.0		0.10		Min	0.018
	MHDR	25.690	85.0	Normal	50.0	40	0.25	0.050	Low	0.022
A21AF	OPEN	0.180	6.6	Dry	10.0		0.10		Min	0.027
	MHDR	2.560	93.4	Normal	50.0	40	0.25	0.050	Low	0.036
A21AG	OPEN	2.685	13.6	Dry	10.0		0.10		Min	0.020
	MHDR	17.035	86.4	Normal	50.0	40	0.25	0.050	Low	0.024
A21AH	OPEN	1.650	10.3	Dry	10.0		0.10		Min	0.021
	MHDR	14.420	89.7	Normal	50.0	40	0.25	0.050	Low	0.025

* Custom Value (not default value)

Land Use Data

Area Id	Land Use Code	Area	Area Pct (%)	DTHETA Condition	Vegetation Cover (%)	RTIMP (%)	IA (in)	Kn	Kb Type	Kb
A21AI	OPEN	0.350	7.5	Dry	10.0		0.10		Min	0.025
	MHDR	4.300	92.5	Normal	50.0	40	0.25	0.050	Low	0.033
A21AJ	OPEN	0.390	5.5	Dry	10.0		0.10		Min	0.025
	MFR	6.750	94.5	Normal	50.0	45	0.25	0.050	Low	0.030
A21AK	OPEN	2.440	8.8	Dry	10.0		0.10		Min	0.020
	Comm	25.170	91.2	Normal	75.0	80	0.10	0.020	Min	0.014
A21B	Mountain	0.022	100.0	Dry	25.0		0.15	0.070	Hi	0.121
A21C	OPEN-2	8.620	25.1	Normal	95.0	2	0.20	0.020	Min	0.017
	MHDR	23.130	67.5	Normal	50.0	40	0.25	0.050	Low	0.023
	WATER	2.530	7.4	Wet		100		0.001	Min	0.020
A21D	Mountain	11.940	100.0	Dry	25.0		0.15	0.070	Hi	0.053
A21E	OPEN-2	3.460	9.3	Normal	95.0	2	0.20	0.020	Min	0.019
	MHDR	30.910	83.5	Normal	50.0	40	0.25	0.050	Low	0.021
	WATER	2.650	7.2	Wet		100		0.001	Min	0.020
A21F	Mountain	29.430	100.0	Dry	25.0		0.15	0.070	Hi	0.043
A21G	OPEN-2	8.820	33.3	Normal	95.0	2	0.20	0.020	Min	0.017
	MHDR	16.800	63.5	Normal	50.0	40	0.25	0.050	Low	0.025
	WATER	0.840	3.2	Wet		100		0.001	Min	0.023
A21H	MHDR	3.590	75.7	Normal	50.0	40	0.25	0.050	Low	0.034
	WATER	1.150	24.3	Wet		100		0.001	Min	0.022
A21I	Mountain	23.840	100.0	Dry	25.0		0.15	0.070	Hi	0.045
A21J	OPEN-2	8.900	12.4	Normal	95.0	2	0.20	0.020	Min	0.017
	MHDR	62.240	86.6	Normal	50.0	40	0.25	0.050	Low	0.017
	WATER	0.770	1.1	Wet		100		0.001	Min	0.023
A21K	OPEN-2	8.550	19.8	Normal	95.0	2	0.20	0.020	Min	0.017
	MHDR	31.680	73.2	Normal	50.0	40	0.25	0.050	Low	0.021
	WATER	3.030	7.0	Wet		100		0.001	Min	0.019
A21L	OPEN	0.530	3.0	Dry	10.0		0.10		Min	0.024
	OPEN-2	1.360	7.6	Normal	95.0	2	0.20	0.020	Min	0.022

* Custom Value (not default value)

Land Use Data

Area Id	Land Use Code	Area	Area Pct (%)	DTHETA Condition	Vegetation Cover (%)	RTIMP (%)	IA (in)	Kn	Kb Type	Kb
A21L	MHDR	15.230	84.9	Normal	50.0	40	0.25	0.050	Low	0.025
	WATER	0.820	4.6	Wet		100		0.001	Min	0.023
A21M	MHDR	9.750	93.0	Normal	50.0	40	0.25	0.050	Low	0.028
	WATER	0.730	7.0	Wet		100		0.001	Min	0.023
A21N	OPEN-2	37.850	22.9	Normal	95.0	2	0.20	0.020	Min	0.013
	MHDR	108.880	65.9	Normal	50.0	40	0.25	0.050	Low	0.013
	Ins-1	12.620	7.6	Normal	85.0	75	0.10	0.020	Min	0.016
	WATER	5.940	3.6	Wet		100		0.001	Min	0.018
A21O	Com-1	5.425	78.4	Normal	70.0	70	0.10	0.020	Min	0.018
	WATER	1.495	21.6	Wet		100		0.001	Min	0.021
A21P	MHDR	20.180	89.8	Normal	50.0	40	0.25	0.050	Low	0.023
	WATER	2.300	10.2	Wet		100		0.001	Min	0.020
A21Q	OPEN	0.140	0.5	Dry	10.0		0.10		Min	0.028
	MHDR	26.600	96.7	Normal	50.0	40	0.25	0.050	Low	0.022
	WATER	0.760	2.8	Wet		100		0.001	Min	0.023
A21R	MHDR	4.500	87.0	Normal	50.0	40	0.25	0.050	Low	0.032
	WATER	0.670	13.0	Wet		100		0.001	Min	0.024
A21S	MHDR	8.815	93.1	Normal	50.0	40	0.25	0.050	Low	0.028
	WATER	0.655	6.9	Wet		100		0.001	Min	0.024
A21T	OPEN	0.170	0.7	Dry	10.0		0.10		Min	0.027
	MHDR	20.710	85.5	Normal	50.0	40	0.25	0.050	Low	0.023
	WATER	3.350	13.8	Wet		100		0.001	Min	0.019
A21U	OPEN	1.090	1.2	Dry	10.0		0.10		Min	0.022
	OPEN-2	22.530	24.3	Normal	95.0	2	0.20	0.020	Min	0.014
	MHDR	62.670	67.6	Normal	50.0	40	0.25	0.050	Low	0.017
	WATER	6.370	6.9	Wet		100		0.001	Min	0.017
A21V	OPEN-2	22.720	95.1	Normal	95.0	2	0.20	0.020	Min	0.014
	WATER	1.170	4.9	Wet		100		0.001	Min	0.022
A21W	OPEN-2	11.250	100.0	Normal	95.0	2	0.20	0.020	Min	0.016
A21X	OPEN-2	15.450	100.0	Normal	95.0	2	0.20	0.020	Min	0.015

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Land Use Data

Area Id	Land Use Code	Area	Area Pct (%)	DTHETA Condition	Vegetation Cover (%)	RTIMP (%)	IA (in)	Kn	Kb Type	Kb
A21Y	OPEN	2.077	6.5	Dry	10.0		0.10		Min	0.020
	MHDR	26.126	81.2	Normal	50.0	40	0.25	0.050	Low	0.022
	Park	3.987	12.4	Normal	90.0		0.20	0.100	Hi	0.065
A21Z	OPEN	8.230	19.9	Dry	10.0		0.10		Min	0.017
	MHDR	33.160	80.1	Normal	50.0	40	0.25	0.050	Low	0.021
N19A	Desert	0.023	4.9	Dry	25.0		0.35		Low	0.064
	Mountain	0.423	92.0	Dry	25.0		0.15	0.070	Hi	0.089
	WATER	0.014	3.1	Wet		100		0.001	Min	0.034
N21A1	VACANT	0.002	7.5	*	15.0	5	0.10	0.030	Min	0.040
	MDR	0.020	92.5	*	50.0	30	0.25	0.050	Low	0.065
N21A10	MDR	0.043	100.0	*	50.0	30	0.25	0.050	Low	0.060
N21A11	MDR	0.005	32.2	*	50.0	30	0.25	0.050	Low	0.073
	Park	0.010	67.8	*	90.0		0.20	0.100	Hi	0.130
N21A12	MDR	0.013	100.0	*	50.0	30	0.25	0.050	Low	0.067
N21A13	MDR	0.020	100.0	*	50.0	30	0.25	0.050	Low	0.065
N21A14	MDR	0.007	11.8	*	50.0	30	0.25	0.050	Low	0.071
	Park	0.042	69.0	*	90.0		0.20	0.100	Hi	0.114
	Comm	0.004	6.0	*	75.0	80	0.10	0.020	Min	0.038
	VACANT	0.008	13.3	Dry	15.0	5	0.10	0.030	Min	0.036
N21A15	MDR	0.012	80.0	*	50.0	30	0.25	0.050	Low	0.068
	Park	0.003	20.0	*	90.0		0.20	0.100	Hi	0.143
N21A16	MDR	0.022	100.0	*	50.0	30	0.25	0.050	Low	0.064
N21A17	MDR	0.006	58.7	*	50.0	30	0.25	0.050	Low	0.072
	Park	0.005	41.3	*	90.0		0.20	0.100	Hi	0.139
N21A18	MDR	0.025	100.0	*	50.0	30	0.25	0.050	Low	0.063
N21A19	MDR	0.006	100.0	*	50.0	30	0.25	0.050	Low	0.072
N21A2	MDR	0.009	100.0	*	50.0	30	0.25	0.050	Low	0.070
N21A20	MDR	0.001	42.3	*	50.0	30	0.25	0.050	Low	0.082

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Land Use Data

Area Id	Land Use Code	Area	Area Pct (%)	DTHETA Condition	Vegetation Cover (%)	RTIMP (%)	IA (in)	Kn	Kb Type	Kb
N21A20	Park	0.002	57.7	*	90.0		0.20	0.100	Hi	0.150
N21A21	MFR	0.014	89.5	*	50.0	45	0.25	0.050	Low	0.067
	WATER	0.002	10.5	*		100		0.001	Min	0.040
N21A22	FWY	0.007	100.0	*	80.0	95	0.05	0.020	Low	0.071
N21A23	MDR	0.025	100.0	*	50.0	30	0.25	0.050	Low	0.063
N21A24	MDR	0.018	100.0	*	50.0	30	0.25	0.050	Low	0.066
N21A25	Comm	0.004	100.0	*	75.0	80	0.10	0.020	Min	0.038
N21A26	MDR	0.026	100.0	*	50.0	30	0.25	0.050	Low	0.063
N21A27	Park	0.004	100.0	Normal	90.0		0.20	0.100	Hi	0.140
N21A28	Park	0.006	100.0	*	90.0		0.20	0.100	Hi	0.135
N21A29	MDR	0.017	100.0	*	50.0	30	0.25	0.050	Low	0.066
N21A3	MDR	0.015	91.2	*	50.0	30	0.25	0.050	Low	0.067
	MDR	0.001	8.8	*	50.0	30	0.25	0.050	Low	0.081
N21A30	MDR	0.024	100.0	*	50.0	30	0.25	0.050	Low	0.064
N21A31	MDR	0.017	100.0	*	50.0	30	0.25	0.050	Low	0.066
N21A32	Park	0.004	100.0	*	90.0		0.20	0.100	Hi	0.140
N21A33	VACANT	0.003	8.0	*	15.0	5	0.10	0.030	Min	0.038
	MDR	0.035	92.0	*	50.0	30	0.25	0.050	Low	0.061
N21A34	MDR	0.016	100.0	Normal	50.0	30	0.25	0.050	Low	0.066
N21A35	MDR	0.012	100.0	*	50.0	30	0.25	0.050	Low	0.068
N21A36	MDR	0.015	100.0	*	50.0	30	0.25	0.050	Low	0.066
N21A37	MDR	0.013	100.0	*	50.0	30	0.25	0.050	Low	0.067
N21A38	MDR	0.020	88.9	*	50.0	30	0.25	0.050	Low	0.065
	Park	0.003	11.1	*	90.0		0.20	0.100	Hi	0.145
N21A39	FWY	0.010	100.0	*	80.0	95	0.05	0.020	Low	0.069
N21A4	MDR	0.009	100.0	*	50.0	30	0.25	0.050	Low	0.070

* Custom Value (not default value)

Land Use Data

Area Id	Land Use Code	Area	Area Pct (%)	DTHETA Condition	Vegetation Cover (%)	RTIMP (%)	IA (in)	Kn	Kb Type	Kb
N21A40	Park	0.008	16.5	*	90.0		0.20	0.100	Hi	0.132
	MDR	0.043	83.5	*	50.0	30	0.25	0.050	Low	0.060
N21A41	MDR	0.027	100.0	*	50.0	30	0.25	0.050	Low	0.063
N21A42	MDR	0.021	100.0	*	50.0	30	0.25	0.050	Low	0.065
N21A43	Park	0.002	60.5	*	90.0		0.20	0.100	Hi	0.146
	MDR	0.002	39.5	*	50.0	30	0.25	0.050	Low	0.080
N21A44	WATER	0.004	14.2	*		100		0.001	Min	0.038
	MFR	0.021	85.8	*	50.0	45	0.25	0.050	Low	0.064
N21A5	VACANT	0.001	13.0	*	15.0	5	0.10	0.030	Min	0.040
	Park	0.005	52.0	*	90.0		0.20	0.100	Hi	0.137
	MDR	0.004	35.0	*	50.0	30	0.25	0.050	Low	0.075
N21A6	MDR	0.019	100.0	*	50.0	30	0.25	0.050	Low	0.065
N21A7	MDR	0.013	100.0	*	50.0	30	0.25	0.050	Low	0.067
N21A8	Park	0.009	100.0	*	90.0		0.20	0.100	Hi	0.131
N21A9	MDR	0.024	100.0	*	50.0	30	0.25	0.050	Low	0.064
N21A90	Comm	0.001	4.1	*	75.0	80	0.10	0.020	Min	0.043
	VACANT	0.002	18.9	*	15.0	5	0.10	0.030	Min	0.039
	FWY	0.009	73.0	*	80.0	95	0.05	0.020	Low	0.070
	MDR	0.001	4.1	*	50.0	30	0.25	0.050	Low	0.087
N21A91	FWY	0.005	100.0	*	80.0	95	0.05	0.020	Low	0.073
N21A92	VACANT	0.001	13.1	*	15.0	5	0.10	0.030	Min	0.042
	FWY	0.005	86.9	*	80.0	95	0.05	0.020	Low	0.073
N21AP1	WATER	0.007	42.4	*		100		0.001	Min	0.036
	Park	0.002	9.3	*	90.0		0.20	0.100	Hi	0.150
	MDR	0.008	48.3	*	50.0	30	0.25	0.050	Low	0.070
N21AP2	WATER	0.001	7.4	*		100		0.001	Min	0.041
	Park	0.001	9.5	*	90.0		0.20	0.100	Hi	0.151
	MDR	0.012	83.1	*	50.0	30	0.25	0.050	Low	0.068

* Custom Value (not default value)

Land Use Data

Area Id	Land Use Code	Area	Area Pct (%)	DTHETA Condition	Vegetation Cover (%)	RTIMP (%)	IA (in)	Kn	Kb Type	Kb
N21AP3	WATER	0.003	35.1	*		100		0.001	Min	0.038
	Park	0.001	9.6	*	90.0		0.20	0.100	Hi	0.156
	MDR	0.005	55.3	*	50.0	30	0.25	0.050	Low	0.073
N21AP4	WATER	0.013	44.5	*		100		0.001	Min	0.034
	Park	0.009	30.8	*	90.0		0.20	0.100	Hi	0.131
	MDR	0.007	24.7	*	50.0	30	0.25	0.050	Low	0.071
N21AP5	WATER	0.003	34.7	*		100		0.001	Min	0.039
	MDR	0.002	25.0	*	50.0	30	0.25	0.050	Low	0.079
	Park	0.003	40.3	*	90.0		0.20	0.100	Hi	0.143

* Custom Value (not default value)

SOIL INFORMATION

Soil Data

Area Id	Soil Survey	Map Unit	Area	Area Pct (%)	XKSAT	Rock Outcrop (%)	Effective (%)
398A	Maricopa	C_EBD	0.001	1.1	0.10		
	Maricopa	C_GGA	0.005	4.6	0.25		
	Maricopa	C_RS	0.097	94.3	0.40	65.0	100
398B	Maricopa	C_ABA	0.007	5.5	0.38		
	Maricopa	C_AE	0.000	0.3	0.39		
	Maricopa	C_ES	0.011	8.3	0.25		
	Maricopa	C_GE	0.028	20.6	0.26		
	Maricopa	C_GGA	0.081	59.6	0.25		
	Maricopa	C_RS	0.008	5.8	0.40	65.0	100
398C	Maricopa	C_ES	0.032	34.3	0.25		
	Maricopa	C_GGA	0.034	36.3	0.25		
	Maricopa	C_MR	0.020	21.6	0.05		
	Maricopa	C_VF	0.007	7.8	0.01		
398D	Maricopa	C_RS	0.081	100.0	0.40	65.0	100
398E	Maricopa	C_GE	0.005	4.2	0.26		
	Maricopa	C_GGA	0.003	2.9	0.25		
	Maricopa	C_LCA	0.009	8.0	0.25		
	Maricopa	C_MR	0.001	0.6	0.05		
	Maricopa	C_RS	0.084	74.7	0.40	65.0	100
	Maricopa	C_TU	0.003	2.9	0.25		
	Maricopa	C_VF	0.008	6.7	0.01		
398F	Maricopa	C_CP	0.046	22.4	0.40		
	Maricopa	C_CRB	0.009	4.3	0.40		
	Maricopa	C_GE	0.017	8.2	0.26		
	Maricopa	C_GGA	0.007	3.3	0.25		
	Maricopa	C_MR	0.000		0.05		
	Maricopa	C_RS	0.059	28.7	0.40	65.0	100
	Maricopa	C_TD	0.046	22.5	1.20		
	Maricopa	C_VF	0.021	10.5	0.01		
398G	Maricopa	C_CP	0.004	2.0	0.40		
	Maricopa	C_CRB	0.013	6.0	0.40		
	Maricopa	C_ES	0.011	4.9	0.25		
	Maricopa	C_GE	0.005	2.1	0.26		
	Maricopa	C_GGA	0.005	2.5	0.25		
	Maricopa	C_MP	0.012	5.5	0.25		
	Maricopa	C_MR	0.009	4.2	0.05		
	Maricopa	C_RBA	0.005	2.5	0.26		
	Maricopa	C_TD	0.112	50.8	1.20		
	Maricopa	C_TE	0.001	0.6	0.25		
	Maricopa	C_TU	0.035	15.8	0.25		
	Maricopa	C_TW	0.005	2.2	0.05		
	Maricopa	C_VF	0.002	1.0	0.01		
A21A	Maricopa	C_CO	0.012	14.7	0.29	20.0	100
	Maricopa	C_EBD	0.017	20.2	0.10		
	Maricopa	C_PSB	0.007	8.9	0.26		
	Maricopa	C_PT	0.002	2.9	0.40		
	Maricopa	C_RS	0.044	53.3	0.40	65.0	100
A21AA	Maricopa	C_ES	0.000	0.9	0.25		

* Custom Value (not default value)

Soil Data

Area Id	Soil Survey	Map Unit	Area	Area Pct (%)	XKSAT	Rock Outcrop (%)	Effective (%)
A21AA	Maricopa	C_MR	0.007	68.5	0.05		
	Maricopa	C_VF	0.003	30.6	0.01		
A21AB	Maricopa	C_MR	0.017	46.9	0.05		
	Maricopa	C_TD	0.001	3.1	1.20		
	Maricopa	C_TW	0.011	30.0	0.05		
	Maricopa	C_VF	0.007	20.0	0.01		
A21AC	Maricopa	C_MR	0.001	4.5	0.05		
	Maricopa	C_TW	0.021	93.2	0.05		
	Maricopa	C_VF	0.001	2.3	0.01		
A21AD	Maricopa	C_ES	0.005	9.7	0.25		
	Maricopa	C_MR	0.024	44.9	0.05		
	Maricopa	C_TW	0.016	30.2	0.05		
	Maricopa	C_VF	0.008	15.2	0.01		
A21AE	Maricopa	C_AE	0.000	0.4	0.39		
	Maricopa	C_ES	0.017	35.5	0.25		
	Maricopa	C_GE	0.003	5.3	0.26		
	Maricopa	C_LE	0.003	7.0	0.04		
	Maricopa	C_MR	0.007	14.4	0.05		
	Maricopa	C_TE	0.000	0.2	0.25		
	Maricopa	C_TW	0.018	37.2	0.05		
A21AF	Maricopa	C_ES	0.004	100.0	0.25		
A21AG	Maricopa	C_ES	0.024	76.9	0.25		
	Maricopa	C_MP	0.001	2.3	0.25		
	Maricopa	C_MR	0.006	19.8	0.05		
	Maricopa	C_TW	0.000	1.0	0.05		
A21AH	Maricopa	C_ES	0.008	30.3	0.25		
	Maricopa	C_MP	0.017	68.5	0.25		
	Maricopa	C_TW	0.000	1.2	0.05		
A21AI	Maricopa	C_MP	0.007	100.0	0.25		
A21AJ	Maricopa	C_MP	0.010	93.7	0.25		
	Maricopa	C_TE	0.001	6.3	0.25		
A21AK	Maricopa	C_ES	0.017	38.9	0.25		
	Maricopa	C_MP	0.026	61.1	0.25		
A21B	Maricopa	C_AE	0.006	29.1	*		
	Maricopa	C_EBD	0.004	19.1	*		
	Maricopa	C_RS	0.011	51.8	*	65.0	100
A21C	Maricopa	C_ABA	0.018	33.3	0.38		
	Maricopa	C_AE	0.029	53.5	0.39		
	Maricopa	C_EBD	0.005	9.2	0.10		
	Maricopa	C_GE	0.001	2.1	0.26		
	Maricopa	C_RS	0.001	2.1	0.40	65.0	100
A21D	Maricopa	C_RS	0.019	100.0	0.40	65.0	100
A21E	Maricopa	C_ABA	0.003	5.5	0.38		
	Maricopa	C_AE	0.025	43.0	0.39		

* Custom Value (not default value)

Soil Data

Area Id	Soil Survey	Map Unit	Area	Area Pct (%)	XKSAT	Rock Outcrop (%)	Effective (%)
A21E	Maricopa	C_EBD	0.007	11.2	0.10		
	Maricopa	C_GE	0.010	17.8	0.26		
	Maricopa	C_RS	0.013	22.5	0.40	65.0	100
A21F	Maricopa	C_RS	0.046	100.0	0.40	65.0	100
A21G	Maricopa	C_AE	0.002	5.8	0.39		
	Maricopa	C_EBD	0.015	35.6	0.10		
	Maricopa	C_GE	0.009	21.3	0.26		
	Maricopa	C_RS	0.015	37.3	0.40	65.0	100
A21H	Maricopa	C_EBD	0.006	86.5	0.10		
	Maricopa	C_GE	0.000	1.4	0.26		
	Maricopa	C_GGA	0.001	12.2	0.25		
A21I	Maricopa	C_EBD	0.004	10.5	0.10		
	Maricopa	C_LCA	0.008	22.0	0.25		
	Maricopa	C_RS	0.025	67.6	0.40	65.0	100
A21J	Maricopa	C_ADA	0.007	6.0	0.40		
	Maricopa	C_AE	0.001	1.1	0.39		
	Maricopa	C_EBD	0.018	16.1	0.10		
	Maricopa	C_GE	0.003	2.7	0.26		
	Maricopa	C_GGA	0.009	8.3	0.25		
	Maricopa	C_LCA	0.056	50.2	0.25		
	Maricopa	C_RS	0.018	15.7	0.40	65.0	100
A21K	Maricopa	C_AA	0.000	0.1	0.26		
	Maricopa	C_ABA	0.003	4.4	0.38		
	Maricopa	C_AE	0.020	30.0	0.39		
	Maricopa	C_GE	0.044	64.9	0.26		
	Maricopa	C_GGA	0.000	0.4	0.25		
A21L	Maricopa	C_AA	0.001	2.8	0.26		
	Maricopa	C_AE	0.000	1.4	0.39		
	Maricopa	C_GE	0.020	70.1	0.26		
	Maricopa	C_GGA	0.007	25.6	0.25		
A21M	Maricopa	C_AA	0.004	23.2	0.26		
	Maricopa	C_GE	0.006	37.8	0.26		
	Maricopa	C_GGA	0.006	39.0	0.25		
A21N	Maricopa	C_AA	0.003	1.1	0.26		
	Maricopa	C_AE	0.035	13.6	0.39		
	Maricopa	C_ES	0.020	7.9	0.25		
	Maricopa	C_GE	0.082	31.7	0.26		
	Maricopa	C_GGA	0.050	19.4	0.25		
	Maricopa	C_LCA	0.063	24.2	0.25		
	Maricopa	C_TE	0.005	2.1	0.25		
A21O	Maricopa	C_ES	0.003	26.9	0.25		
	Maricopa	C_LCA	0.003	27.8	0.25		
	Maricopa	C_MP	0.002	14.8	0.25		
	Maricopa	C_TE	0.003	30.6	0.25		
A21P	Maricopa	C_ES	0.017	47.0	0.25		
	Maricopa	C_MP	0.001	1.4	0.25		

* Custom Value (not default value)

Soil Data

Area Id	Soil Survey	Map Unit	Area	Area Pct (%)	XKSAT	Rock Outcrop (%)	Effective (%)
A21P	Maricopa	C_MR	0.009	26.2	0.05		
	Maricopa	C_TW	0.003	7.7	0.05		
	Maricopa	C_VF	0.006	17.7	0.01		
A21Q	Maricopa	C_AA	0.001	1.2	0.26		
	Maricopa	C_ABA	0.003	6.7	0.38		
	Maricopa	C_AE	0.002	5.3	0.39		
	Maricopa	C_ES	0.022	50.2	0.25		
	Maricopa	C_GE	0.005	12.3	0.26		
	Maricopa	C_GGA	0.010	24.2	0.25		
A21R	Maricopa	C_ES	0.008	98.8	0.25		
	Maricopa	C_GE	0.000	1.3	0.26		
A21S	Maricopa	C_ES	0.007	43.9	0.25		
	Maricopa	C_GE	0.008	56.1	0.26		
A21T	Maricopa	C_ES	0.022	58.7	0.25		
	Maricopa	C_GE	0.014	36.2	0.26		
	Maricopa	C_MR	0.002	5.0	0.05		
A21U	Maricopa	C_AE	0.004	3.0	0.39		
	Maricopa	C_ES	0.041	28.0	0.25		
	Maricopa	C_GE	0.032	22.0	0.26		
	Maricopa	C_GGA	0.023	15.6	0.25		
	Maricopa	C_LCA	0.009	6.3	0.25		
	Maricopa	C_MP	0.025	17.3	0.25		
	Maricopa	C_TE	0.011	7.9	0.25		
A21V	Maricopa	C_ES	0.006	15.5	0.25		
	Maricopa	C_GGA	0.007	17.7	0.25		
	Maricopa	C_MP	0.002	4.0	0.25		
	Maricopa	C_MR	0.009	22.8	0.05		
	Maricopa	C_TW	0.007	18.2	0.05		
	Maricopa	C_VF	0.008	21.7	0.01		
A21W	Maricopa	C_AA	0.003	16.0	0.26		
	Maricopa	C_AE	0.000	0.6	0.39		
	Maricopa	C_ES	0.001	3.4	0.25		
	Maricopa	C_GE	0.012	70.9	0.26		
	Maricopa	C_GGA	0.002	9.1	0.25		
A21X	Maricopa	C_ES	0.018	76.3	0.25		
	Maricopa	C_MR	0.006	23.7	0.05		
A21Y	Maricopa	C_MR	0.009	18.5	0.05		
	Maricopa	C_TD	0.006	12.4	1.20		
	Maricopa	C_TW	0.034	68.1	0.05		
	Maricopa	C_VF	0.001	1.0	0.01		
A21Z	Maricopa	C_CRB	0.004	6.0	0.40		
	Maricopa	C_MR	0.003	4.2	0.05		
	Maricopa	C_TD	0.017	26.3	1.20		
	Maricopa	C_TE	0.006	9.8	0.25		
	Maricopa	C_TW	0.030	46.3	0.05		
	Maricopa	C_VF	0.005	7.4	0.01		

* Custom Value (not default value)

Soil Data

Area Id	Soil Survey	Map Unit	Area	Area Pct (%)	XKSAT	Rock Outcrop (%)	Effective (%)
N19A	Maricopa	C_ABA	0.004	0.8	0.38		
	Maricopa	C_AE	0.034	7.2	0.39		
	Maricopa	C_AFA	0.005	1.0	0.38		
	Maricopa	C_CO	0.092	19.8	0.29	20.0	100
	Maricopa	C_EBD	0.146	31.4	0.10		
	Maricopa	C_GE	0.003	0.6	0.26		
	Maricopa	C_GGA	0.004	0.9	0.25		
	Maricopa	C_GXB	0.000		0.24		
	Maricopa	C_LCB	0.002	0.3	0.25		
	Maricopa	C_RS	0.177	37.9	0.40	65.0	100
N21A1	Central County	GGA	0.003	15.4	*		
	Central County	MR	0.011	53.3	0.05		
	Central County	LCA	0.007	31.3	*		
N21A10	Central County	LCA	0.003	6.0	*		
	Central County	VF	0.009	19.7	*		
	Central County	MP	0.019	43.4	*		
	Central County	MR	0.013	30.9	*		
N21A11	Central County	VF	0.004	23.8	*		
	Central County	MR	0.012	76.2	*		
N21A12	Central County	VF	0.009	69.5	*		
	Central County	LCA	0.002	16.8	*		
	Central County	MR	0.002	13.0	*		
	Central County	MP	0.000	0.8	*		
N21A13	Central County	LCA	0.007	31.9	*		
	Central County	MP	0.014	68.1	*		
N21A14	Central County	MP	0.029	48.6	*		
	Central County	MR	0.004	7.1	*		
	Central County	LCA	0.014	22.7	*		
	Central County	VF	0.013	21.6	*		
N21A15	Central County	MP	0.013	85.4	*		
	Central County	MR	0.002	14.6	*		
N21A16	Central County	MR	0.007	33.0	*		
	Central County	MP	0.015	67.0	*		
N21A17	Central County	MR	0.002	18.2	*		
	Central County	MP	0.007	65.5	*		
	Central County	LCA	0.002	16.4	*		
N21A18	Central County	MP	0.014	57.8	*		
	Central County	MR	0.011	42.2	*		
N21A19	Central County	MP	0.006	100.0	*		
N21A2	Central County	LCA	0.007	80.0	*		
	Central County	MR	0.002	20.0	*		
N21A20	Central County	MP	0.003	100.0	*		
N21A21	Central County	MP	0.007	47.7	*		
	Central County	MR	0.008	52.3	*		

* Custom Value (not default value)

Soil Data

Area Id	Soil Survey	Map Unit	Area	Area Pct (%)	XKSAT	Rock Outcrop (%)	Effective (%)
N21A22	Central County	LCA	0.003	38.9	*		
	Central County	ES	0.001	13.9	*		
	Central County	MR	0.001	12.5	*		
	Central County	MP	0.002	31.9	*		
	Central County	VF	0.000	2.8	*		
N21A23	Central County	LCA	0.018	71.7	*		
	Central County	VE	0.002	6.8	*		
	Central County	ES	0.001	4.0	*		
	Central County	MP	0.004	17.5	*		
N21A24	Central County	LCA	0.012	67.6	*		
	Central County	MP	0.006	32.4	*		
N21A25	Central County	LCA	0.004	100.0	*		
N21A26	Central County	LCA	0.024	94.1	*		
	Central County	MP	0.002	5.9	*		
N21A27	Central County	LCA	0.001	35.9	*		
	Central County	MP	0.003	64.1	*		
N21A28	Central County	MP	0.003	42.9	*		
	Central County	LCA	0.001	20.6	*		
	Central County	MR	0.000	3.2	*		
	Central County	ES	0.002	33.3	*		
N21A29	Central County	ES	0.001	4.2	*		
	Central County	LCA	0.015	91.1	*		
	Central County	MP	0.001	4.8	*		
N21A3	Central County	LCA	0.005	33.5	*		
	Central County	MR	0.009	56.3	*		
	Central County	VF	0.002	10.1	*		
N21A30	Central County	MP	0.005	20.2	*		
	Central County	LCA	0.003	11.8	*		
	Central County	ES	0.012	51.7	*		
	Central County	VF	0.004	16.4	*		
N21A31	Central County	ES	0.006	33.9	*		
	Central County	LCA	0.001	6.7	*		
	Central County	MP	0.010	59.4	*		
N21A32	Central County	LCA	0.003	74.4	*		
	Central County	MP	0.001	25.6	*		
N21A33	Central County	ES	0.003	8.7	*		
	Central County	LCA	0.034	91.0	*		
	Central County	MP	0.000	0.3	*		
N21A34	Central County	ES	0.015	94.4	*		
	Central County	LCA	0.001	5.6	*		
N21A35	Central County	ES	0.010	87.0	*		
	Central County	LCA	0.002	13.0	*		
N21A36	Central County	LCA	0.013	85.6	*		

* Custom Value (not default value)

Soil Data

Area Id	Soil Survey	Map Unit	Area	Area Pct (%)	XKSAT	Rock Outcrop (%)	Effective (%)
N21A36	Central County	TE	0.002	14.4	*		
N21A37	Central County	PEA	0.008	60.0	*		
	Central County	LCA	0.005	40.0	*		
N21A38	Central County	MP	0.013	55.3	*		
	Central County	LCA	0.010	44.7	*		
N21A39	Central County	MP	0.003	32.7	*		
	Central County	LCA	0.006	56.7	*		
	Central County	PEA	0.001	10.6	*		
N21A4	Central County	LCA	0.004	44.2	*		
	Central County	MR	0.005	54.7	*		
	Central County	ES	0.000	1.2	*		
N21A40	Central County	LCA	0.022	43.6	*		
	Central County	MP	0.020	39.5	*		
	Central County	MR	0.006	12.0	*		
	Central County	PEA	0.003	4.9	*		
N21A41	Central County	MR	0.017	61.7	*		
	Central County	VF	0.007	24.1	*		
	Central County	MP	0.004	14.2	*		
N21A42	Central County	LCA	0.008	38.8	*		
	Central County	MP	0.013	61.2	*		
N21A43	Central County	MP	0.004	100.0	*		
N21A44	Central County	MP	0.009	35.3	*		
	Central County	LCA	0.009	35.3	*		
	Central County	ES	0.007	29.3	*		
N21A5	Central County	MR	0.006	62.4	*		
	Central County	VF	0.004	37.6	*		
N21A6	Central County	ES	0.000	0.1	*		
	Central County	MR	0.236	98.2	*		
	Central County	VF	0.004	1.8	*		
N21A7	Central County	LCA	0.008	63.6	*		
	Central County	MR	0.002	15.2	*		
	Central County	ES	0.003	21.2	*		
N21A8	Central County	MR	0.008	95.3	*		
	Central County	VF	0.000	4.7	*		
N21A9	Central County	VF	0.006	23.3	*		
	Central County	MR	0.018	76.7	*		
N21A90	Central County	MR	0.002	18.0	*		
	Central County	VF	0.001	6.6	*		
	Central County	MP	0.003	23.0	*		
	Central County	LCA	0.003	20.5	*		
	Central County	ES	0.004	32.0	*		
N21A91	Central County	LCA	0.000	8.0	*		
	Central County	MR	0.004	70.0	*		

* Custom Value (not default value)

Soil Data

Area Id	Soil Survey	Map Unit	Area	Area Pct (%)	XKSAT	Rock Outcrop (%)	Effective (%)
N21A91	Central County	MP	0.001	22.0	*		
N21A92	Central County	ES	0.000	1.7	*		
	Central County	LE	0.000	5.0	*		
	Central County	MP	0.003	50.0	*		
	Central County	MR	0.003	43.3	*		
N21AP1	Central County	LCA	0.005	29.2	*		
	Central County	MP	0.003	18.1	*		
	Central County	ES	0.008	49.1	*		
	Central County	PEA	0.001	3.5	*		
N21AP2	Central County	ES	0.005	30.4	*		
	Central County	LCA	0.005	35.1	*		
	Central County	PEA	0.005	34.5	*		
N21AP3	Central County	MP	0.002	16.0	*		
	Central County	LCA	0.008	79.8	*		
	Central County	PEA	0.000	2.1	*		
	Central County	TE	0.000	2.1	*		
N21AP4	Central County	PEA	0.006	20.5	*		
	Central County	ES	0.003	9.2	*		
	Central County	LCA	0.018	59.9	*		
	Central County	MP	0.003	10.3	*		
N21AP5	Central County	LCA	0.003	29.4	*		
	Central County	MP	0.003	35.3	*		
	Central County	ES	0.003	35.3	*		

* Custom Value (not default value)

D.3. HYDROGRAPH ROUTING DATA

D.3. HYDROGRAPH ROUTING DATA

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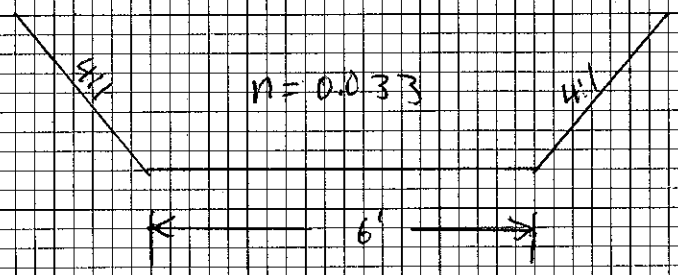
Job No. 5043.0001 Sheet 1 of

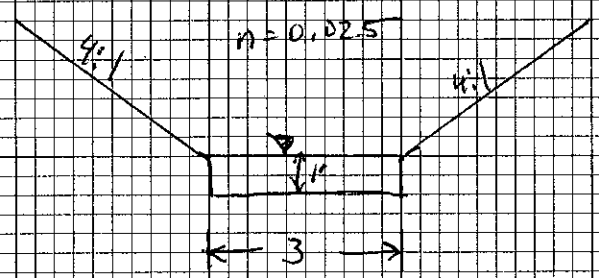
Project Glendale/Peoria ADMP - Arrowhead Lakes Option

Subject Cross Sections

Designed By Date Checked By Date



Route RA21A Man-Made Channel (Earth)



Route RA21C Running Creek Through Golf Course

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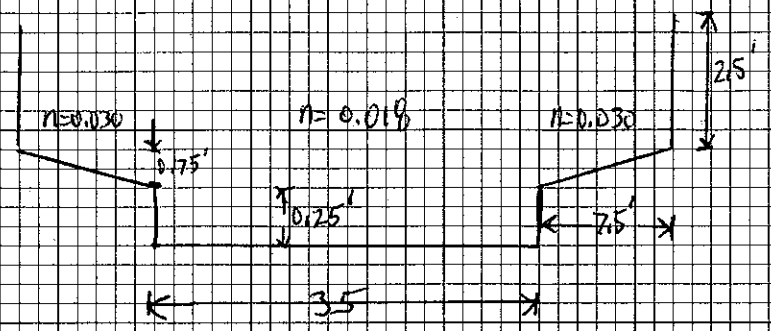
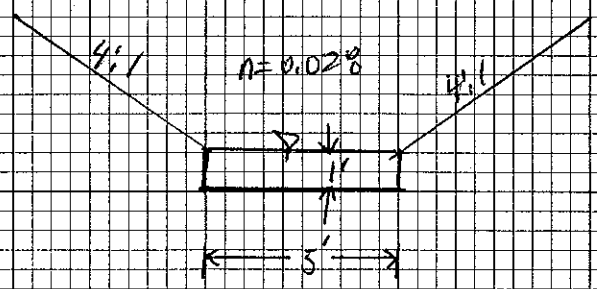


Route RA21D Local Street (Typical)
Route RA21F
Route RA21I



Route RA21ES Existing Running Creek (Typical)
Route RA21L

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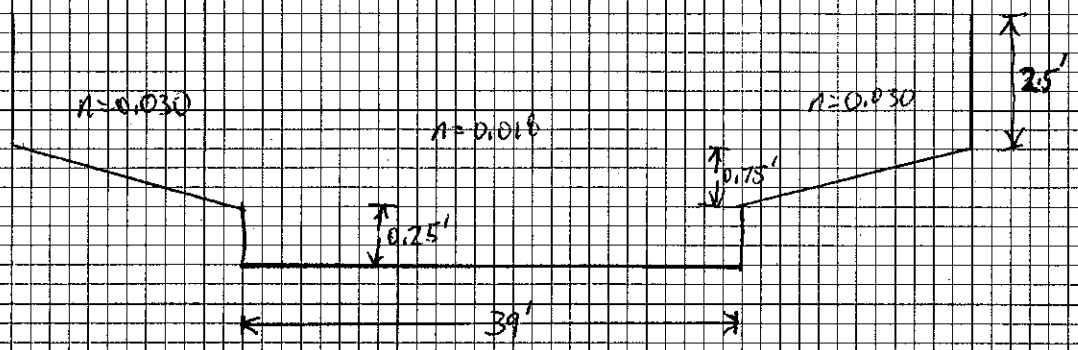
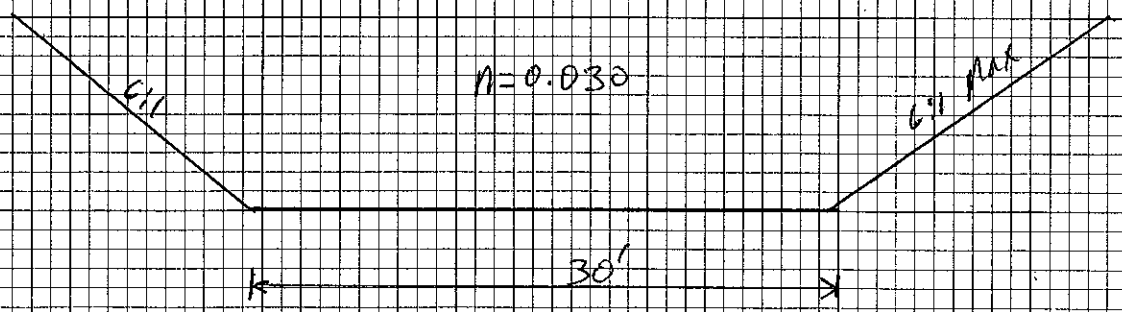


Route RA21M Collector Street (typical)



Route RA21F Golf Course Field (typical)
Route RA21J

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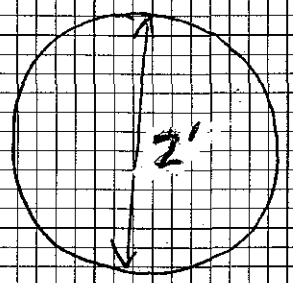
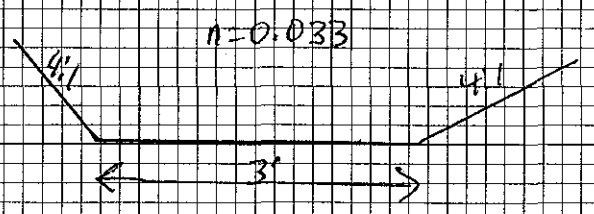


Route RA21P 24" PIPE (TYPICAL)
Route RA21T
Route RA21US



Route RA21Z Existing ADOT Swale

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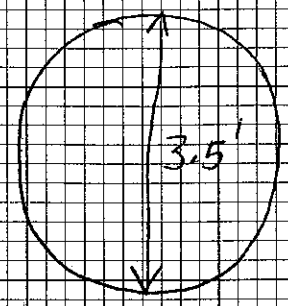
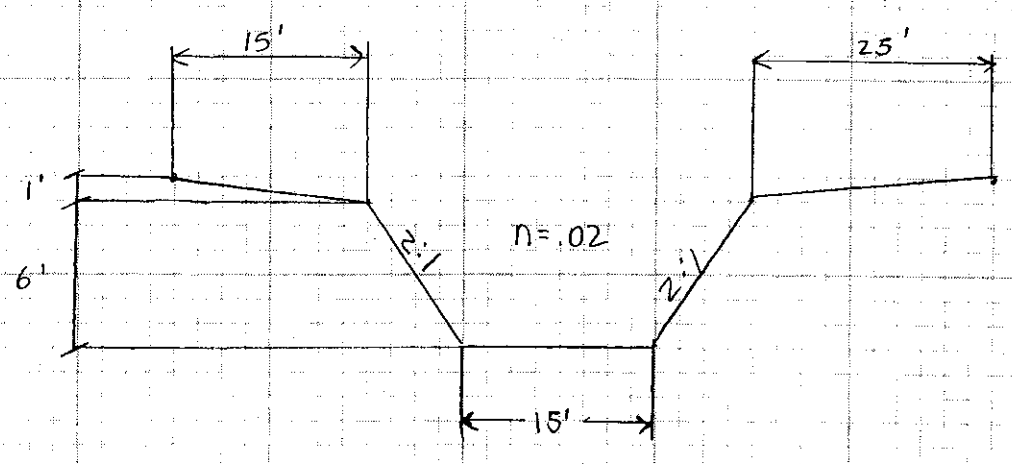


Route RA21AB Existing 42" ADOT Pipe
Route RA21AD
Route RA21AE
Route RA21AG

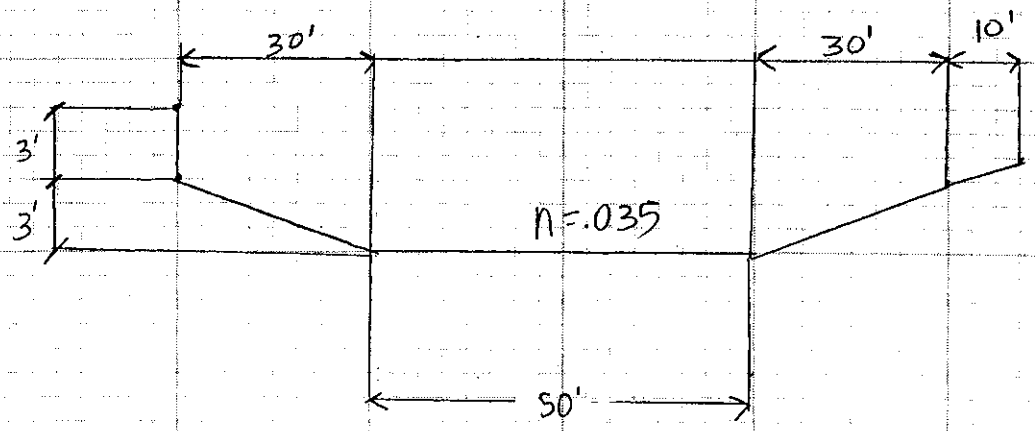
Entellus™

SHEET 0 OF 0
BY PAW DATE
CHECK DATE

CLIENT FCDMC
JOB NAME Glendale / Peoria ADMP- Arrowhead Lakes JOB NO. 5043.001



ADOT 101 channel (Typical)



Grassed Swale (Typical)

D.4. STORAGE ROUTING DATA

D.4. STORAGE ROUTING DATA

STAGE-STORAGE-DISCHARGE RATING TABLES

GLENDALE/PEORIA ADMP UPDATE

ARROWHEAD LAKES

Stage-Storage-Discharge Rating Table Summary

Lake I.D. #	Lake Outlet Structure [1]	HEC-1 Routes [2]	Structure Elevation E (ft)	Water Surface Elevation WSE (ft)	Cumulative Volume [3] V (acre-ft)	Cumulative Discharge [4] Q (cfs)
Lake 1	Weirs (S20-1)	397RR	1,296.0	1,296.0	0.00	0
				1,296.5	8.50	139
				1,297.0	17.19	399
				1,297.5	26.06	732
				1,298.0	35.12	1,146
				1,298.5	44.34	1,639
				1,299.0	53.71	2,202
				1,299.5	63.24	2,814
				1,300.0	72.91	3,516
Lake 2	Weirs (S20-2A, S20-2B & S20-3)	398BRR	1,294.0	1,294.0	0.00	0
				1,294.5	14.13	224
				1,295.0	28.79	653
				1,295.5	43.96	1,296
				1,296.0	59.40	2,017
				1,296.5	74.84	3,045
				1,297.0	90.27	4,090
				1,297.5	105.71	5,217
				1,298.0	121.14	6,375
Lake 3	Weirs (S20-5)	398FRR	1,292.0	1,292.0	0.00	0
				1,292.5	17.52	47
				1,293.0	38.16	138
				1,293.5	59.58	275
				1,294.0	81.39	429
				1,294.5	103.19	648
				1,295.0	125.00	863
				1,295.5	146.80	1,087
				1,296.0	168.60	1,328
Lake 4	Weirs (S20-6)	398GRR	1,290.0	1,290.0	0.00	0
				1,290.5	20.87	120
				1,291.0	42.58	346
				1,291.5	65.14	634
				1,292.0	88.11	993
				1,292.5	111.08	1,421
				1,293.0	134.05	1,908
				1,293.5	157.03	2,439
				1,294.0	202.97	3,047
Lake 5	Weirs (S20-4)	398CRR	1,292.0	1,292.0	0.00	0
				1,292.5	9.77	46
				1,293.0	19.90	133
				1,293.5	30.41	260
				1,294.0	41.11	403
				1,294.5	51.80	607
				1,295.0	62.50	831
				1,295.5	73.19	1,087
				1,296.0	89.89	1,328
Lake 6	Weirs (S19-1A)	A21CRR	1,304.0	1,304.0	0.00	0
				1,304.5	1.42	19
				1,305.0	2.89	60
				1,305.5	4.42	119
				1,306.0	6.00	187
				1,306.5	7.64	262
				1,307.0	9.34	345
				1,307.5	11.08	435
				1,308.0	12.85	531

GLENDALE/PEORIA ADMP UPDATE

ARROWHEAD LAKES

Stage-Storage-Discharge Rating Table Summary

Lake I.D. #	Lake Outlet Structure [1]	HEC-1 Routes [2]	Structure Elevation E (ft)	Water Surface Elevation WSE (ft)	Cumulative Volume [3] V (acre-ft)	Cumulative Discharge [4] Q (cfs)
Lake 7	Weirs (S19-6A, S19-6B & S19-7)	A21ERR	1,301.5	1,301.5	0.00	0
				1,302.0	1.55	67
				1,302.5	3.17	210
				1,303.0	4.87	417
				1,303.5	6.62	653
				1,304.0	8.40	916
				1,304.5	10.19	1,207
				1,305.0	11.97	1,521
				1,305.5	13.75	1,859
Lake 8	Channel (between Lake #8 & Lake #9)	A21KRR	1,289.5	1,289.5	0.00	0
				1,290.0	1.20	41
				1,290.5	2.43	145
				1,291.0	3.70	317
				1,291.5	4.99	514
				1,292.0	6.32	884
				1,292.5	7.66	1,457
				1,293.0	9.03	2,132
				1,293.5	10.40	2,899
Lake 9	Culvert (6'x3' & 4'x3' CBC)	A21LRR	1,286.5	1,286.5	0.00	74
				1,287.0	0.42	103
				1,287.5	0.88	134
				1,288.0	1.35	164
				1,288.5	1.83	194
				1,289.0	2.33	219
				1,289.5	2.84	241
				1,290.0	3.35	264
				1,290.5	3.86	286
Lake 10	Adjacent Street	A21MRR	1,284.5	1,284.5	0.00	0
				1,285.0	0.38	0
				1,285.5	0.79	0
				1,286.0	1.23	0
				1,286.5	1.69	0
				1,287.0	2.18	0
				1,287.5	2.68	53
				1,288.0	3.18	153
				1,288.5	3.70	284
Lake 11	Weir (S19-8)	A21GRR	1,297.0	1,297.0	0.00	0
				1,297.5	0.43	19
				1,298.0	0.90	60
				1,298.5	1.39	119
				1,299.0	1.91	187
				1,299.5	2.45	262
				1,300.0	3.01	345
				1,300.5	3.57	435
				1,301.0	4.13	531
Lake 12	Weir (S19-9)	A21HRR	1,295.0	1,295.0	0.00	0
				1,295.5	0.69	19
				1,296.0	1.42	60
				1,296.5	2.18	119
				1,297.0	2.96	187
				1,297.5	3.73	262
				1,298.0	4.51	345
				1,298.5	5.28	435
				1,299.0	6.06	531

GLENDALE/PEORIA ADMP UPDATE

ARROWHEAD LAKES

Stage-Storage-Discharge Rating Table Summary

Lake I.D. #	Lake Outlet Structure [1]	HEC-1 Routes [2]	Structure Elevation E (ft)	Water Surface Elevation WSE (ft)	Cumulative Volume [3] V (acre-ft)	Cumulative Discharge [4] Q (cfs)
Lake 13	Weir (S19-10A)	A21JRR	1,289.5	1,289.5	0.00	0
				1,290.0	0.40	24
				1,290.5	0.83	75
				1,291.0	1.29	149
				1,291.5	1.78	233
				1,292.0	2.29	327
				1,292.5	2.81	431
				1,293.0	3.34	543
				1,293.5	3.88	664
Lake 14	Weir (S19-11)	A21NRR	1,277.0	1,277.0	0.00	0
				1,277.5	2.93	24
				1,278.0	5.97	75
				1,278.5	9.12	149
				1,279.0	12.39	233
				1,279.5	15.76	327
				1,280.0	19.19	431
				1,280.5	22.67	543
				1,281.0	26.20	664
Lake 15	Weir (S19-12)	A21ORR	1,272.5	1,272.5	0.00	0
				1,273.0	0.76	44
				1,273.5	1.55	134
				1,274.0	2.36	268
				1,274.5	3.19	420
				1,275.0	4.05	589
				1,275.5	4.91	776
				1,276.0	5.80	978
				1,276.5	6.69	1,195
Lake 16	Culvert (2-8'x4' CBC & 24" Relief Pipe)	A21URR	1,267.5	1,267.5	0.00	9
				1,268.0	3.75	25
				1,268.5	7.54	84
				1,269.0	11.36	159
				1,269.5	15.21	229
				1,270.0	19.08	310
				1,270.5	22.97	380
				1,271.0	26.89	449
				1,271.5	30.84	504
				1,272.0	34.81	550
				1,272.5	38.81	596
Lake 17	Storm Drain & Street (24" RCP bleed-off pipe)	A21PRR	1,278.0	1,278.0	0.00	0
				1,278.5	0.65	16
				1,279.0	1.35	16
				1,279.5	2.07	16
				1,280.0	2.81	16
				1,280.5	5.02	16
				1,281.0	5.78	16
				1,281.5	8.05	122
				1,282.0	8.81	322

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Stage-Storage-Discharge Rating Table Summary

Lake I.D. #	Lake Outlet Structure [1]	HEC-1 Routes [2]	Structure Elevation E (ft)	Water Surface Elevation WSE (ft)	Cumulative Volume [3] V (acre-ft)	Cumulative Discharge [4] Q (cfs)
Lake 18	Weir (S19-14)	A21QRR	1,277.5	1,277.5	0.00	0
				1,278.0	0.39	29
				1,278.5	0.80	89
				1,279.0	1.22	179
				1,279.5	1.66	280
				1,280.0	2.12	393
				1,280.5	2.58	518
				1,281.0	3.04	652
				1,281.5	3.51	797
Lake 19	Weir (S19-15)	A21RRR	1,276.0	1,276.0	0.00	0
				1,276.5	0.34	24
				1,277.0	0.71	75
				1,277.5	1.08	149
				1,278.0	1.47	233
				1,278.5	1.88	327
				1,279.0	2.30	431
				1,279.5	2.71	543
				1,280.0	3.13	664
Lake 20	Weir (S19-16)	A21SRR	1,273.0	1,273.0	0.00	0
				1,273.5	0.33	29
				1,274.0	0.67	89
				1,274.5	1.03	179
				1,275.0	1.40	280
				1,275.5	1.78	393
				1,276.0	2.16	518
				1,276.5	2.54	652
				1,277.0	2.93	797
Lake 21	Storm Drain & Street (24" RCP bleed-off pipe)	A21TRR	1,268.0	1,268.0	0.00	0
				1,268.5	1.71	16
				1,269.0	3.50	16
				1,269.5	5.34	16
				1,270.0	7.22	16
				1,270.5	9.12	16
				1,271.0	11.01	16
				1,271.5	12.91	53
				1,272.0	14.81	153
L21A27	Storm Drain & Sidewalk (8" PVC bleed-off pipe)	L21A27	1,281.0	1,281.0	0.00	0
				1,282.0	0.20	1
				1,284.0	2.07	3
				1,285.0	2.10 *(5)	76
				1,286.0	2.10 *(5)	216
L2A281	Storm Drain & Sidewalk (2-8" PVC bleed-off pipe)	L2A281	1,281.0	1,281.0	0.00	2
				1,282.0	0.14	5
				1,284.0	1.56	7
				1,285.0	1.56	116
				1,286.0	1.60 *(5)	314
L2A282	Storm Drain & Sidewalk (2-8" PVC bleed-off pipe)	L2A282	1,279.0	1,279.0	0.00	4
				1,280.0	0.19	6
				1,282.0	1.59	143
				1,283.0	1.60 *(5)	391

GLENDALE/PEORIA ADMP UPDATE

ARROWHEAD LAKES

Stage-Storage-Discharge Rating Table Summary

Lake I.D. #	Lake Outlet Structure [1]	HEC-1 Routes [2]	Structure Elevation E (ft)	Water Surface Elevation WSE (ft)	Cumulative Volume [3] V (acre-ft)	Cumulative Discharge [4] Q (cfs)
L2A283	Storm Drain & Sidewalk (2-8" PVC bleed-off pipe)	L2A283	1,274.0	1,274.0	0.00	0
				1,276.0	0.19	5
				1,277.0	0.44	6
				1,278.0	0.44 *(5)	108
				1,279.0	0.44 *(5)	304
L21AP1	Sidewalk Weir (Small circulation pipes)	L21AP1	1,275.0	1,275.0	0.00	0
				1,276.0	5.11	67
				1,277.0	10.69	191
				1,278.0	17.07	355
L21AP5	Storm Drain & Sidewalk (36" RCP equalizer pipe)	L21AP5	1,265.0	1,266.0	0.00	0
				1,268.0	3.63	7
				1,269.0	5.72	38
				1,270.0	8.12	197
L21AP3	Sharp Crested Weir	L21AP3	1,267.5	1,267.5	0.00	0
				1,268.0	1.05	253
				1,269.0	3.23	1,314
				1,270.0	5.55	2,827
L21AP4	Sharp Crested Weir (2-4'x8' RCB reduces peak outflow)	L21AP4	1,265.0	1,265.0	0.00	0
				1,266.0	2.79	46
				1,267.0	11.60	418
				1,268.0	21.28	768
L21A43	Weir & Storm Drain Structure (24" RCP relief pipe)	L21A43	1,253.0	1,253.0	0.00	0
				1,254.0	0.16	10
				1,255.0	0.76	16
				1,256.0	1.42	24
				1,257.0	1.84	29
				1,258.0	3.74	205
				1,259.0	3.75 *(5)	525
				1,260.0	3.76 *(5)	928
L21A44	Apartment Complex	L21A44	1,259.7	1,259.7	0.00	0
				1,262.0	5.37	0
				1,263.0	5.38 *(5)	100
L21A8	Sidewalk Weir	L21A8	1,276.0	1,276.0	0.00	0
				1,278.0	10.16	4
				1,279.0	10.20 *(5)	161
L21A11	Sidewalk Weir (36" RCP relief pipe)	L21A11	1,267.0	1,267.0	0.00	0
				1,268.0	0.28	10
				1,270.0	3.67	35
				1,271.0	3.70 *(5)	305
L21A14	Street & Storm Drain (36" RCP relief pipe)	L21A14	1,264.0	1,264.0	0.00	0
				1,266.0	0.09	35
				1,268.0	0.26	60
				1,270.0	1.06	76
				1,271.0	1.10 *(5)	214
				1,272.0	1.10 *(5)	469
L21A15	Weir (24" RCP relief pipe)	L21A15	1,256.0	1,256.0	0.00	0
				1,258.0	0.50	15
				1,260.0	2.30	26
				1,262.0	5.30	127
				1,263.0	5.40 *(5)	369

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Stage-Storage-Discharge Rating Table Summary

Lake I.D. #	Lake Outlet Structure [1]	HEC-1 Routes [2]	Structure Elevation E (ft)	Water Surface Elevation WSE (ft)	Cumulative Volume [3] V (acre-ft)	Cumulative Discharge [4] Q (cfs)
L21A17	Weir (12" PVC relief pipe)	L21A17	1,256.0	1,256.0	0.00	0
				1,258.0	0.15	6
				1,260.0	1.14	8
				1,262.0	3.66	90
L21A16	Street & Storm Drain (3-24" RCP relief pipes)	L21A16	1,256.0	1,256.0	0.00	12
				1,258.0	0.10	60
				1,260.0	0.31	84
				1,261.0	0.35 *(5)	367
L21A20	Weir (8" PVC relief pipe)	L21A20	1,256.0	1,256.0	0.00	1
				1,258.0	0.26	3
				1,259.0	0.30 *(5)	125
				1,260.0	0.30 *(5)	350
L21A21	Apartment Complex	L21A21	1,259.3	1,259.3	0.00	0
				1,260.0	0.72	0
				1,262.0	2.82	56
				1,263.0	2.85 *(5)	246

Notes:
1) See **Plate AL-1** for lake and outfall structure identifications.
2) See **Plate AL-1** for HEC-1 schematic map.
3) See stage-storage data in this appendix for detailed volume calculations.
4) See stage-discharge rating table in this appendix for detailed weir calculations.
See HY8 culvert analysis for culvert discharge rating table.
See Flowmaster analysis for storm drain outputs and street weir discharge rating table.

STAGE VS STORAGE TABLES

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Detention Elevation/Storage Data

Lake ID (Weir ID)	Water Surface Elevation (ft)	Incremental Surface Area (ft^2)	Incremental Volume (acre-ft)	Cummulative Volume (acre-ft)
Lake #1	1296.0	731,950	-	0.00
(S20-1)	1296.5	748,950	8.50	8.50
	1297.0	764,900	8.69	17.19
	1297.5	781,550	8.88	26.06
	1298.0	797,100	9.06	35.12
	1298.5	809,650	9.22	44.34
	1299.0	822,900	9.37	53.71
	1299.5	836,250	9.52	63.24
	1300.0	849,650	9.68	72.91
Lake #2	1294.0	1,208,750	-	0.00
(S20-2A)	1294.5	1,254,150	14.13	14.13
(S20-2B)	1295.0	1,299,450	14.65	28.79
(S20-3)	1295.5	1,344,750	15.17	43.96
	1296.0	1,344,750	15.44	59.40
	1296.5	1,344,750	15.44	74.84
	1297.0	1,344,750	15.44	90.27
	1297.5	1,344,750	15.44	105.71
	1298.0	1,344,750	15.44	121.14
Lake #3	1292.0	1,298,400	-	0.00
(S20-5)	1292.5	1,765,450	17.52	17.52
	1293.0	1,832,500	20.65	38.16
	1293.5	1,899,600	21.42	59.58
	1294.0	1,899,600	21.80	81.39
	1294.5	1,899,600	21.80	103.19
	1295.0	1,899,600	21.80	125.00
	1295.5	1,899,600	21.80	146.80
	1296.0	1,899,600	21.80	168.60
Lake #4	1290.0	1,781,850	-	0.00
(S20-6)	1290.5	1,855,050	20.87	20.87
	1291.0	1,928,250	21.71	42.58
	1291.5	2,001,400	22.55	65.14
	1292.0	2,001,400	22.97	88.11
	1292.5	2,001,400	22.97	111.08
	1293.0	2,001,400	22.97	134.05
	1293.5	2,001,400	22.97	157.03
	1294.0	2,001,400	45.95	202.97
Lake #5	1292.0	834,800	-	0.00
(S20-4)	1292.5	867,100	9.77	9.77
	1293.0	899,400	10.14	19.90
	1293.5	931,700	10.51	30.41
	1294.0	931,700	10.69	41.11
	1294.5	931,700	10.69	51.80
	1295.0	931,700	10.69	62.50
	1295.5	931,700	10.69	73.19
	1296.0	931,700	10.69	83.89

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Detention Elevation/Storage Data

Lake ID (Weir ID)	Water Surface Elevation (ft)	Incremental Surface Area (ft^2)	Incremental Volume (acre-ft)	Cummulative Volume (acre-ft)
Lake #6 (S19-1A)	1304.0	120,950	-	0.00
	1304.5	125,800	1.42	1.42
	1305.0	130,650	1.47	2.89
	1305.5	135,550	1.53	4.42
	1306.0	140,500	1.58	6.00
	1306.5	145,900	1.64	7.64
	1307.0	149,750	1.70	9.34
	1307.5	152,900	1.74	11.08
	1308.0	155,850	1.77	12.85
Lake #7 (S19-6A) (S19-6B) (S19-7)	1301.5	132,000	-	0.00
	1302.0	138,300	1.55	1.55
	1302.5	144,500	1.62	3.17
	1303.0	150,650	1.69	4.87
	1303.5	155,200	1.76	6.62
	1304.0	155,200	1.78	8.40
	1304.5	155,200	1.78	10.19
	1305.0	155,200	1.78	11.97
	1305.5	155,200	1.78	13.75
Lake #8 (Channel)	1289.5	102,850	-	0.00
	1290.0	105,900	1.20	1.20
	1290.5	109,000	1.23	2.43
	1291.0	111,600	1.27	3.70
	1291.5	114,200	1.30	4.99
	1292.0	116,350	1.32	6.32
	1292.5	118,000	1.34	7.66
	1293.0	119,600	1.36	9.03
	1293.5	120,750	1.38	10.40
Lake #9 (2-CBC)	1286.5	35,900	-	0.00
	1287.0	38,150	0.42	0.42
	1287.5	40,350	0.45	0.88
	1288.0	41,950	0.47	1.35
	1288.5	42,900	0.49	1.83
	1289.0	43,600	0.50	2.33
	1289.5	44,300	0.50	2.84
	1290.0	44,750	0.51	3.35
	1290.5	45,200	0.52	3.86
Lake #10 (Street)	1284.5	31,600	-	0.00
	1285.0	34,250	0.38	0.38
	1285.5	37,000	0.41	0.79
	1286.0	39,700	0.44	1.23
	1286.5	41,750	0.47	1.69
	1287.0	42,750	0.48	2.18
	1287.5	43,750	0.50	2.68
	1288.0	44,450	0.51	3.18
	1288.5	45,100	0.51	3.70

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Detention Elevation/Storage Data

Lake ID (Weir ID)	Water Surface Elevation (ft)	Incremental Surface Area (ft^2)	Incremental Volume (acre-ft)	Cummulative Volume (acre-ft)
Lake #11 (S19-8)	1297.0	36,550	-	**0.00**
	1297.5	39,150	0.43	**0.43**
	1298.0	41,700	0.46	**0.90**
	1298.5	44,200	0.49	**1.39**
	1299.0	46,650	0.52	**1.91**
	1299.5	47,600	0.54	**2.45**
	1300.0	48,550	0.55	**3.01**
	1300.5	49,150	0.56	**3.57**
	1301.0	49,700	0.57	**4.13**
Lake #12 (S19-9)	1295.0	58,400	-	**0.00**
	1295.5	61,200	0.69	**0.69**
	1296.0	66,050	0.73	**1.42**
	1296.5	67,450	0.77	**2.18**
	1297.0	67,450	0.77	**2.96**
	1297.5	67,450	0.77	**3.73**
	1298.0	67,500	0.77	**4.51**
	1298.5	67,500	0.77	**5.28**
	1299.0	67,500	0.77	**6.06**
Lake #13 (S19-10A)	1289.5	33,650	-	**0.00**
	1290.0	36,250	0.40	**0.40**
	1290.5	38,850	0.43	**0.83**
	1291.0	41,450	0.46	**1.29**
	1291.5	44,100	0.49	**1.78**
	1292.0	44,850	0.51	**2.29**
	1292.5	45,750	0.52	**2.81**
	1293.0	46,600	0.53	**3.34**
	1293.5	47,450	0.54	**3.88**
Lake #14 (S19-11)	1277.0	249,950	-	**0.00**
	1277.5	259,900	2.93	**2.93**
	1278.0	269,900	3.04	**5.97**
	1278.5	279,950	3.16	**9.12**
	1279.0	290,000	3.27	**12.39**
	1279.5	296,350	3.37	**15.76**
	1280.0	301,100	3.43	**19.19**
	1280.5	305,950	3.48	**22.67**
	1281.0	309,150	3.53	**26.20**
Lake #15 (S19-12)	1272.5	65,150	-	**0.00**
	1273.0	67,300	0.76	**0.76**
	1273.5	69,500	0.79	**1.55**
	1274.0	71,650	0.81	**2.36**
	1274.5	73,850	0.84	**3.19**
	1275.0	75,100	0.85	**4.05**
	1275.5	76,400	0.87	**4.91**
	1276.0	77,250	0.88	**5.80**
	1276.5	78,100	0.89	**6.69**

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Detention Elevation/Storage Data

Lake ID (Weir ID)	Water Surface Elevation (ft)	Incremental Surface Area (ft^2)	Incremental Volume (acre-ft)	Cummulative Volume (acre-ft)
Lake #6	1304.0	120,950	-	**0.00**
(S19-1A)	1304.5	125,800	1.42	**1.42**
	1305.0	130,650	1.47	**2.89**
	1305.5	135,550	1.53	**4.42**
	1306.0	140,500	1.58	**6.00**
	1306.5	145,900	1.64	**7.64**
	1307.0	149,750	1.70	**9.34**
	1307.5	152,900	1.74	**11.08**
	1308.0	155,850	1.77	**12.85**
Lake #7	1301.5	132,000	-	**0.00**
(S19-6A)	1302.0	138,300	1.55	**1.55**
(S19-6B)	1302.5	144,500	1.62	**3.17**
(S19-7)	1303.0	150,650	1.69	**4.87**
	1303.5	155,200	1.76	**6.62**
	1304.0	155,200	1.78	**8.40**
	1304.5	155,200	1.78	**10.19**
	1305.0	155,200	1.78	**11.97**
	1305.5	155,200	1.78	**13.75**
Lake #8	1289.5	102,850	-	**0.00**
(Channel)	1290.0	105,900	1.20	**1.20**
	1290.5	109,000	1.23	**2.43**
	1291.0	111,600	1.27	**3.70**
	1291.5	114,200	1.30	**4.99**
	1292.0	116,350	1.32	**6.32**
	1292.5	118,000	1.34	**7.66**
	1293.0	119,600	1.36	**9.03**
	1293.5	120,750	1.38	**10.40**
Lake #9	1286.5	35,900	-	**0.00**
(2-CBC)	1287.0	38,150	0.42	**0.42**
	1287.5	40,350	0.45	**0.88**
	1288.0	41,950	0.47	**1.35**
	1288.5	42,900	0.49	**1.83**
	1289.0	43,600	0.50	**2.33**
	1289.5	44,300	0.50	**2.84**
	1290.0	44,750	0.51	**3.35**
	1290.5	45,200	0.52	**3.86**
Lake #10	1284.5	31,600	-	**0.00**
(Street)	1285.0	34,250	0.38	**0.38**
	1285.5	37,000	0.41	**0.79**
	1286.0	39,700	0.44	**1.23**
	1286.5	41,750	0.47	**1.69**
	1287.0	42,750	0.48	**2.18**
	1287.5	43,750	0.50	**2.68**
	1288.0	44,450	0.51	**3.18**
	1288.5	45,100	0.51	**3.70**

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Detention Elevation/Storage Data

Lake ID (Weir ID)	Water Surface Elevation (ft)	Incremental Surface Area (ft^2)	Incremental Volume (acre-ft)	Cummulative Volume (acre-ft)
Lake #11 (S19-8)	1297.0	36,550	-	**0.00**
	1297.5	39,150	0.43	**0.43**
	1298.0	41,700	0.46	**0.90**
	1298.5	44,200	0.49	**1.39**
	1299.0	46,650	0.52	**1.91**
	1299.5	47,600	0.54	**2.45**
	1300.0	48,550	0.55	**3.01**
	1300.5	49,150	0.56	**3.57**
	1301.0	49,700	0.57	**4.13**
Lake #12 (S19-9)	1295.0	58,400	-	**0.00**
	1295.5	61,200	0.69	**0.69**
	1296.0	66,050	0.73	**1.42**
	1296.5	67,450	0.77	**2.18**
	1297.0	67,450	0.77	**2.96**
	1297.5	67,450	0.77	**3.73**
	1298.0	67,500	0.77	**4.51**
	1298.5	67,500	0.77	**5.28**
	1299.0	67,500	0.77	**6.06**
Lake #13 (S19-10A)	1289.5	33,650	-	**0.00**
	1290.0	36,250	0.40	**0.40**
	1290.5	38,850	0.43	**0.83**
	1291.0	41,450	0.46	**1.29**
	1291.5	44,100	0.49	**1.78**
	1292.0	44,850	0.51	**2.29**
	1292.5	45,750	0.52	**2.81**
	1293.0	46,600	0.53	**3.34**
	1293.5	47,450	0.54	**3.88**
Lake #14 (S19-11)	1277.0	249,950	-	**0.00**
	1277.5	259,900	2.93	**2.93**
	1278.0	269,900	3.04	**5.97**
	1278.5	279,950	3.16	**9.12**
	1279.0	290,000	3.27	**12.39**
	1279.5	296,350	3.37	**15.76**
	1280.0	301,100	3.43	**19.19**
	1280.5	305,950	3.48	**22.67**
	1281.0	309,150	3.53	**26.20**
Lake #15 (S19-12)	1272.5	65,150	-	**0.00**
	1273.0	67,300	0.76	**0.76**
	1273.5	69,500	0.79	**1.55**
	1274.0	71,650	0.81	**2.36**
	1274.5	73,850	0.84	**3.19**
	1275.0	75,100	0.85	**4.05**
	1275.5	76,400	0.87	**4.91**
	1276.0	77,250	0.88	**5.80**
	1276.5	78,100	0.89	**6.69**

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Detention Elevation/Storage Data

Lake ID (Weir ID)	Water Surface Elevation (ft)	Incremental Surface Area (ft^2)	Incremental Volume (acre-ft)	Cummulative Volume (acre-ft)
Lake #16	1267.5	324,200	-	**0.00**
(S19-13)	1268.0	328,750	3.75	**3.75**
(& C.O.G. 24"	1268.5	331,800	3.79	**7.54**
Emergency	1269.0	334,000	3.82	**11.36**
Relief Pipe)	1269.5	336,150	3.85	**15.21**
	1270.0	338,350	3.87	**19.08**
	1270.5	340,500	3.90	**22.97**
	1271.0	342,700	3.92	**26.89**
	1271.5	344,850	3.95	**30.84**
	1272.0	347,100	3.97	**34.81**
	1272.5	349,300	4.00	**38.81**
Lake #17	1278.0	55,150	-	**0.00**
(Street &	1278.5	58,650	0.65	**0.65**
24" Pipe)	1279.0	62,150	0.69	**1.35**
	1279.5	63,900	0.72	**2.07**
	1280.0	65,650	0.74	**2.81**
	1280.5	66,000	2.21	**5.02**
	1281.0	66,300	0.76	**5.78**
	1281.5	66,400	2.27	**8.05**
	1282.0	66,500	0.76	**8.81**
Lake #18	1277.5	32,950	-	**0.00**
(S19-14)	1278.0	34,950	0.39	**0.39**
	1278.5	36,300	0.41	**0.80**
	1279.0	37,650	0.42	**1.22**
	1279.5	39,000	0.44	**1.66**
	1280.0	40,350	0.46	**2.12**
	1280.5	40,350	0.46	**2.58**
	1281.0	40,350	0.46	**3.04**
	1281.5	40,350	0.46	**3.51**
Lake #19	1276.0	29,000	-	**0.00**
(S19-15)	1276.5	30,900	0.34	**0.34**
	1277.0	32,200	0.36	**0.71**
	1277.5	33,500	0.38	**1.08**
	1278.0	34,800	0.39	**1.47**
	1278.5	36,150	0.41	**1.88**
	1279.0	36,150	0.41	**2.30**
	1279.5	36,150	0.41	**2.71**
	1280.0	36,150	0.41	**3.13**

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Detention Elevation/Storage Data

Lake ID (Weir ID)	Water Surface Elevation (ft)	Incremental Surface Area (ft^2)	Incremental Volume (acre-ft)	Cummulative Volume (acre-ft)
Lake #20 (S19-16)	1273.0	28,400	-	0.00
	1273.5	29,400	0.33	0.33
	1274.0	30,400	0.34	0.67
	1274.5	31,450	0.35	1.03
	1275.0	32,500	0.37	1.40
	1275.5	33,500	0.38	1.78
	1276.0	33,500	0.38	2.16
	1276.5	33,500	0.38	2.54
	1277.0	33,500	0.38	2.93
Lake #21 (Street & 24" Pipe)	1268.0	146,000	-	0.00
	1268.5	152,400	1.71	1.71
	1269.0	158,850	1.79	3.50
	1269.5	162,050	1.84	5.34
	1270.0	165,300	1.88	7.22
	1270.5	165,300	1.90	9.12
	1271.0	165,300	1.90	11.01
	1271.5	165,300	1.90	12.91
	1272.0	165,300	1.90	14.81
L21A27 (Weir & 1-8" Pipe)	1281.0	0	-	0.00
	1282.0	26,169	0.20	0.20
	1284.0	57,320	1.87	2.07
L2A281 (Weir & 2-8" Pipes)	1281.0	0	-	0.00
	1282.0	17,798	0.14	0.14
	1284.0	46,272	1.42	1.56
L2A282 (Weir & 2-8" Pipes)	1279.0	0	-	0.00
	1280.0	25,132	0.19	0.19
	1282.0	36,139	1.40	1.59
L2A283 (Weir & 2-8" Pipes)	1274.0	791	-	0.00
	1276.0	9,080	0.19	0.19
	1277.0	12,255	0.24	0.44
Lake L21AP1 (Weir)	1275.0	202,750	-	0.00
	1276.0	242,934	5.11	5.11
	1277.0	242,934	5.58	10.69
	1278.0	314,695	6.38	17.07
Lake L21AP3 (Weir)	1267.5	91,743	-	0.00
	1268.0	91,743	1.05	1.05
	1269.0	98,003	2.18	3.23
	1270.0	104,263	2.32	5.55
Lake L21AP5 (Weir)	1266.0	73,550	-	0.00
	1268.0	84,678	3.63	3.63
	1269.0	98,003	2.10	5.72
	1270.0	110,714	2.39	8.12

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Detention Elevation/Storage Data

Lake ID (Weir ID)	Water Surface Elevation (ft)	Incremental Surface Area (ft^2)	Incremental Volume (acre-ft)	Cummulative Volume (acre-ft)
Lake L21AP4	1265.0	0	-	**0.00**
(Weir into	1266.0	364,658	2.79	**2.79**
2- 4x8 RCB's)	1267.0	402,909	8.81	**11.60**
	1268.0	441,160	9.69	**21.28**
Lake L21A43	1253.0	0	-	**0.00**
(Weir &	1254.0	21,098	0.16	**0.16**
24" RCP)	1255.0	31,052	0.59	**0.76**
	1256.0	41,005	0.82	**1.42**
	1257.0	47,106	1.01	**1.84**
	1258.0	53,206	1.15	**3.74**
Lake L21A44	1259.7	51,839	-	**0.00**
(No Weir)	1262.0	161,573	5.37	**5.37**
L21A8	1276.0	155,447	-	**0.00**
(Weir)	1278.0	294,584	10.16	**10.16**
Lake L21A11	1267.0	0	-	**0.00**
(Weir &	1268.0	36,774	0.28	**0.28**
36" RCP)	1270.0	118,468	3.39	**3.67**
Lake L21A14	1264.0	1,510	-	**0.00**
(Weir &	1266.0	2,480	0.09	**0.09**
36" RCP)	1268.0	4,876	0.17	**0.26**
	1270.0	39,800	0.90	**1.06**
Lake L21A15	1257.0	0	-	**0.00**
(Weir &	1258.0	31,661	0.24	**0.24**
24" RCP)	1260.0	49,933	1.86	**2.10**
	1262.0	79,993	2.96	**4.81**
Lake L21A17	1256.0	0	-	**0.00**
(Weir &	1258.0	9,973	0.15	**0.15**
12" PVC)	1260.0	35,679	0.99	**1.14**
	1262.0	84,172	2.67	**3.66**
Lake L21A16	1256.0	942	-	**0.00**
(Weir &	1258.0	3,725	0.10	**0.10**
3-24" RCP's)	1260.0	5,454	0.21	**0.31**
Lake L21A20	1256.0	1,941	-	**0.00**
(Weir &	1258.0	10,651	0.26	**0.26**
1-8" PVC)				
Lake L21A21	1259.3	43,835	-	**0.00**
(No Weir)	1260.0	46,066	0.72	**0.72**
	1262.0	45,230	2.10	**2.82**

STAGE VS DISCHARGE RATING TABLES
(WEIR FLOW)

GLENDALE/PEORIA ADMP UPDATE

ARROWHEAD LAKES

Weir Calculations & Rating Table

Retention I.D. #	Weir I.D. #	Crest Length L (ft)	Crest Breadth W (ft)	Crest Elevation E_i (ft)	Headwater Elevation E_o (ft)	Different in Head H (ft)	Discharge Coefficient C [1]	Discharge Q [2] (cfs)
Lake 1	S20-1	150	3.5	1,296.00	1,296.00	0.0	0.000	0
					1,296.50	0.5	2.620	139
					1,297.00	1.0	2.660	399
					1,297.50	1.5	2.655	732
					1,298.00	2.0	2.700	1,146
					1,298.50	2.5	2.765	1,639
					1,299.00	3.0	2.825	2,202
					1,299.50	3.5	2.865	2,814
					1,300.00	4.0	2.930	3,516
Lake 2	S20-2A	80	1.5	1,294.00	1,294.00	0.0	0.000	0
					1,294.50	0.5	2.640	75
					1,295.00	1.0	2.750	220
					1,295.50	1.5	2.995	440
					1,296.00	2.0	3.030	686
					1,296.50	2.5	3.280	1,037
					1,297.00	3.0	3.320	1,380
					1,297.50	3.5	3.320	1,739
					1,298.00	4.0	3.320	2,125
Lake 2	S20-2B	80	1.5	1,294.00	1,294.00	0.0	0.000	0
					1,294.50	0.5	2.640	75
					1,295.00	1.0	2.750	220
					1,295.50	1.5	2.995	440
					1,296.00	2.0	3.030	686
					1,296.50	2.5	3.280	1,037
					1,297.00	3.0	3.320	1,380
					1,297.50	3.5	3.320	1,739
					1,298.00	4.0	3.320	2,125

Notes: 1) Reference from *Handbook of Hydraulics*, Sixth Edition, by Ernest F. Brater and Horace Williams King, Table 5-3, pg. 5-40, 1982.
The values of C are based from Table 5-3 and/or linear interpolated.
2) Discharge calculated from Formula, $Q = CLH^{3/2}$ for Broadcrested Weirs.

GLENDALE/PEORIA ADMP UPDATE

ARROWHEAD LAKES

Weir Calculations & Rating Table

Retention I.D. #	Weir I.D. #	Crest Length L (ft)	Crest Breadth W (ft)	Crest Elevation E_i (ft)	Headwater Elevation E_o (ft)	Different in Head H (ft)	Discharge Coefficient C [1]	Discharge Q [2] (cfs)
Lake 2	S20-3	80	2.0	1,294.00	1,294.00	0.0	0.000	0
					1,294.50	0.5	2.610	74
					1,295.00	1.0	2.660	213
					1,295.50	1.5	2.830	416
					1,296.00	2.0	2.850	645
					1,296.50	2.5	3.070	971
					1,297.00	3.0	3.200	1,330
					1,297.50	3.5	3.320	1,739
					1,298.00	4.0	3.320	2,125
Lake 3	S20-5	50	1.5	1,292.00	1,292.00	0.0	0.000	0
					1,292.50	0.5	2.640	47
					1,293.00	1.0	2.750	138
					1,293.50	1.5	2.995	275
					1,294.00	2.0	3.030	429
					1,294.50	2.5	3.280	648
					1,295.00	3.0	3.320	863
					1,295.50	3.5	3.320	1,087
					1,296.00	4.0	3.320	1,328
Lake 4	S20-6	130	3.5	1,290.00	1,290.00	0.0	0.000	0
					1,290.50	0.5	2.620	120
					1,291.00	1.0	2.660	346
					1,291.50	1.5	2.655	634
					1,292.00	2.0	2.700	993
					1,292.50	2.5	2.765	1,421
					1,293.00	3.0	2.825	1,908
					1,293.50	3.5	2.865	2,439
					1,294.00	4.0	2.930	3,047

Notes: 1) Reference from *Handbook of Hydraulics*, Sixth Edition, by Ernest F. Brater and Horace Williams King, Table 5-3, pg. 5-40, 1982.
The values of C are based from Table 5-3 and/or linear interpolated.
2) Discharge calculated from Formula, $Q = CLH^{3/2}$ for Broadcrested Weirs.

GLENDALE/PEORIA ADMP UPDATE

ARROWHEAD LAKES

Weir Calculations & Rating Table

Retention I.D. #	Weir I.D. #	Crest Length L (ft)	Crest Breadth W (ft)	Crest Elevation E_i (ft)	Headwater Elevation E_o (ft)	Different in Head H (ft)	Discharge Coefficient C [1]	Discharge Q [2] (cfs)
Lake 5	S20-4	50	2.0	1,292.00	1,292.00	0.0	0.000	0
					1,292.50	0.5	2.610	46
					1,293.00	1.0	2.660	133
					1,293.50	1.5	2.830	260
					1,294.00	2.0	2.850	403
					1,294.50	2.5	3.070	607
					1,295.00	3.0	3.200	831
					1,295.50	3.5	3.320	1,087
					1,296.00	4.0	3.320	1,328
Lake 6	S19-1A	20	1.0	1,304.00	1,304.00	0.0	0.000	0
					1,304.50	0.5	2.735	19
					1,305.00	1.0	2.980	60
					1,305.50	1.5	3.240	119
					1,306.00	2.0	3.300	187
					1,306.50	2.5	3.310	262
					1,307.00	3.0	3.320	345
					1,307.50	3.5	3.320	435
					1,308.00	4.0	3.320	531
Lake 7	S19-6A	25	1.0	1,301.50	1,301.50	0.0	0.000	0
					1,302.00	0.5	2.735	24
					1,302.50	1.0	2.980	75
					1,303.00	1.5	3.240	149
					1,303.50	2.0	3.300	233
					1,304.00	2.5	3.310	327
					1,304.50	3.0	3.320	431
					1,305.00	3.5	3.320	543
					1,305.50	4.0	3.320	664

Notes: 1) Reference from *Handbook of Hydraulics*, Sixth Edition, by Ernest F. Brater and Horace Williams King, Table 5-3, pg. 5-40, 1982.
The values of C are based from Table 5-3 and/or linear interpolated.
2) Discharge calculated from Formula, $\mathbf{Q = CLH^{3/2}}$ for Broadcrested Weirs.

GLENDALE/PEORIA ADMP UPDATE

ARROWHEAD LAKES

Weir Calculations & Rating Table

Retention I.D. #	Weir I.D. #	Crest Length L (ft)	Crest Breadth W (ft)	Crest Elevation E_i (ft)	Headwater Elevation E_o (ft)	Different in Head H (ft)	Discharge Coefficient C [1]	Discharge Q [2] (cfs)
Lake 7	S19-6B	25	1.0	1,301.50	1,301.50	0.0	0.000	0
					1,302.00	0.5	2.735	24
					1,302.50	1.0	2.980	75
					1,303.00	1.5	3.240	149
					1,303.50	2.0	3.300	233
					1,304.00	2.5	3.310	327
					1,304.50	3.0	3.320	431
					1,305.00	3.5	3.320	543
					1,305.50	4.0	3.320	664
Lake 7	S19-7	20	1.0	1,301.50	1,301.50	0.0	0.000	0
					1,302.00	0.5	2.735	19
					1,302.50	1.0	2.980	60
					1,303.00	1.5	3.240	119
					1,303.50	2.0	3.300	187
					1,304.00	2.5	3.310	262
					1,304.50	3.0	3.320	345
					1,305.00	3.5	3.320	435
					1,305.50	4.0	3.320	531
Lake 8	S19-2	20	3.0	1,289.50	1,289.50	0.0	0.000	0
					1,290.00	0.5	2.630	19
					1,290.50	1.0	2.650	53
					1,291.00	1.5	2.660	98
					1,291.50	2.0	2.720	154
					1,292.00	2.5	2.810	222
					1,292.50	3.0	2.920	303
					1,293.00	3.5	2.970	389
					1,293.50	4.0	3.070	491
Lake 9	See Culvert/Storm drain section							
Lake 10	See Culvert/Storm drain section							

GLENDALE/PEORIA ADMP UPDATE

ARROWHEAD LAKES

Weir Calculations & Rating Table

Retention I.D. #	Weir I.D. #	Crest Length L (ft)	Crest Breadth W (ft)	Crest Elevation E_i (ft)	Headwater Elevation E_o (ft)	Different in Head H (ft)	Discharge Coefficient C [1]	Discharge Q [2] (cfs)
Lake 11	S19-8	20	1.0	1,297.00	1,297.00	0.0	0.000	0
					1,297.50	0.5	2.735	19
					1,298.00	1.0	2.980	60
					1,298.50	1.5	3.240	119
					1,299.00	2.0	3.300	187
					1,299.50	2.5	3.310	262
					1,300.00	3.0	3.320	345
					1,300.50	3.5	3.320	435
					1,301.00	4.0	3.320	531
Lake 12	S19-9	20	1.0	1,295.00	1,295.00	0.0	0.000	0
					1,295.50	0.5	2.735	19
					1,296.00	1.0	2.980	60
					1,296.50	1.5	3.240	119
					1,297.00	2.0	3.300	187
					1,297.50	2.5	3.310	262
					1,298.00	3.0	3.320	345
					1,298.50	3.5	3.320	435
					1,299.00	4.0	3.320	531
Lake 13	S19-10A	25	1.0	1,289.50	1,289.50	0.0	0.000	0
					1,290.00	0.5	2.735	24
					1,290.50	1.0	2.980	75
					1,291.00	1.5	3.240	149
					1,291.50	2.0	3.300	233
					1,292.00	2.5	3.310	327
					1,292.50	3.0	3.320	431
					1,293.00	3.5	3.320	543
					1,293.50	4.0	3.320	664

Notes: 1) Reference from *Handbook of Hydraulics*, Sixth Edition, by Ernest F. Brater and Horace Williams King, Table 5-3, pg. 5-40, 1982.
The values of C are based from Table 5-3 and/or linear interpolated.
2) Discharge calculated from Formula, $Q = CLH^{3/2}$ for Broadcrested Weirs.

GLENDALE/PEORIA ADMP UPDATE

ARROWHEAD LAKES

Weir Calculations & Rating Table

Retention I.D. #	Weir I.D. #	Crest Length L (ft)	Crest Breadth W (ft)	Crest Elevation E_i (ft)	Headwater Elevation E_o (ft)	Different in Head H (ft)	Discharge Coefficient C [1]	Discharge Q [2] (cfs)
Lake 14	S19-11	25	1.0	1,277.00	1,277.00	0.0	0.000	0
					1,277.50	0.5	2.735	24
					1,278.00	1.0	2.980	75
					1,278.50	1.5	3.240	149
					1,279.00	2.0	3.300	233
					1,279.50	2.5	3.310	327
					1,280.00	3.0	3.320	431
					1,280.50	3.5	3.320	543
					1,281.00	4.0	3.320	664
Lake 15	S19-12	45	1.0	1,272.50	1,272.50	0.0	0.000	0
					1,273.00	0.5	2.735	44
					1,273.50	1.0	2.980	134
					1,274.00	1.5	3.240	268
					1,274.50	2.0	3.300	420
					1,275.00	2.5	3.310	589
					1,275.50	3.0	3.320	776
					1,276.00	3.5	3.320	978
					1,276.50	4.0	3.320	1,195
Lake 16	S19-13	35	1.0	1,267.50	1,267.50	0.0	0.000	0
					1,268.00	0.5	2.735	34
					1,268.50	1.0	2.980	104
					1,269.00	1.5	3.240	208
					1,269.50	2.0	3.300	327
					1,270.00	2.5	3.310	458
					1,270.50	3.0	3.320	604
					1,271.00	3.5	3.320	761
					1,271.50	4.0	3.320	930
Lake 17	See Culvert/Storm drain section							

Notes: 1) Reference from *Handbook of Hydraulics*, Sixth Edition, by Ernest F. Brater and Horace Williams King, Table 5-3, pg. 5-40, 1982.
The values of C are based from Table 5-3 and/or linear interpolated.
2) Discharge calculated from Formula, $Q = CLH^{3/2}$ for Broadcrested Weirs.

GLENDALE/PEORIA ADMP UPDATE

ARROWHEAD LAKES

Weir Calculations & Rating Table

Retention I.D. #	Weir I.D. #	Crest Length L (ft)	Crest Breadth W (ft)	Crest Elevation E_i (ft)	Headwater Elevation E_o (ft)	Different in Head H (ft)	Discharge Coefficient C [1]	Discharge Q [2] (cfs)
18	S19-14	30	1.0	1,277.50	1,277.50	0.0	0.000	0
					1,278.00	0.5	2.735	29
					1,278.50	1.0	2.980	89
					1,279.00	1.5	3.240	179
					1,279.50	2.0	3.300	280
					1,280.00	2.5	3.310	393
					1,280.50	3.0	3.320	518
					1,281.00	3.5	3.320	652
					1,281.50	4.0	3.320	797
19	S19-15	25	1.0	1,276.00	1,276.00	0.0	0.000	0
					1,276.50	0.5	2.735	24
					1,277.00	1.0	2.980	75
					1,277.50	1.5	3.240	149
					1,278.00	2.0	3.300	233
					1,278.50	2.5	3.310	327
					1,279.00	3.0	3.320	431
					1,279.50	3.5	3.320	543
					1,280.00	4.0	3.320	664
20	S19-16	30	1.0	1,273.00	1,273.00	0.0	0.000	0
					1,273.50	0.5	2.735	29
					1,274.00	1.0	2.980	89
					1,274.50	1.5	3.240	179
					1,275.00	2.0	3.300	280
					1,275.50	2.5	3.310	393
					1,276.00	3.0	3.320	518
					1,276.50	3.5	3.320	652
					1,277.00	4.0	3.320	797

Notes: 1) Reference from *Handbook of Hydraulics*, Sixth Edition, by Ernest F. Brater and Horace Williams King, Table 5-3, pg. 5-40, 1982.
The values of C are based from Table 5-3 and/or linear interpolated.

2) Discharge calculated from Formula, $Q = CLH^{3/2}$ for Broadcrested Weirs.

WEIR COEFFICIENT CALCULATIONS

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Detention Storage Discharge Elevation Calculations

Detention I.D. #	Weir I.D. #	Crest Length L (ft)	Crest Breadth W (ft)	Crest Elevation E_i (ft)	Stage Discharge Elevation E [1] (ft)	Headwater H [2] (ft)	Discharge Coefficient C [3]	Discharge from HEC-1 Q (cfs)
Lake 1	S20-1	150	3.5	1296.0	**1297.8**	1.8	2.685	1010 397RR
Lake 2	S20-2A	80	1.5	1294.0	**1295.3**	1.3	2.868	325 D398BE
	S20-2B	80	1.5	1294.0	**1295.3**	1.3	2.828	325 398BSW
	S20-3	80	2.0	1294.0	**1295.3**	1.3	2.773	325 398BW
Lake 3	S20-5	50	1.5	1292.0	**1293.5**	1.5	2.982	267 398FRR
Lake 4	S20-6	130	3.5	1290.0	**1291.6**	1.6	2.667	730 398GRR
Lake 5	S20-4	50	2.0	1292.0	**1293.5**	1.5	2.830	259 398CRR
Lake 6	S19-1A	20	1.0	1304.0	**1304.8**	0.8	2.879	43 A21CRR
Lake 7	S19-6A	25	1.0	1301.5	**1302.3**	0.8	2.849	47.5 DA21E
	S19-6B	25	1.0	1301.5	**1302.3**	0.8	2.849	47.5 DA21E
	S19-7	20	1.0	1301.5	**1302.3**	0.8	2.867	41 DA21EW
Lake 11	S19-8	20	1.0	1297.0	**1299.1**	2.1	3.302	201 A21GRR
Lake 12	S19-9	20	1.0	1295.0	**1296.9**	1.9	3.283	168 A21HRR
Lake 13	S19-10A	25	1.0	1289.5	**1292.3**	2.8	3.317	395 A21JRR
Lake 14	S19-11	25	1.0	1277.0	**1280.6**	3.6	3.320	557 A21NRR

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Detention Storage Discharge Elevation Calculations

Detention I.D. #	Weir I.D. #	Crest Length L (ft)	Crest Breadth W (ft)	Crest Elevation E_i (ft)	Stage Discharge Elevation E (1) (ft)	Headwater H (2) (ft)	Discharge Coefficient C (3)	Discharge from HEC-1 Q (cfs)
Lake 15	S19-12	45	1.0	1272.5	**1274.9**	2.4	3.308	556 A21ORR
Lake 16	S19-13	35	1.0	1267.5	**1270.0**	2.5	3.310	446 A21URR
Lake 18	S19-14	30	1.0	1277.5	**1278.3**	0.8	2.869	62 A21QRR
Lake 19	S19-15	25	1.0	1276.0	**1276.9**	0.9	2.948	68 A21RRR
Lake 20	S19-16	30	1.0	1273.0	**1273.9**	0.9	2.942	80 A21SRR
L21A27	L21A27	30	10.0	1284.0	**1284.3**	0.3	2.543	15 L21A27
L2A281	L2A281	30	30.0	1284.0	**1284.4**	0.4	2.700	23 L2A281
L2A282	L2A282	50	20.0	1281.0	**1281.2**	0.2	2.685	16 L2A282
L2A283	L2A283	40	30.0	1277.0	**1277.3**	0.3	2.690	18 L2A283
L21AP1	L21AP1	25	10.0	1275.0	**1275.6**	0.6	2.695	35 L21AP1
L21AP3	L21AP3	120	1.0	1267.5	**1268.6**	1.1	3.040	436 L21AP3
L21AP5	L21AP5	40	40.0	1268.5	**1268.5**	0.0	2.680	1 L21AP5
L21AP4	L21AP4	87	1.0	1265.7	**1267.1**	1.4	3.110	463 L21AP4
L21A43	L21A43	65	15.0	1257.0	**1259.0**	2.0	2.630	500 L21A43
L21A38	L21A38	40	50.0	1265.0	**1265.2**	0.2	2.680	12 L21A38

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
Detention Storage Discharge Elevation Calculations

Detention I.D. #	Weir I.D. #	Crest Length L (ft)	Crest Breadth W (ft)	Crest Elevation E_i (ft)	Stage Discharge Elevation E (1) (ft)	Headwater H (2) (ft)	Discharge Coefficient C (3)	Discharge from HEC-1 Q (cfs)
L21A8	L21A8	60	15.0	1278.0	**1278.1**	0.1	2.680	3 L21A8
L21A11	L21A11	100	25.0	1270.0	**1270.2**	0.2	2.680	26 L21A11
L21A14	L21A14	50	25.0	1270.0	**1270.3**	0.3	2.680	26 L21A14
L21A15	L21A15	55	40.0	1261.3	**1261.7**	0.4	2.700	38 L21A15
L21A17	L21A17	30	20.0	1261.0	**1261.1**	0.1	2.680	4 L21A17
L21A16	L21A16	100	100.0	1260.0	**1260.1**	0.1	2.680	14 L21A16
L21A20	L21A20	45	20.0	1258.0	**1258.6**	0.6	2.700	52 L21A20
L21A21	L21A21	45	140.0	1261.4	**1261.7**	0.3	2.690	18 L21A21

Notes:
1) Stage Discharge Elevation (E) = Crest Elevation (E_i) + Headwater (H) in ft.
2) Headwater calculated from Formula, $H = (Q/CL)^{2/3}$ for Broadcrested Weirs.
3) Reference from *Handbook of Hydraulics*, Sixth Edition, by Ernest F. Brater and Horace Williams King, Table 5-3, pg. 5-40, 1982.
The values of C are based from Table 5-3 and/or linear interpolated.

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Table 5-3. Values of C in the Formula $Q = CLH^{3/2}$ for Broad-crested Weirs

Measured head in feet, H	Breadth of crest of weir in feet										
	0.50	0.75	1.00	1.50	2.00	2.50	3.00	4.00	5.00	10.00	15.00
0.2	2.80	2.75	2.69	2.62	2.54	2.48	2.44	2.38	2.34	2.49	2.68
0.4	2.92	2.80	2.72	2.64	2.61	2.60	2.58	2.54	2.50	2.56	2.70
0.6	3.08	2.89	2.75	2.64	2.61	2.60	2.68	2.69	2.70	2.70	2.70
0.8	3.30	3.04	2.85	2.68	2.60	2.60	2.67	2.68	2.68	2.69	2.64
1.0	3.32	3.14	2.98	2.75	2.66	2.64	2.65	2.67	2.68	2.68	2.63
1.2	3.32	3.20	3.08	2.86	2.70	2.65	2.64	2.67	2.66	2.69	2.64
1.4	3.32	3.26	3.20	2.92	2.77	2.68	2.64	2.65	2.65	2.67	2.64
1.6	3.32	3.29	3.28	3.07	2.89	2.75	2.68	2.66	2.65	2.64	2.63
1.8	3.32	3.32	3.31	3.07	2.88	2.74	2.68	2.66	2.65	2.64	2.63
2.0	3.32	3.31	3.30	3.03	2.85	2.76	2.72	2.68	2.65	2.64	2.63
2.5	3.32	3.32	3.31	3.28	3.07	2.89	2.81	2.72	2.67	2.64	2.63
3.0	3.32	3.32	3.32	3.32	3.20	3.05	2.92	2.73	2.66	2.64	2.63
3.5	3.32	3.32	3.32	3.32	3.32	3.19	2.97	2.76	2.68	2.64	2.63
4.0	3.32	3.32	3.32	3.32	3.32	3.32	3.07	2.79	2.70	2.64	2.63
4.5	3.32	3.32	3.32	3.32	3.32	3.32	3.32	2.88	2.74	2.64	2.63
5.0	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.07	2.79	2.64	2.63
5.5	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.32	2.88	2.64	2.63

Table 5-4. Values of C in the Formula $Q = CLH^{3/2}$ for Models of Broad-crested Weirs with Rounded Upstream Corner

Name of experimenter	Radius of curve in feet	Breadth of weir in feet, B	Height of weir in feet, P	Head in feet, H									
				0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Bazin	0.33	2.62	2.46	2.93	2.97	2.98	3.01	3.04					
Bazin	0.33	6.56	2.46	2.70	2.82	2.87	2.89	2.92					
U. S. Deep Waterways	0.33	2.62	4.57	....	2.77	2.80	2.83	2.92	3.00	3.08	3.17	3.34	3.50
U. S. Deep Waterways	0.33	6.56	4.56	....	....	2.83	2.83	2.83	2.82	2.82	2.82	2.82	2.81

Table 5-5. Values of C in the Formula $Q = CLH^{3/2}$ for Broad-crested Weirs with Crests Inclined Slightly Downward

(a)

Crest	Energy head = H_e								
	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.5
Level	2.78	2.79	2.80	2.81	2.82	2.83	2.85	2.85	2.85
Slope = 0.004	2.95	2.94	2.93	2.92	2.91	2.90	2.88	2.87	2.87
Slope = 0.026	3.07	3.06	3.05	3.04	3.03	3.02	3.00	2.99	

(b)

Slope of crest	Length of weir in feet	Head in feet, H						
		0.1	0.2	0.3	0.4	0.5	0.6	0.7
12 to 1	3.0	2.58	2.87	2.57	2.60	2.84	2.81	2.70
18 to 1	3.0	2.91	2.92	2.53	2.60	2.80	2.74	2.62
18 to 1	10.0	2.52	2.68	2.73	2.80	2.90	2.80	2.68

Table 5-6. Values of C in the Formula $Q = CLH^{3/2}$ for Weirs of Triangular Cross Section with Vertical Upstream Face and Sloping Downstream Face

Slope of downstream face	Height of weir in feet, P	Head in feet, H										
		0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.5
Hor. Vert.												
1 to 1	2.46	3.88	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85
2 to 1	2.46	3.48	3.48	3.49	3.49	3.50	3.50	3.50	3.50	3.50	3.51	3.51
2 to 1	1.64	3.56	3.47	3.47	3.51	3.54	3.57	3.58	3.58	3.58	3.59	3.57
3 to 1	1.64	....	2.90	3.11	3.22	3.26	3.33	3.37	3.40	3.40	3.41	3.41
5 to 1	2.46	....	3.08	3.06	3.05	3.05	3.07	3.09	3.12	3.13	3.13	3.13
10 to 1	2.46	....	2.82	2.83	2.84	2.86	2.89	2.90	2.91	2.91	2.92	2.93

Values of n to Be Used with the Manning Equation

Surface	Best	Good	Fair	Bad
Uncoated cast-iron pipe	0.012	0.013	0.014	0.015
Coated cast-iron pipe	0.011	0.012*	0.013*	
Commercial wrought-iron pipe, black	0.012	0.013	0.014	0.015
Commercial wrought-iron pipe, galvanized	0.013	0.014	0.015	0.017
Smooth brass and glass pipe	0.009	0.010	0.011	0.013
Smooth lockbar and welded "OD" pipe	0.010	0.011*	0.013*	
Riveted and spiral steel pipe	0.013	0.015*	0.017*	
Vitrified sewer pipe	0.010 0.011	0.013*	0.015	0.017
Common clay drainage tile	0.011	0.012*	0.014*	0.017
Glazed brickwork	0.011	0.012	0.013*	0.015
Brick in cement mortar; brick sewers	0.012	0.013	0.015*	0.017
Neat cement surfaces	0.010	0.011	0.012	0.013
Cement mortar surfaces	0.011	0.012	0.013*	0.015
Concrete pipe	0.012	0.013	0.015*	0.016
Wood stave pipe	0.010	0.011	0.012	0.013
Plank Flumes:				
Planed	0.010	0.012*	0.013	0.014
Unplaned	0.011	0.013*	0.014	0.015
With battens	0.012	0.015*	0.016	
Concrete-lined channels	0.012	0.014*	0.016*	0.018
Cement-rubble surface	0.017	0.020	0.025	0.030
Dry-rubble surface	0.025	0.030	0.033	0.035
Dressed-ashlar surface	0.013	0.014	0.015	0.017
Semicircular metal flumes, smooth	0.011	0.012	0.013	0.015
Semicircular metal flumes, corrugated	0.0225	0.025	0.0275	0.030
Canals and Ditches:				
Earth, straight and uniform	0.017	0.020	0.0225*	0.025
Rock cuts, smooth and uniform	0.025	0.030	0.033*	0.035
Rock cuts, jagged and irregular	0.035	0.040	0.045	
Winding sluggish canals	0.0225	0.025*	0.0275	0.030
Dredged earth channels	0.025	0.0275*	0.030	0.033
Canals with rough stony beds, weeds on earth banks	0.025	0.030	0.035*	0.040
Earth bottom, rubble sides	0.028	0.030*	0.033*	0.035
Natural Stream Channels:				
(1) Clean, straight bank, full stage, no rifts or deep pools	0.025	0.0275	0.030	0.033
(2) Same as (1), but some weeds and stones	0.030	0.033	0.035	0.040
(3) Winding, some pools and shoals, clean	0.033	0.035	0.040	0.045
(4) Same as (3), lower stages, more ineffective slope and sections	0.040	0.045	0.050	0.055
(5) Same as (3), some weeds and stones	0.035	0.040	0.045	0.050
(6) Same as (4), stony sections	0.045	0.050	0.055	0.060
(7) Sluggish river reaches, rather weedy or with very deep pools	0.050	0.060	0.070	0.080
(8) Very weedy reaches	0.075	0.100	0.125	0.150

* Values commonly used in designing.

STAGE VS DISCHARGE RATING TABLES

(CULVERT/STORM DRAIN)

Arrowhead Lakes Update: Channel Between Lake #8 & Lake #9
Rating Table for Irregular Channel

Project Description	
Worksheet	Channel between Lake #8 and Lake
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Slope	0.012500 ft/ft

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Method	mproved Lotter's Method
Closed Channel Weighting Metho	Horton's Method

Attribute	Minimum	Maximum	Increment
Water Surface Elevation (ft	1,289.50	1,293.50	0.50

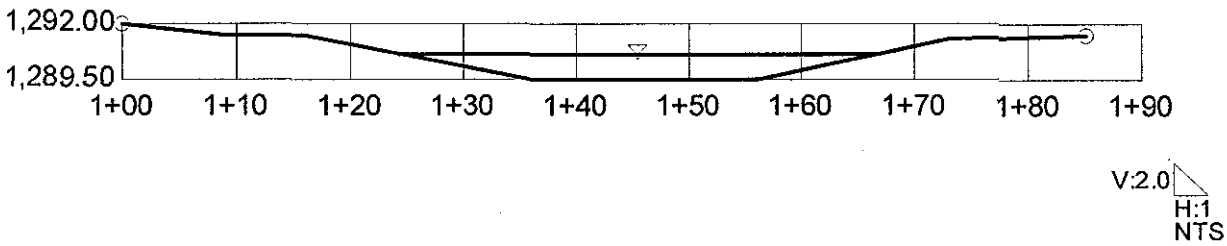
Water Surface Elevation (ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
1,289.50	N/A	N/A	N/A	N/A	N/A
1,290.00	41.14	3.32	12.4	29.65	29.59
1,290.50	145.36	4.91	29.6	39.29	39.19
1,291.00	317.03	6.15	51.6	48.94	48.78
1,291.50	513.88	6.49	79.2	69.20	69.00
1,292.00	883.92	7.40	119.4	85.71	85.00
1,292.50	1,456.87	9.00	161.9	86.71	85.00
1,293.00	2,132.06	10.43	204.4	87.71	85.00
1,293.50	2,898.92	11.74	246.9	88.71	85.00

Appendix D.4

Channel Between Lake #8 and Lake #9
Cross Section for Irregular Channel

Project Description	
Worksheet	Channel between Lake #8 and Lake
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.028	
Slope	0.012500	ft/ft
Water Surface Elevation	1,290.67	ft
Elevation Range	1,289.50 to 1,292.00	
Discharge	197.00	cfs



Appendix D.4

Channel Between Lake #8 and Lake #9
Worksheet for Irregular Channel

Project Description	
Worksheet	Channel between Lake #8 and Lake
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Slope	0.012500	ft/ft
Water Surface Elevation	1,290.67	ft

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Method	mproved Lotter's Method
Closed Channel Weighting Metho	Horton's Method

Results		
Mannings Coefficient	0.028	
Elevation Range	1,289.50 to 1,292.00	
Discharge	197.00	cfs
Flow Area	36.7	ft²
Wetted Perimeter	42.65	ft
Top Width	42.53	ft
Actual Depth	1.17	ft
Critical Elevation	1,290.69	ft
Critical Slope	0.012011	ft/ft
Velocity	5.37	ft/s
Velocity Head	0.45	ft
Specific Energy	1,291.12	ft
Froude Number	1.02	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
1+00	1+85	0.028

Natural Channel Points

Station (ft)	Elevation (ft)
1+00	1,292.00
1+09	1,291.50
1+16	1,291.50
1+36	1,289.50
1+56	1,289.50
1+73	1,291.35
1+85	1,291.50

Appendix D.4

AL – Arrowhead Lakes
Culvert Analysis - Lake #9

CURRENT DATE: 02-16-2001 FILE DATE: 02-16-2001
CURRENT TIME: 15:35:57 FILE NAME: LAKE9

****
********** FHWA CULVERT ANALYSIS **********
********** HY-8, VERSION 6.0 **********
****

C U L V NO.	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	1284.50	1284.00	90.00	2 RCB	5.00	3.00	.013	CONVENTIONAL
2								
3								
4								
5								
6								

Assume: culverts equivalent to 1-6'x3' and 1-4'x3' CBC.

****
SUMMARY OF CULVERT FLOWS (cfs) FILE: LAKE9 DATE: 02-16-2001

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1284.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1286.07	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1286.96	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1287.76	150.0	150.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1288.61	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1288.74	207.0	207.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1290.56	300.0	288.8	0.0	0.0	0.0	0.0	0.0	10.58	4
1291.04	350.0	306.6	0.0	0.0	0.0	0.0	0.0	42.83	3
1291.44	400.0	320.7	0.0	0.0	0.0	0.0	0.0	78.99	3
1291.80	450.0	332.7	0.0	0.0	0.0	0.0	0.0	117.06	3
1292.13	500.0	343.4	0.0	0.0	0.0	0.0	0.0	156.41	3
1290.25	276.3	276.3	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

****
SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: LAKE9 DATE: 02-16-2001

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1284.50	0.000	0.00	0.00	0.00
1286.07	0.000	50.00	0.00	0.00
1286.96	0.000	100.00	0.00	0.00
1287.76	0.000	150.00	0.00	0.00
1288.61	0.000	200.00	0.00	0.00
1288.74	0.000	207.00	0.00	0.00
1290.56	-0.006	300.00	0.60	0.20
1291.04	-0.004	350.00	0.55	0.16
1291.44	-0.002	400.00	0.35	0.09
1291.80	-0.002	450.00	0.25	0.06
1292.13	-0.001	500.00	0.19	0.04

****
<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000
****

AL – Arrowhead Lakes
Culvert Analysis - Lake #9

CURRENT DATE: 02-16-2001 FILE DATE: 02-16-2001
CURRENT TIME: 15:35:57 FILE NAME: LAKE9

PERFORMANCE CURVE FOR CULVERT 1 - 2(5.00 (ft) BY 3.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1284.50	0.00	-0.50	0-NF	0.00	0.00	0.00	%-1200.00	0.00	0.00
50.00	1286.07	1.57	1.55	1-S2n	0.80	0.92	0.72	%-1198.70	6.93	3.76
100.00	1286.96	2.46	2.07	1-S2n	1.29	1.46	1.29	%-1198.19	7.74	4.51
150.00	1287.76	3.26	2.73	1-S2n	1.72	1.92	1.72	%-1197.82	8.74	5.01
200.00	1288.61	4.11	3.53	5-S2n	2.13	2.32	2.02	%-1197.52	9.90	5.40
207.00	1288.74	4.24	3.65	5-S2n	2.18	2.37	2.07	%-1197.48	9.98	5.44
288.82	1290.56	6.06	5.35	2-M2c	3.00	2.97	2.97	%-1197.03	9.74	5.98
306.62	1291.04	6.54	5.71	6-FFc	3.00	3.00	2.97	%-1196.82	10.34	6.22
320.66	1291.44	6.94	6.01	6-FFc	3.00	3.00	2.97	%-1196.64	10.81	6.44
332.69	1291.80	7.30	6.28	6-FFc	3.00	3.00	2.97	%-1196.46	11.22	6.64
343.40	1292.13	7.63	6.53	6-FFc	3.00	3.00	2.97	%-1196.30	11.58	6.82

El. inlet face invert 1284.50 ft El. outlet invert 1284.00 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

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

INLET STATION	90.00 ft
INLET ELEVATION	1284.50 ft
OUTLET STATION	0.00 ft
OUTLET ELEVATION	1284.00 ft
NUMBER OF BARRELS	2
SLOPE (V/H)	0.0056
CULVERT LENGTH ALONG SLOPE	90.00 ft

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

BARREL SHAPE	BOX
BARREL SPAN	5.00 ft
BARREL RISE	3.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	NONE

Discharge Elev. (ft)	Culvert Discharge (cfs)
1284.50	0
1285.00	16
1285.50	32
1286.00	48
1286.50	74
1287.00	103
1287.50	134
1288.00	164
1288.50	194
1289.00	219
1289.50	241
1290.00	264
1290.50	286

CURRENT DATE: 02-16-2001 FILE DATE: 02-16-2001
CURRENT TIME: 15:35:57 FILE NAME: LAKE9

```
*******************************************************************************
**************************          TAILWATER          **************************
*******************************************************************************
```

******* REGULAR CHANNEL CROSS SECTION ****************

BOTTOM WIDTH	5.00 ft
SIDE SLOPE H/V (X:1)	4.0
CHANNEL SLOPE V/H (ft/ft)	0.005
MANNING'S n (.01-0.1)	0.025
CHANNEL INVERT ELEVATION	84.00 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1284.00 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	84.00	0.000	0.00	0.00	0.00
50.00	85.30	0.580	1.30	3.76	0.41
100.00	85.81	0.591	1.81	4.51	0.56
150.00	86.18	0.598	2.18	5.01	0.68
200.00	86.48	0.604	2.48	5.40	0.77
207.00	86.52	0.604	2.52	5.44	0.79
300.00	86.97	0.612	2.97	5.98	0.93
350.00	87.18	0.615	3.18	6.22	0.99
400.00	87.36	0.619	3.36	6.44	1.05
450.00	87.54	0.622	3.54	6.64	1.10
500.00	87.70	0.624	3.70	6.82	1.15

```
*******************************************************************************
**************************  ROADWAY OVERTOPPING DATA  **************************
*******************************************************************************
```

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	50.00 ft
CREST LENGTH	20.00 ft
OVERTOPPING CREST ELEVATION	1290.25 ft

****
****

Arrowhead Lakes Update: Street Weir for Lake #10
Rating Table for Broad Crested Weir

Project Description	
Worksheet	Street Weir for Lake #10
Type	Broad Crested Weir
Solve For	Discharge

Input Data		
Crest Elevation	1,287.00	ft
Tailwater Elevation	1,287.00	ft
Crest Surface Type	Paved	
Crest Breadth	5.00	ft
Crest Length	50.00	ft

Attribute	Minimum	Maximum	Increment
Headwater Elevation (ft)	1,287.00	1,288.50	0.50

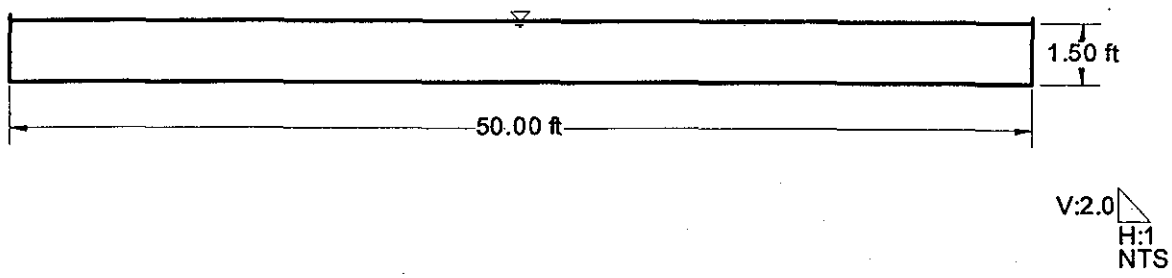
Headwater Elevation (ft)	Discharge (cfs)	Velocity (ft/s)
1,287.00	N/A	N/A
1,287.50	53.17	2.13
1,288.00	153.25	3.07
1,288.50	283.71	3.78

Appendix D.4

Arrowhead Lakes Update: Street Weir for Lake #10
Cross Section for Broad Crested Weir

Project Description	
Worksheet	Street Weir for Lake #10
Type	Broad Crested Weir
Solve For	Discharge

Section Data		
Discharge	283.71	cfs
Headwater Elevation	1,288.50	ft
Crest Elevation	1,287.00	ft
Tailwater Elevation	1,287.00	ft
Crest Surface Type	*Paved*	
Crest Breadth	5.00	ft
Crest Length	50.00	ft



Appendix D.4

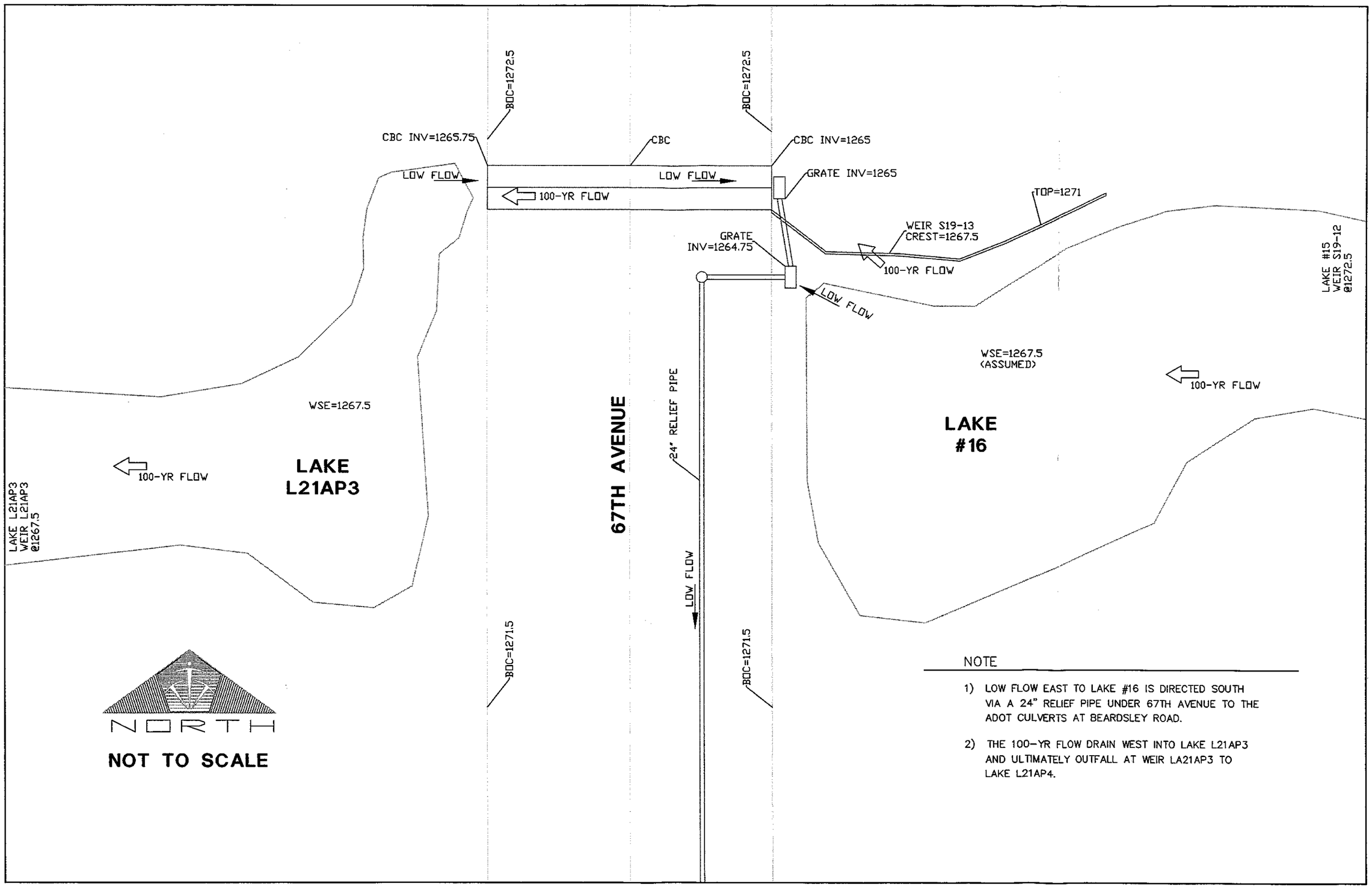
Arrowhead Lakes Update: Street Weir for Lake #10
Worksheet for Broad Crested Weir

Project Description	
Worksheet	Street Weir for Lake #10
Type	Broad Crested Weir
Solve For	Discharge

Input Data		
Headwater Elevation	1,288.50	ft
Crest Elevation	1,287.00	ft
Tailwater Elevation	1,287.00	ft
Crest Surface Type	Paved	
Crest Breadth	5.00	ft
Crest Length	50.00	ft

Results		
Discharge	283.71	cfs
Headwater Height Above Crest	1.50	ft
Tailwater Height Above Crest	0.00	ft
Discharge Coefficient	3.09	US
Submergence Factor	1.00	
Adjusted Discharge Coefficient	3.09	US
Flow Area	75.0	ft²
Velocity	3.78	ft/s
Wetted Perimeter	53.00	ft
Top Width	50.00	ft

Appendix D.4



NOTE

1) LOW FLOW EAST TO LAKE #16 IS DIRECTED SOUTH VIA A 24" RELIEF PIPE UNDER 67TH AVENUE TO THE ADOT CULVERTS AT BEARDSLEY ROAD.

2) THE 100-YR FLOW DRAIN WEST INTO LAKE L21AP3 AND ULTIMATELY OUTFALL AT WEIR LA21AP3 TO LAKE L21AP4.

AL – Arrowhead Lakes
Culvert Analysis – Lake #16

CURRENT DATE: 02-23-2001 FILE DATE: 02-23-2001
CURRENT TIME: 10:51:53 FILE NAME: LAKE16

****
********** FHWA CULVERT ANALYSIS **********
********** HY-8, VERSION 6.0 **********
****

C U L V NO.	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	1266.01	1265.75	130.00	2 RCB	8.00	4.00	.013	CONVENTIONAL
2								
3								
4								
5								
6								

****

SUMMARY OF CULVERT FLOWS (cfs) FILE: LAKE16 DATE: 02-23-2001

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1267.85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1268.41	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1268.81	120.0	120.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1269.20	180.0	180.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1269.66	240.0	240.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1270.01	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1270.43	360.0	360.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1270.84	420.0	420.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1271.37	480.0	480.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1271.99	540.0	540.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1272.66	600.0	600.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1273.00	627.8	627.8	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

****

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: LAKE16 DATE: 02-23-2001

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1267.85	0.000	0.00	0.00	0.00
1268.41	0.000	60.00	0.00	0.00
1268.81	0.000	120.00	0.00	0.00
1269.20	0.000	180.00	0.00	0.00
1269.66	0.000	240.00	0.00	0.00
1270.01	0.000	300.00	0.00	0.00
1270.43	0.000	360.00	0.00	0.00
1270.84	0.000	420.00	0.00	0.00
1271.37	0.000	480.00	0.00	0.00
1271.99	0.000	540.00	0.00	0.00
1272.66	0.000	600.00	0.00	0.00

****

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

****

AL – Arrowhead Lakes
Culvert Analysis – Lake #16

CURRENT DATE: 02-23-2001 FILE DATE: 02-23-2001
CURRENT TIME: 10:51:53 FILE NAME: LAKE16

PERFORMANCE CURVE FOR CULVERT 1 - 2(8.00 (ft) BY 4.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1267.85	0.00	1.84	0-NF	0.00	0.00	0.00	2.10	0.00	0.00
60.00	1268.41	1.30	2.40	3-M1t	0.89	0.76	2.58	2.58	1.45	2.00
120.00	1268.81	2.06	2.80	3-M1t	1.41	1.21	2.83	2.83	2.65	2.61
180.00	1269.20	2.68	3.19	3-M1t	1.87	1.58	3.03	3.03	3.71	3.04
240.00	1269.66	3.23	3.65	3-M1t	2.28	1.92	3.20	3.20	4.68	3.38
300.00	1270.01	3.75	4.00	3-M1t	2.67	2.22	3.36	3.36	5.59	3.67
360.00	1270.43	4.27	4.42	3-M1t	3.05	2.51	3.50	3.50	6.43	3.92
420.00	1270.84	4.80	4.83	3-M1t	3.41	2.78	3.63	3.63	7.23	4.15
480.00	1271.37	5.36	5.24	3-M2t	4.00	3.04	3.76	3.76	7.99	4.35
540.00	1271.99	5.98	5.65	3-M2t	4.00	3.29	3.87	3.87	8.71	4.54
600.00	1272.66	6.65	6.38	3-M2t	4.00	3.53	3.99	3.99	9.41	4.71

El. inlet face invert 1266.01 ft El. outlet invert 1265.75 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

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

INLET STATION	130.00 ft
INLET ELEVATION	1266.01 ft
OUTLET STATION	0.00 ft
OUTLET ELEVATION	1265.75 ft
NUMBER OF BARRELS	2
SLOPE (V/H)	0.0020
CULVERT LENGTH ALONG SLOPE	130.00 ft

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

BARREL SHAPE	BOX
BARREL SPAN	8.00 ft
BARREL RISE	4.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	NONE

Discharge Elev. (ft)	Storm Drain Discharge (cfs)	Culvert Discharge (cfs)	Total Discharge (cfs)
1267.50	9	0	9
1268.00	9	16	25
1268.50	10	74	84
1269.00	10	149	159
1269.50	10	219	229
1270.00	10	300	310
1270.50	10	370	380
1271.00	11	438	449
1271.50	11	493	504
1272.00	11	540	550
1272.50	11	585	596

CURRENT DATE: 02-23-2001 FILE DATE: 02-23-2001
CURRENT TIME: 10:51:53 FILE NAME: LAKE16

****
********** TAILWATER **********
****

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	60.00 ft
SIDE SLOPE H/V (X:1)	4.0
CHANNEL SLOPE V/H (ft/ft)	0.002
MANNING'S n (.01-0.1)	0.020
CHANNEL INVERT ELEVATION	1267.85 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1265.75 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

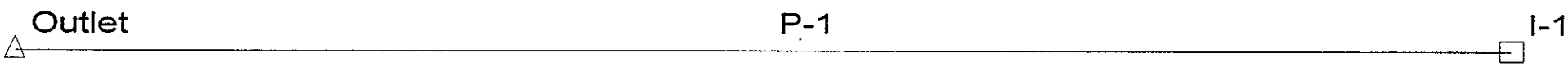
FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1267.85	0.000	0.00	0.00	0.00
60.00	1268.33	0.508	0.48	2.00	0.06
120.00	1268.58	0.538	0.73	2.61	0.09
180.00	1268.78	0.556	0.93	3.04	0.12
240.00	1268.95	0.568	1.10	3.38	0.14
300.00	1269.11	0.577	1.26	3.67	0.16
360.00	1269.25	0.584	1.40	3.92	0.17
420.00	1269.38	0.591	1.53	4.15	0.19
480.00	1269.51	0.596	1.66	4.35	0.21
540.00	1269.62	0.600	1.77	4.54	0.22
600.00	1269.74	0.604	1.89	4.71	0.23

****
********** ROADWAY OVERTOPPING DATA **********
****

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	30.00 ft
CREST LENGTH	150.00 ft
OVERTOPPING CREST ELEVATION	1273.00 ft

****

ARROWHEAD LAKES
67TH Avenue Storm Drain
Begin at Lake #16 and end at the ADOT channel



Appendix D.4

Arrowhead Lakes

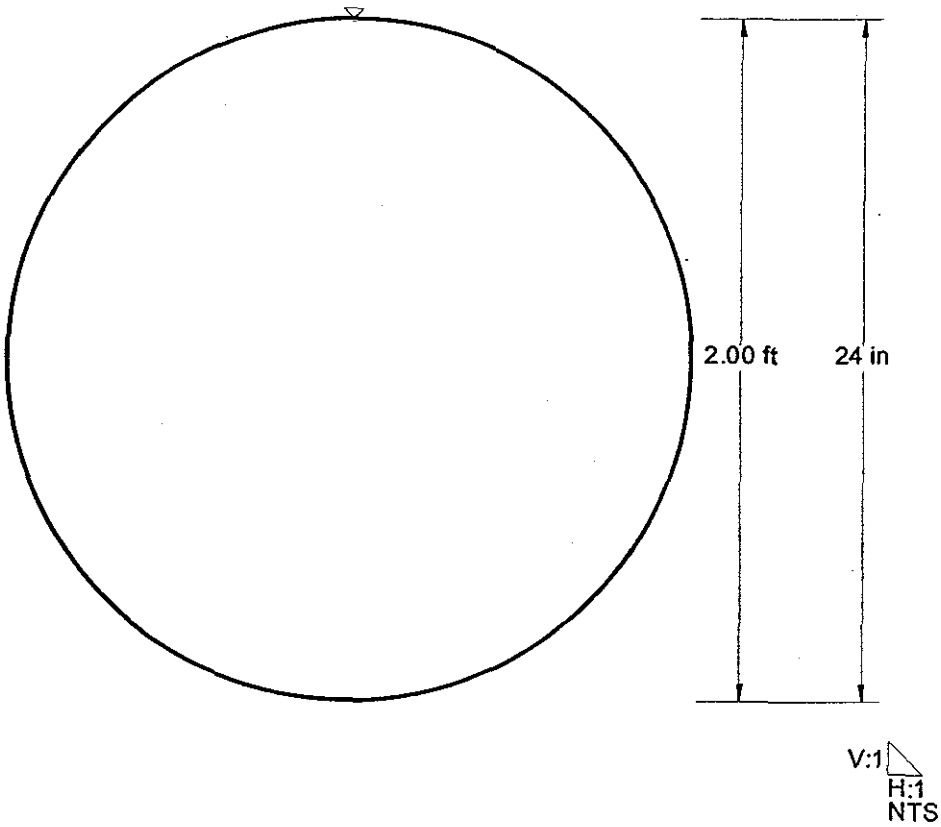
-Node- Up Dn	Pipe	-Section- Shape Size	Number Sections	Roughness	-Invert- Up Dn (ft)	Length (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	V avg (ft/s)	-Ground- Up Dn (ft)	-Cover- Up Dn (ft)	-HGL- Up Dn (ft)	-EGL- Up Dn (ft)
I-1	P-1	Circular	1	0.010	1,260.76	2,600.00	0.004174	19.00	6.05	1,267.85	5.09	1,266.85	1,267.42
Outlet		24 inch			1,254.00		0.002600	14.99		1,259.00	3.00	1,256.00	1,256.57

Appendix D.4

Arrowhead Lakes Update: 24" Outlet Pipe from Lake #17
Cross Section for Circular Channel

Project Description	
Worksheet	24" Outlet Pipe from Lake #17
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Mannings Coefficient	0.013	
Slope	0.005000	ft/ft
Depth	2.00	ft
Diameter	24	in
Discharge	16.00	cfs



Appendix D.4

Arrowhead Lakes Update: Outlet Pipe for Lake #17
Worksheet for Circular Channel

Project Description	
Worksheet	24" Outlet Pipe from Lake #17
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Slope	0.005000	ft/ft
Depth	2.00	ft
Diameter	24	in

Results		
Discharge	16.00	cfs
Flow Area	3.1	ft^2
Wetted Perimeter	6.28	ft
Top Width	5.96e-8	ft
Critical Depth	1.44	ft
Percent Full	100.0	%
Critical Slope	0.006613	ft/ft
Velocity	5.09	ft/s
Velocity Head	0.40	ft
Specific Energy	2.40	ft
Froude Number	1.24e-4	
Maximum Discharg	17.21	cfs
Discharge Full	16.00	cfs
Slope Full	0.005000	ft/ft
Flow Type	Subcritical	

Appendix D.4

Arrowhead Lakes Update: Street Weir for Lake #17
Worksheet for Broad Crested Weir

Project Description	
Worksheet	Street Weir for Lake #17
Type	Broad Crested Weir
Solve For	Discharge

Input Data		
Headwater Elevation	1,282.00	ft
Crest Elevation	1,281.00	ft
Tailwater Elevation	1,281.00	ft
Crest Surface Type	Paved	
Crest Breadth	5.00	ft
Crest Length	100.00	ft

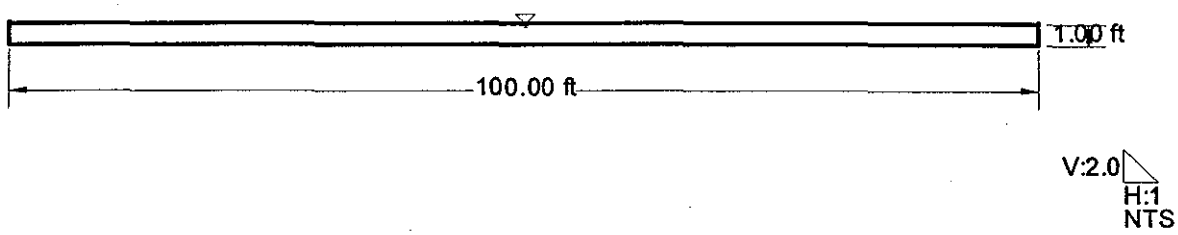
Results		
Discharge	306.50	cfs
Headwater Height Above Crest	1.00	ft
Tailwater Height Above Crest	0.00	ft
Discharge Coefficient	3.07	US
Submergence Factor	1.00	
Adjusted Discharge Coefficient	3.07	US
Flow Area	100.0	ft^2
Velocity	3.07	ft/s
Wetted Perimeter	102.00	ft
Top Width	100.00	ft

Appendix D.4

Arrowhead Lakes Update: Street Weir for Lake #17
Cross Section for Broad Crested Weir

Project Description	
Worksheet	Street Weir for Lake #17
Type	Broad Crested Weir
Solve For	Discharge

Section Data		
Discharge	306.50	cfs
Headwater Elevation	1,282.00	ft
Crest Elevation	1,281.00	ft
Tailwater Elevation	1,281.00	ft
Crest Surface Type	Paved	
Crest Breadth	5.00	ft
Crest Length	100.00	ft



Appendix D.4

Arrowhead Lakes Update: Street Weir for Lake #17
Rating Table for Broad Crested Weir

Project Description	
Worksheet	Street Weir for Lake #17
Type	Broad Crested Weir
Solve For	Discharge

Input Data		
Crest Elevation	1,281.00	ft
Tailwater Elevation	1,281.00	ft
Crest Surface Type	Paved	
Crest Breadth	*5.00*	*ft*
Crest Length	100.00	ft

Attribute	Minimum	Maximum	Increment
Headwater Elevation (ft)	1,281.00	1,282.00	0.50

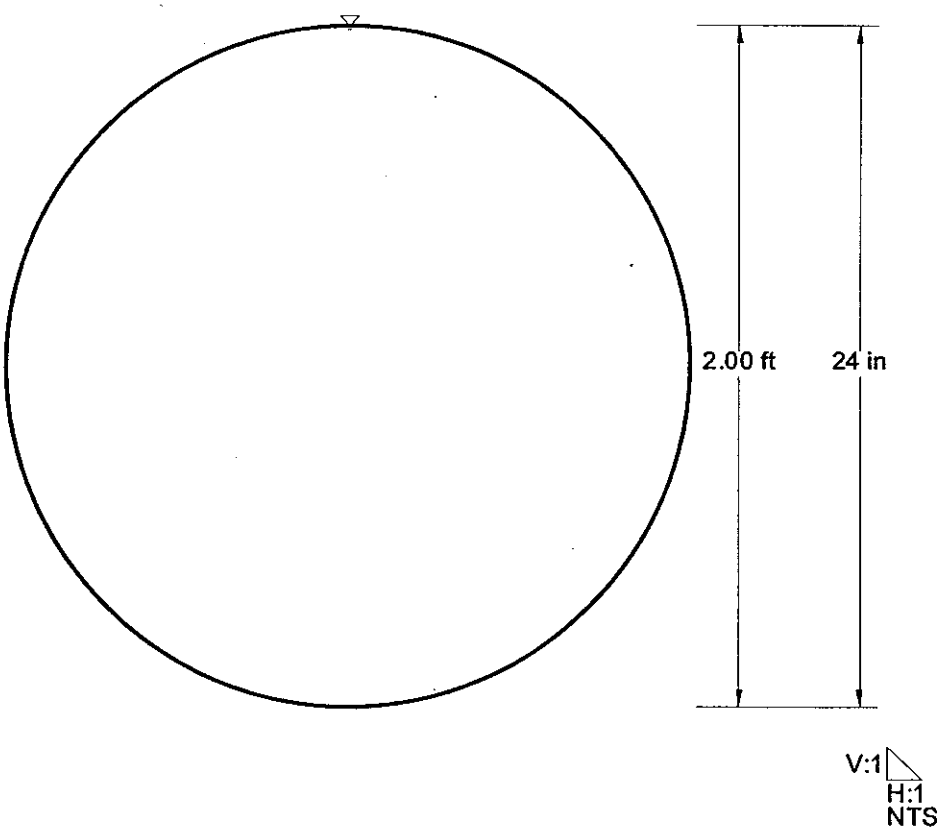
Headwater Elevation (ft)	Discharge (cfs)	Velocity (ft/s)
1,281.00	N/A	N/A
1,281.50	106.33	2.13
1,282.00	306.50	3.07

Appendix D.4

Arrowhead Lakes Update: 24" Outlet Pipe from Lake #21
Cross Section for Circular Channel

Project Description	
Worksheet	24" Outlet Pipe from Lake #21
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Mannings Coefficient	0.013	
Slope	0.005000	ft/ft
Depth	2.00	ft
Diameter	24	in
Discharge	16.00	cfs



Appendix D.4

Arrowhead Lakes Update: 24" Outlet Pipe from Lake #21
Worksheet for Circular Channel

Project Description	
Worksheet	24" Outlet Pipe from Lake #21
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Slope	0.005000	ft/ft
Depth	2.00	ft
Diameter	24	in

Results		
Discharge	16.00	cfs
Flow Area	3.1	ft²
Wetted Perimeter	6.28	ft
Top Width	5.96e-8	ft
Critical Depth	1.44	ft
Percent Full	100.0	%
Critical Slope	0.006613	ft/ft
Velocity	5.09	ft/s
Velocity Head	0.40	ft
Specific Energy	2.40	ft
Froude Number	1.24e-4	
Maximum Discharg	17.21	cfs
Discharge Full	16.00	cfs
Slope Full	0.005000	ft/ft
Flow Type	Subcritical	

Appendix D.4

Arrowhead Lakes Update: Street Weir for Lake #21
Rating Table for Broad Crested Weir

Project Description	
Worksheet	Street Weir for Lake #21
Type	Broad Crested Weir
Solve For	Discharge

Input Data		
Crest Elevation	1,271.00	ft
Tailwater Elevation	1,268.00	ft
Crest Surface Type	Paved	
Crest Breadth	5.00	ft
Crest Length	50.00	ft

Attribute	*Minimum*	*Maximum*	*Increment*
Headwater Elevation (ft)	1,271.00	1,272.00	0.50

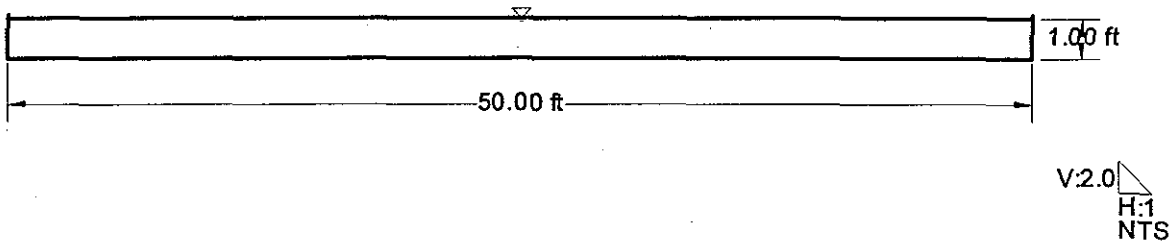
Headwater Elevation (ft)	Discharge (cfs)	Velocity (ft/s)
1,271.00	N/A	N/A
1,271.50	53.17	2.13
1,272.00	153.25	3.07

Appendix D.4

Arrowhead Lakes Update: Street Weir for Lake #21
Cross Section for Broad Crested Weir

Project Description	
Worksheet	Street Weir for Lake #21
Type	Broad Crested Weir
Solve For	*Discharge*

Section Data		
Discharge	153.25	cfs
Headwater Elevation	1,272.00	ft
Crest Elevation	1,271.00	ft
Tailwater Elevation	1,268.00	ft
Crest Surface Type	Paved	
Crest Breadth	5.00	ft
Crest Length	50.00	ft



Appendix D:4

Arrowhead Lakes Update: Street Weir for Lake #21
Worksheet for Broad Crested Weir

Project Description	
Worksheet	Street Weir for Lake #21
Type	Broad Crested Weir
Solve For	Discharge

Input Data		
Headwater Elevation	1,272.00	ft
Crest Elevation	1,271.00	ft
Tailwater Elevation	1,268.00	ft
Crest Surface Type	Paved	
Crest Breadth	5.00	ft
Crest Length	50.00	ft

Results		
Discharge	153.25	cfs
Headwater Height Above Crest	1.00	ft
Tailwater Height Above Crest	-3.00	ft
Discharge Coefficient	3.07	US
Submergence Factor	1.00	
Adjusted Discharge Coefficient	3.07	US
Flow Area	50.0	ft^2
Velocity	3.07	ft/s
Wetted Perimeter	52.00	ft
Top Width	50.00	ft

Appendix D.4

Entellus™

BY _____ DATE _____

CHECK _____ DATE _____

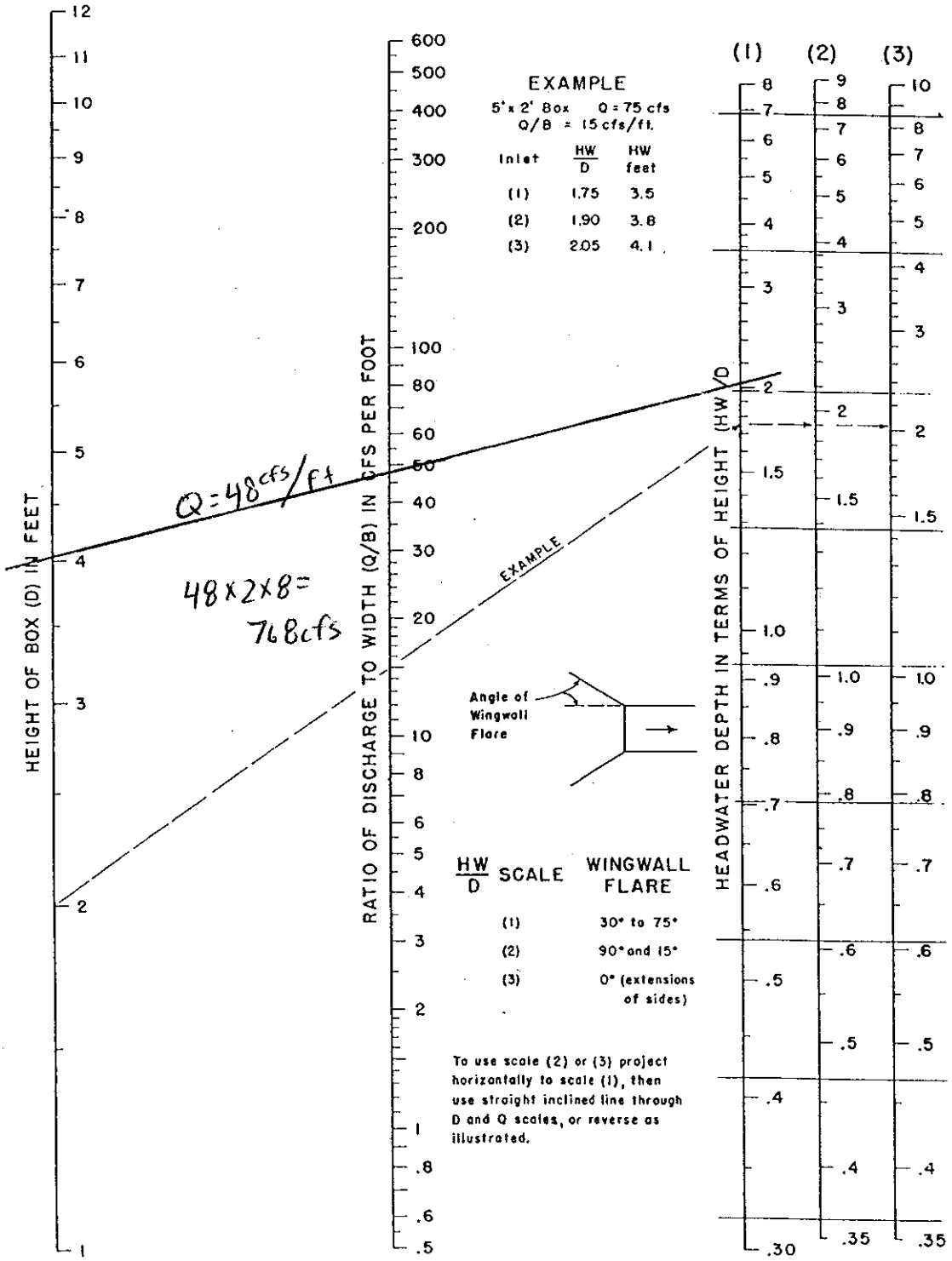
CLIENT Arrowhead Lakes Hydrology - Culvert at L21AP4

Wsel = 1268

Invert Elevation = 1259.9

hw/d = 2.03 2-4'x8' RCB

CHART 8



HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

ON-SITE RETENTION CALCULATIONS

GLENDALE/PEORIA ADMP UPDATE
Arrowhead Lakes/Legends
Retention Volume Calculations

Sub-Basin I.D.	Land Area A (arces)	Land Use Tpyes	Runoff Coefficient C	Precipitation 100-YR, 2-HR P (inches)	Ret. Vol. V (acre-ft)	Total Volume V_T (arce-ft)
A21U	17.30	M.H.D.R.	0.52	2.60	1.95	1.95
A21Q	12.50	Street & R.O.W.	0.88	2.60	2.38	2.38
A21V(1)	23.90	OPEN-2	0.25	4.00	1.99	1.99
A21W(1)	11.25	OPEN-2	0.25	4.00	0.94	0.94
A21X(1)	15.45	OPEN-2	0.25	4.00	1.29	1.29
A21Y	32.20	M.H.D.R.	0.52	2.60	3.63	3.63
A21Z	41.40	M.H.D.R.	0.52	2.60	4.66	4.66
A21AA	7.00	M.H.D.R.	0.52	2.60	0.79	0.79
A21AB(2)	23.01	COMM	0.92	2.60	4.59	4.59
A21AC(2)	14.27	COMM	0.92	2.60	2.84	2.84
A21AD	33.65	M.H.D.R.	0.52	2.60	3.79	3.79
A21AE	30.20	M.H.D.R.	0.52	2.60	3.40	3.40
A21AF	2.75	M.H.D.R.	0.52	2.60	0.31	0.31
A21AG	19.75	M.H.D.R.	0.52	2.60	2.23	2.23
A21AH	16.10	M.H.D.R.	0.52	2.60	1.81	1.81
A21AI	4.65	M.H.D.R.	0.52	2.60	0.52	0.52
A21AJ	6.25	M.F.R.	0.80	2.60	1.08	1.08
A21AK(2)	27.61	COMM	0.92	2.60	5.50	5.50

Notes:

1) Assume golf courses provided 100% retention for the 100-yr, 24-hr storm event, and drains via drywells.
2) Assume commerical sites provided 80% retention for the 100-yr, 2-hr storm event in basins and parking lot areas.
3) Refer to Section RA-4: Hydrology (4.1 Method Description and 4.2.6.4 Sub-Division Required Storage) in the Volume AL report.

D.5. FLOW SPLITS AND DIVERSIONS DATA

D.5. FLOW SPLITS AND DIVERSIONS DATA

PENTACORE ARIZONA
Civil Engineering • Construction Administration
Land Surveying • Planning • ADA Consulting

Job No. 5043.0001 Sheet 1 of

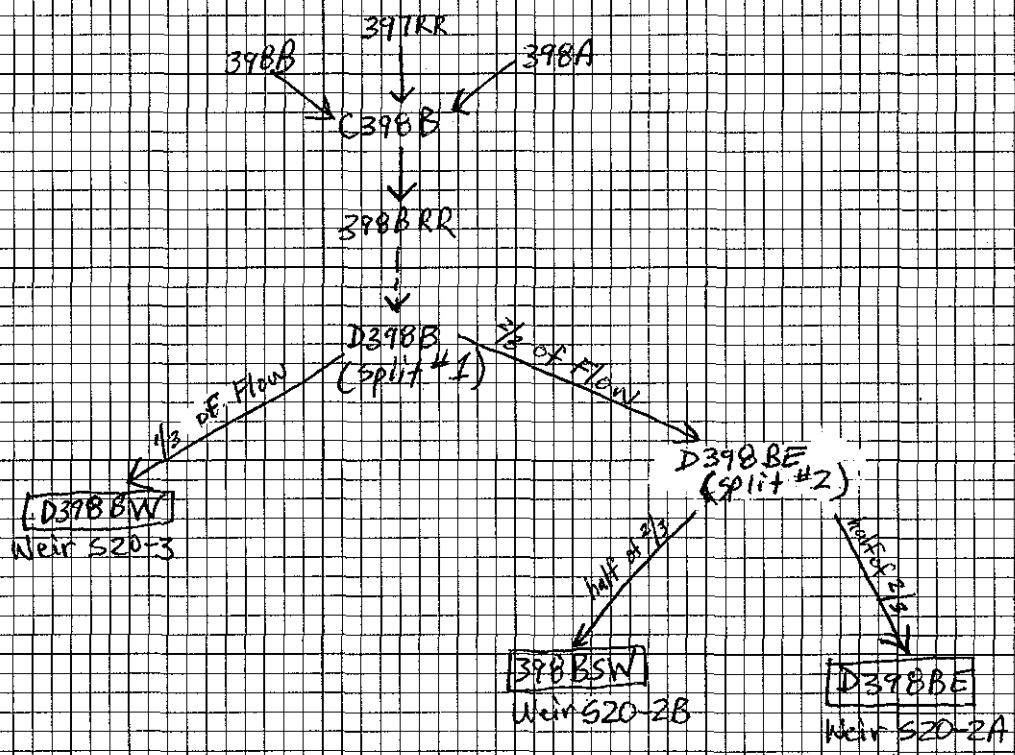
Project Arrowhead Lakes

Subject Flow Split Calculations

Designed By _____ Date _____ Checked By _____ Date _____

① Flow Split at D398B and D398BE in Lake #2

398BRR = 974 cfs (HEC-1)

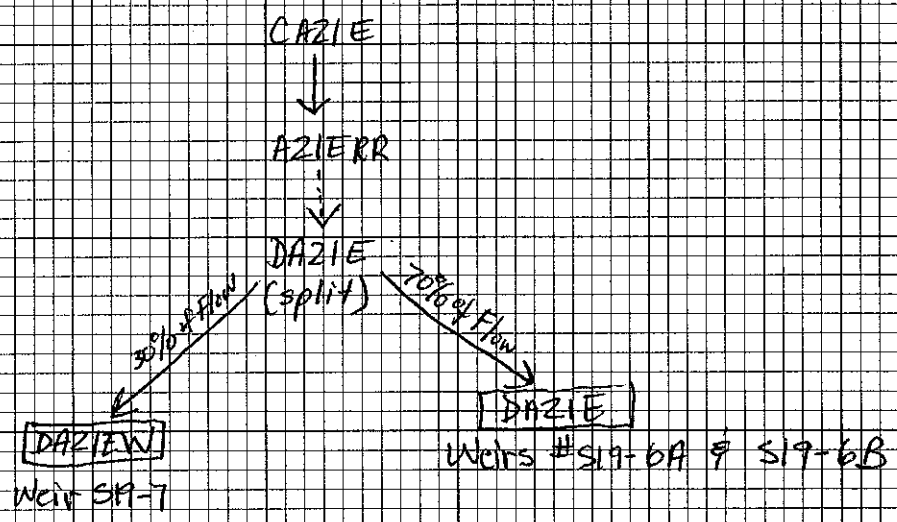


Stage-Discharge Elevation ≈ 1295.3 ft. in Lake #2
Plus, due to the approximately same weir geometry and characteristic of the three weirs (Weirs #S20-2A, #S20-2B and #S20-3) per rating table in Appendix D.4 and Table AL-3.

Therefore, approximately one-third (1/3) of the total Flow of 974 cfs from 398BRR split over each weir in Lake #2.

So, 974 cfs / 3 weirs ≈ 325 cfs at 1295.3 ft (Table AL-3) to D398BE, 398BSW and D398BW (HEC1).

② Flow Split at DAZIE in Lake #7
AZIERR ≅ 136 cfs (HEC-1)



Stage - Discharge Elevation ≅ 1302.3 ft. in Lake #7
Plus, due to the weirs geometry and characteristic of the weirs (Weirs # S19-6A, S19-6B and S19-7) per rating table in Appendix D.4 and Table AL-3.

Therefore, approximately 70% of the total flow of 136 cfs from AZIERR split south over the two-alike weirs (Weirs # S19-6A & #S19-6B), and the other 30% split west over Weir # S19-7 in Lake #7.

So, 136 cfs × (0.70) ≅ 95 cfs for DAZIE (HEC-1)
and 136 cfs × (0.30) ≅ 41 cfs for DAZIEW (HEC-1)
at 1302.3 ft in Lake #7 (Table AL-3).

Entellus™

SHEET 3 OF

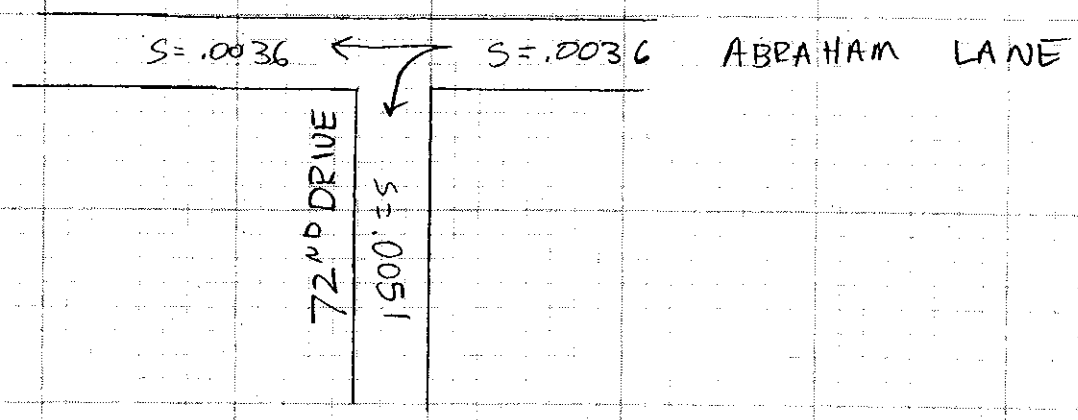
BY DATE

CHECK DATE

CLIENT

JOB NAME JOB NO.

(3) Diversion D21A4



Assumed 60% of flow would continue flowing west, and 40% would flow south.

Entellus™

SHEET _____ OF _____

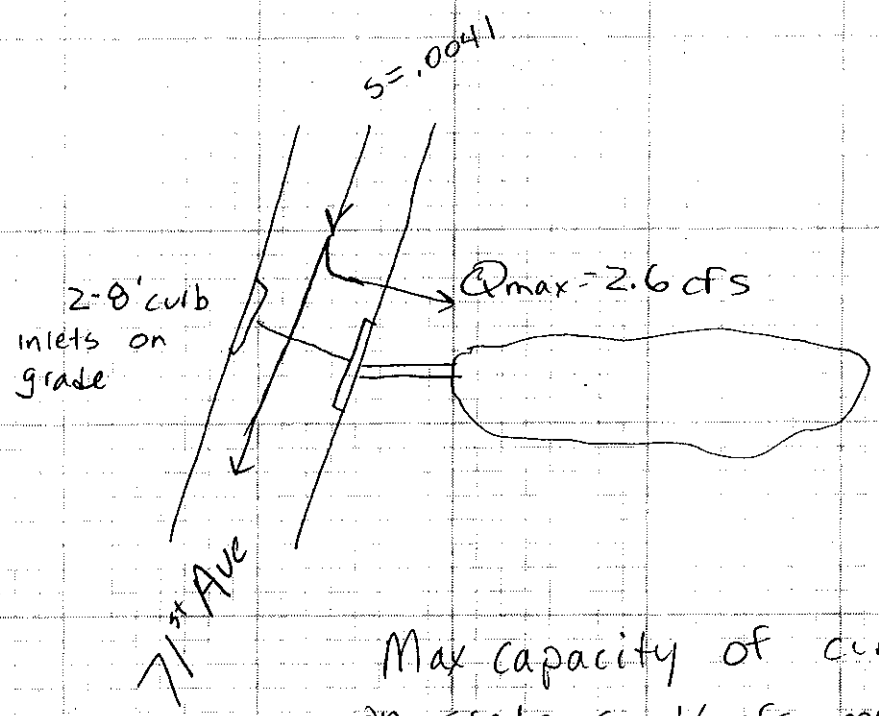
BY _____ DATE _____

CHECK _____ DATE _____

CLIENT _____

JOB NAME _____ JOB NO. _____

(4) Diversion D21A22



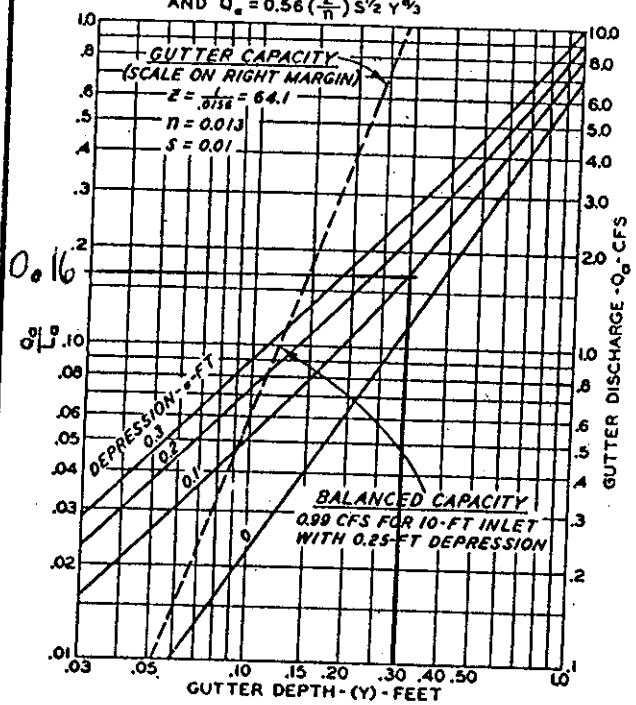
Max capacity of curb inlets on-grade is .16 cfs per foot X 16 ft = 2.6 cfs max. (See attached sheet)

Z/n = 4,150

GRAPHIC SOLUTION OF:

$$\frac{Q_a}{L_a} = 0.7\,(a+Y)^{3/2}\left[1-\left(1-\frac{Y}{a+Y}\right)^{3/2}\right]$$

AND $Q_a = 0.56\left(\frac{Z}{n}\right) S^{1/2}\, Y^{8/3}$



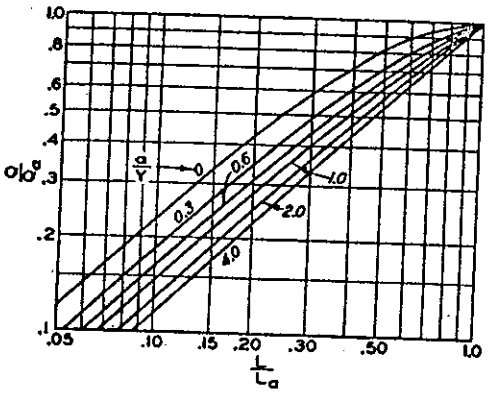
a.-CAPACITY OF CURB OPENING INLET IN CUBIC FEET PER SECOND PER FOOT OF LENGTH, DEPENDING UPON DEPTH IN APPROACH GUTTER (Y) IN FEET, AND DEPRESSION OF GUTTER FLOW LINE (a) IN FEET WHEN INTERCEPTING 100% OF GUTTER FLOW.

GRAPHIC SOLUTION OF:

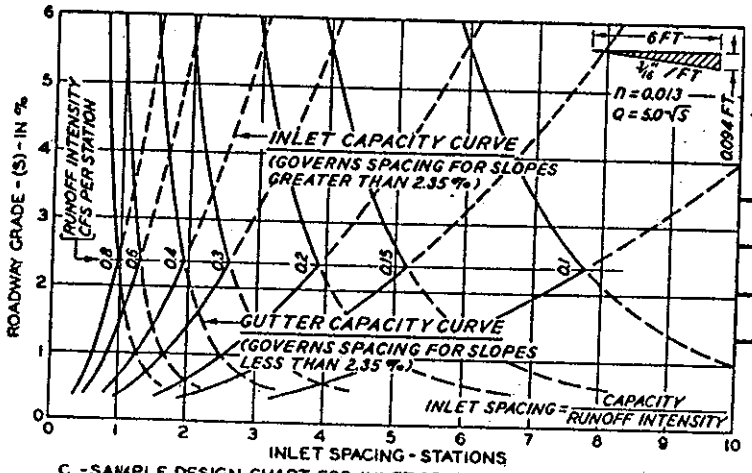
$$\frac{Q}{Q_a} = \frac{\left(\frac{a}{Y}+1\right)^{3/2} - \left(\frac{a}{Y}+1-\frac{L}{L_a}\right)^{3/2}}{\left(\frac{a}{Y}+1\right)^{3/2} - \left(\frac{a}{Y}\right)^{3/2}}$$

L = ACTUAL LENGTH OF INLET
L_a = REQUIRED LENGTH TO INTERCEPT ENTIRE FLOW, Q_a, IN GUTTER.

TOP CURVE IS APPROXIMATE INTERCEPTION RATIO FOR INLET GRATING IF L/L_a IS TAKEN AS RATIO OF WIDTH OF GRATE TO TOTAL WIDTH OF FLOW IN GUTTER.



b.- PARTIAL INTERCEPTION RATIO FOR CURB OPENING INLETS.



TYPE	WIDTH OF GRATE
"F"	2.12
"E"	1.25
"D"	2.12

C.-SAMPLE DESIGN CHART FOR INLET SPACING ON VARIOUS GRADES (CHART IS APPLICABLE ONLY TO A 10-FT INLET WITH A 0.25-FT DEPRESSION AND GUTTER CROSS SECTION AS INDICATED).

PREPARED BY
BUREAU OF PUBLIC ROADS

CURB INLETS
DESIGN CHARTS

Figure 12

GPO 811-336-4

D.6. PEAK FLOW DATA

D.6. PEAK FLOW DATA

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
HEC-1 Peak Discharges Summary

Table AL-2

Existing Conditions							
HEC-1 ID	100yr-24hr Flow (cfs)	Time of Peak (hrs)	Basin Area (sq. mi.)	HEC-1 ID	100yr-24hr Flow (cfs)	Time of Peak (hrs)	Basin Area (sq. mi.)
21A22I	10	12.75	0.01	D21A22	3	14.25	0.01
21A4I	3	12.08	0.01	D21A4	5	12.08	0.01
397RR	1010	12.83	3.04	D398B	649	13.08	3.28
398A	232	12.08	0.10	D398BE	325	13.08	3.28
398B	145	12.25	0.14	DA21E	95	12.08	0.08
398BI	325	13.08	3.28	DA21EW	41	12.08	0.08
398BRR	974	13.08	3.28	DA21U	434	12.75	0.90
398BSI	325	13.08	3.28	DA21US	15	1.33	0.90
398BSW	325	13.08	3.28	DR2122	10	12.75	0.01
398BW	325	13.08	3.28	DR21A4	3	12.08	0.01
398C	63	12.50	0.09	DRN23A	25	12.17	1.13
398CRR	259	14.33	3.27	L21A11	27	12.75	0.21
398D	200	12.00	0.08	L21A14	27	12.83	0.21
398E	249	12.08	0.11	L21A15	39	13.08	0.30
398F	158	12.33	0.20	L21A16	14	12.33	0.02
398FRR	267	14.50	3.68	L21A17	3	12.58	0.01
398G	99	12.75	0.22	L21A20	54	13.17	0.34
398GRR	730	14.83	4.09	L21A21	9	12.50	0.02
A21A	169	12.08	0.08	L21A27	15	12.75	0.05
A21AA	28	12.00	0.01	L21A38	12	12.42	0.02
A21AAR	24	11.92	0.01	L21A43	505	13.08	1.34
A21AB	87	12.00	0.04	L21A44	0	0.08	0.03
A21ABR	87	12.00	0.04	L21A8	3	14.92	0.11
A21AC	58	12.00	0.02	L21AP1	35	12.83	0.21
A21ACR	58	12.00	0.02	L21AP3	440	12.75	0.92
A21AD	102	12.08	0.05	L21AP4	467	13.08	1.23
A21AE	118	12.00	0.05	L21AP5	1	13.17	0.01
A21AEC	230	12.25	0.51	L2A281	17	13.00	0.10
A21AER	101	12.00	0.05	L2A282	13	13.25	0.10
A21AF	9	12.00	0.00	L2A283	12	13.33	0.11
A21AFR	9	12.00	0.00	LA21AA	23	12.08	0.01
A21AG	71	12.00	0.03	LA21AB	49	12.17	0.04
A21AHR	56	12.00	0.03	LA21AC	42	12.08	0.02
A21AI	15	12.00	0.01	LA21AD	78	12.17	0.05
A21AIR	20	12.00	0.01	LA21AE	90	12.08	0.05
A21AIR	20	12.00	0.01	LA21AF	2	12.25	0.00
A21AJ	20	12.00	0.01	LA21AG	34	12.17	0.03
A21AK	105	12.00	0.04	LA21AH	26	12.17	0.03
A21AKR	105	12.00	0.04	LA21AI	2	12.75	0.01
A21B	30	12.17	0.02	LA21AK	50	12.17	0.04

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
HEC-1 Peak Discharges Summary

Table AL-2

Existing Conditions							
HEC-1 ID	100yr-24hr Flow (cfs)	Time of Peak (hrs)	Basin Area (sq. mi.)	HEC-1 ID	100yr-24hr Flow (cfs)	Time of Peak (hrs)	Basin Area (sq. mi.)
A21C	101	12.00	0.05	LA21U	253	12.08	0.14
A21CRR	43	12.25	0.05	LA21V	0	0.08	0.04
A21D	47	12.00	0.02	LA21W	0	0.08	0.02
A21E	146	12.00	0.06	LA21X	0	0.08	0.02
A21EI	41	12.08	0.08	LA21Y	69	12.17	0.05
A21ERR	136	12.08	0.08	LA21Z	76	12.17	0.06
A21F	111	12.00	0.05	N21A1	28	12.08	0.02
A21G	96	12.00	0.04	N21A10	40	12.17	0.05
A21GRR	201	12.08	0.16	N21A11	6	12.25	0.01
A21H	18	12.00	0.01	N21A12	8	12.17	0.01
A21HRR	168	12.25	0.17	N21A13	19	12.17	0.02
A21I	88	12.00	0.04	N21A14	18	12.42	0.06
A21J	239	12.00	0.11	N21A15	11	12.17	0.01
A21JRR	395	12.17	0.32	N21A16	15	12.17	0.02
A21K	143	12.00	0.07	N21A17	4	12.25	0.01
A21KRR	197	12.17	0.20	N21A18	18	12.17	0.03
A21L	46	12.08	0.03	N21A19	6	12.08	0.01
A21LRR	185	12.33	0.23	N21A2	8	12.17	0.01
A21M	14	12.17	0.02	N21A20	1	12.17	0.00
A21MRR	0	0.08	0.02	N21A21	20	12.08	0.02
A21N	515	12.00	0.26	N21A22	6	12.17	0.01
A21NRR	557	12.33	0.75	N21A23	17	12.17	0.03
A21O	25	12.00	0.01	N21A24	8	12.17	0.02
A21ORR	556	12.42	0.76	N21A25	8	12.00	0.00
A21P	58	12.08	0.04	N21A26	17	12.25	0.03
A21PRR	16	12.08	0.04	N21A27	1	12.17	0.00
A21Q	52	12.08	0.04	N21A28	0	12.92	0.01
A21QRR	62	12.25	0.11	N21A29	9	12.25	0.02
A21R	16	12.00	0.01	N21A3	12	12.17	0.02
A21RRR	68	12.25	0.12	N21A30	17	12.17	0.02
A21S	27	12.00	0.01	N21A31	16	12.17	0.02
A21SRR	80	12.25	0.14	N21A32	1	12.17	0.00
A21T	77	12.00	0.04	N21A33	24	12.25	0.04
A21TRR	16	12.00	0.18	N21A34	15	12.17	0.02
A21U	253	12.08	0.14	N21A35	13	12.08	0.01
A21UR	5	10.42	0.14	N21A36	14	12.17	0.02
A21URR	449	12.75	0.90	N21A37	12	12.17	0.01
A21V	87	12.00	0.04	N21A38	15	12.17	0.02
A21VR	87	12.00	0.04	N21A39	6	12.33	0.01
A21W	22	12.08	0.02	N21A4	8	12.08	0.01

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
HEC-1 Peak Discharges Summary

Table AL-2

Existing Conditions							
HEC-1 ID	100yr-24hr Flow (cfs)	Time of Peak (hrs)	Basin Area (sq. mi.)	HEC-1 ID	100yr-24hr Flow (cfs)	Time of Peak (hrs)	Basin Area (sq. mi.)
A21WR	22	12.08	0.02	N21A40	31	12.25	0.05
A21X	30	12.08	0.02	N21A41	19	12.25	0.03
A21XR	30	12.08	0.02	N21A42	14	12.25	0.02
A21Y	102	12.00	0.05	N21A43	3	12.08	0.00
A21YR	102	12.00	0.05	N21A44	27	12.17	0.03
A21Z	132	12.00	0.06	N21A5	3	12.33	0.01
A21ZR	132	12.00	0.06	N21A6	19	12.08	0.02
C21A11	72	12.17	0.21	N21A7	13	12.08	0.01
C21A14	42	12.58	0.27	N21A8	0	0.08	0.01
C21A15	59	12.33	0.30	N21A9	22	12.17	0.03
C21A16	53	13.08	0.34	N21A90	6	12.42	0.01
C21A17	41	13.08	0.32	N21A91	4	12.17	0.00
C21A18	58	13.08	0.37	N21A92	4	12.33	0.01
C21A20	54	13.17	0.34	N21AP1	7	12.67	0.02
C21A22	13	12.75	0.01	N21AP2	14	12.17	0.01
C21A27	33	12.17	0.05	N21AP3	8	12.17	0.01
C21A28	31	12.75	0.10	N21AP4	28	12.17	0.03
C21A3	24	12.17	0.03	N21AP5	9	12.08	0.01
C21A32	13	13.25	0.11	R21A1	28	12.25	0.02
C21A33	43	12.17	0.16	R21A11	27	12.83	0.21
C21A39	480	13.08	1.24	R21A16	53	13.17	0.34
C21A40	489	13.08	1.29	R21A18	58	13.08	0.37
C21A42	498	13.08	1.34	R21A22	10	13.25	0.01
C21A43	632	12.58	2.03	R21A23	17	12.42	0.03
C21A5	53	12.25	0.07	R21A25	8	12.08	0.00
C21A6	22	12.17	0.02	R21A3	24	12.17	0.03
C21A8	81	12.33	0.11	R21A38	11	12.75	0.02
C21A91	631	12.67	2.04	R21A39	479	13.17	1.24
C21AP1	66	12.17	0.21	R21A4	3	12.25	0.01
C21AP2	39	12.58	0.22	R21A43	627	12.67	2.03
C21AP3	441	12.75	0.92	R21A44	0	0.08	0.03
C21APA	480	12.75	1.16	R21A5	53	12.33	0.07
C21APB	499	12.75	1.23	R21A6	22	12.25	0.02
C398B	1100	12.75	3.28	R21A7	11	12.42	0.01
C398C	369	13.08	3.27	R21A8	3	15.08	0.11
C398F	586	12.08	3.68	R21A9	22	12.25	0.03
C398G	838	13.92	4.09	R21A91	630	12.75	2.04
CA21AB	144	12.25	0.15	RA21A	165	12.17	0.08
CA21AD	215	12.25	0.24	RA21AB	133	12.25	0.15
CA21AE	101	12.08	0.27	RA21AD	195	12.25	0.24

GLENDALE/PEORIA ADMP UPDATE
ARROWHEAD LAKES
HEC-1 Peak Discharges Summary

Table AL-2

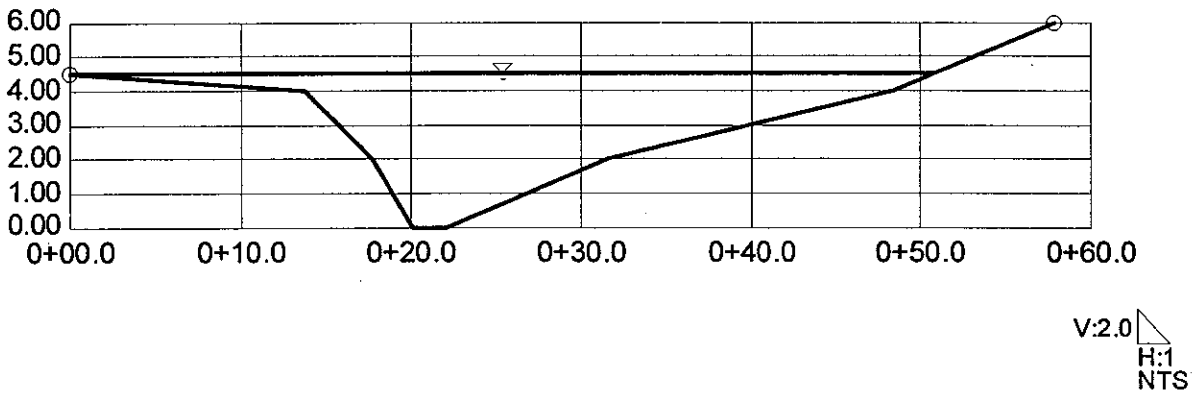
Existing Conditions							
HEC-1 ID	100yr-24hr Flow (cfs)	Time of Peak (hrs)	Basin Area (sq. mi.)	HEC-1 ID	100yr-24hr Flow (cfs)	Time of Peak (hrs)	Basin Area (sq. mi.)
CA21AG	228	12.33	0.54	RA21AE	218	12.33	0.51
CA21AJ	31	12.17	0.04	RA21AG	225	12.33	0.54
CA21E	187	12.00	0.08	RA21B	30	12.25	0.02
CA21G	230	12.00	0.16	RA21C	42	12.25	0.05
CA21H	214	12.08	0.17	RA21D	42	12.00	0.02
CA21J	430	12.08	0.32	RA21ES	89	12.17	0.08
CA21K	234	12.08	0.20	RA21F	103	12.00	0.05
CA21L	238	12.17	0.23	RA21F	103	12.00	0.05
CA21N	894	12.08	0.75	RA21I	85	12.08	0.04
CA21O	567	12.33	0.76	RA21J	392	12.17	0.32
CA21Q	67	12.08	0.11	RA21L	186	12.33	0.23
CA21R	72	12.17	0.12	RA21M	0	0.08	0.02
CA21S	82	12.17	0.14	RA21P	16	12.17	0.04
CA21T	130	12.08	0.18	RA21T	16	12.08	0.18
CA21U	653	12.25	0.90	RA21US	15	1.50	0.90
CN19A	1171	12.50	3.04	RA21Z	66	12.25	0.06
CN21A	685	12.75	3.72	RN21B	260	12.33	0.65
CN21B	273	12.25	0.65	RN23AS	8	12.83	1.13

APPENDIX E. HYDRAULIC CALCULATIONS

R21A39 - Channel Capacity
Cross Section for Irregular Channel

Project Description	
Worksheet	R21A39
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Mannings Coefficient	0.035	
Slope	0.005600	ft/ft
Water Surface Elevation	4.50	ft
Elevation Range	0.00 to 6.00	
Discharge	376.96	cfs



R21A39 - Channel Capacity
Worksheet for Irregular Channel

Project Description	
Worksheet	R21A39
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Slope	0.005600	ft/ft
Water Surface Elevation	4.50	ft

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Method	mproved Lotter's Method
Closed Channel Weighting Metho	Horton's Method

Results		
Mannings Coefficient	0.035	
Elevation Range	0.00 to 6.00	
Discharge	376.96	cfs
Flow Area	85.5	ft²
Wetted Perimeter	52.36	ft
Top Width	50.75	ft
Actual Depth	4.50	ft
Critical Elevation	3.60	ft
Critical Slope	0.015955	ft/ft
Velocity	4.41	ft/s
Velocity Head	0.30	ft
Specific Energy	4.80	ft
Froude Number	0.60	
Flow Type	Subcritical	

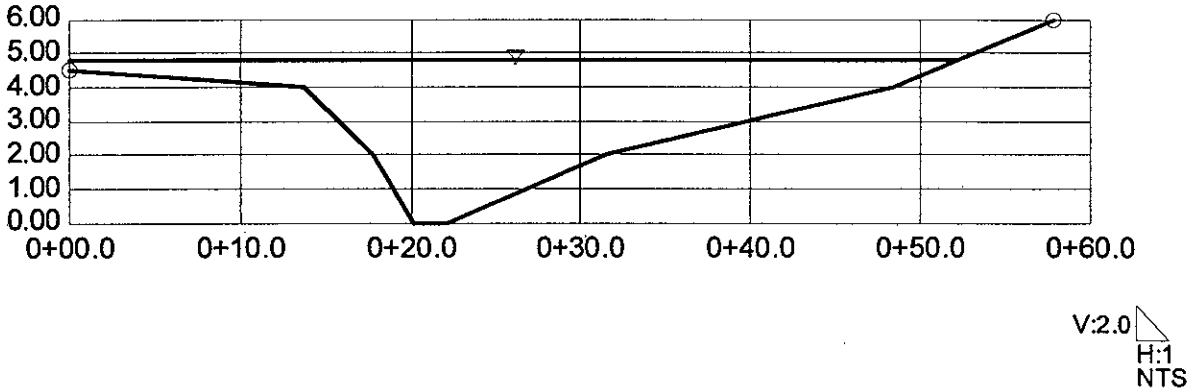
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+57.8	0.035

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	4.50
0+13.8	4.00
0+17.8	2.00
0+20.1	0.00
0+22.1	0.00
0+31.6	2.00
0+48.4	4.00
0+57.8	6.00

R21A39 - Channel Capacity @ 490 cfs
Cross Section for Irregular Channel

Project Description	
Worksheet	R21A39
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.035	
Slope	0.005600	ft/ft
Water Surface Elevation	4.81	ft
Elevation Range	0.00 to 6.00	
Discharge	490.00	cfs



R21A39 - Channel Capacity @ 490 cfs
Worksheet for Irregular Channel

Project Description	
Worksheet	R21A39
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.005600	ft/ft
Discharge	490.00	cfs

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Method	mproved Lotter's Method
Closed Channel Weighting Metho	Horton's Method

Results		
Mannings Coefficient	0.035	
Water Surface Elevation	4.81	ft
Elevation Range	0.00 to 6.00	
Flow Area	101.5	ft²
Wetted Perimeter	54.16	ft
Top Width	52.21	ft
Actual Depth	4.81	ft
Critical Elevation	3.98	ft
Critical Slope	0.015424	ft/ft
Velocity	4.83	ft/s
Velocity Head	0.36	ft
Specific Energy	5.17	ft
Froude Number	0.61	
Flow Type	Subcritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.3096218 ft.

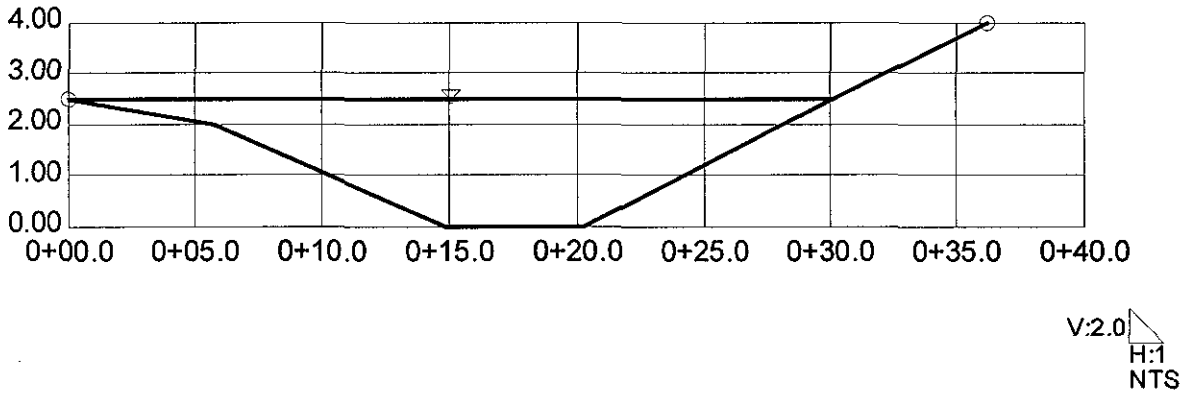
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+57.8	0.035

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	4.50
0+13.8	4.00
0+17.8	2.00
0+20.1	0.00
0+22.1	0.00
0+31.6	2.00
0+48.4	4.00
0+57.8	6.00

R21A16 - Channel Capacity
Cross Section for Irregular Channel

Project Description	
Worksheet	R21A16
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Mannings Coefficient	0.035	
Slope	0.003400	ft/ft
Water Surface Elevation	2.50	ft
Elevation Range	0.00 to 4.00	
Discharge	122.81	cfs



R21A16 - Channel Capacity
Worksheet for Irregular Channel

Project Description	
Worksheet	R21A16
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Slope	0.003400	ft/ft
Water Surface Elevation	2.50	ft

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Method	mproved Lotter's Method
Closed Channel Weighting Metho	Horton's Method

Results		
Mannings Coefficient	0.035	
Elevation Range	0.00 to 4.00	
Discharge	122.81	cfs
Flow Area	40.9	ft²
Wetted Perimeter	30.67	ft
Top Width	30.13	ft
Actual Depth	2.50	ft
Critical Elevation	1.67	ft
Critical Slope	0.017931	ft/ft
Velocity	3.00	ft/s
Velocity Head	0.14	ft
Specific Energy	2.64	ft
Froude Number	0.45	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.0	0+36.2	0.035

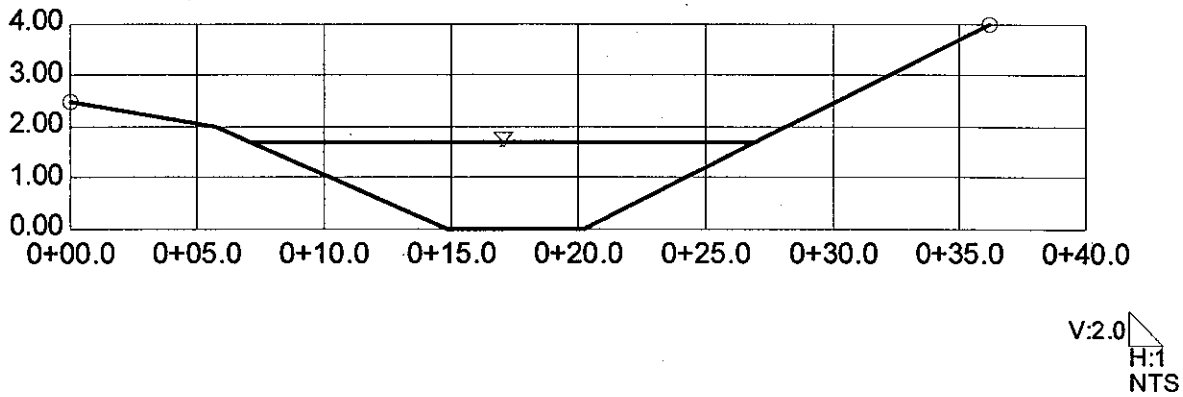
Natural Channel Points

Station (ft)	Elevation (ft)
0+00.0	2.50
0+05.7	2.00
0+14.8	0.00
0+20.2	0.00
0+28.1	2.00
0+36.2	4.00

R21A16 - Channel Capacity @ 55 cfs
Cross Section for Irregular Channel

Project Description	
Worksheet	R21A16
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.035	
Slope	0.003400	ft/ft
Water Surface Elevation	1.70	ft
Elevation Range	0.00 to 4.00	
Discharge	55.00	cfs



R21A16 - Channel Capacity @ 55 cfs
Worksheet for Irregular Channel

Project Description	
Worksheet	R21A16
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.003400	ft/ft
Discharge	55.00	cfs

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Method	mproved Lotter's Method
Closed Channel Weighting Metho	Horton's Method

Results		
Mannings Coefficient	0.035	
Water Surface Elevation	1.70	ft
Elevation Range	0.00 to 4.00	
Flow Area	21.4	ft²
Wetted Perimeter	20.22	ft
Top Width	19.82	ft
Actual Depth	1.70	ft
Critical Elevation	1.11	ft
Critical Slope	0.020065	ft/ft
Velocity	2.57	ft/s
Velocity Head	0.10	ft
Specific Energy	1.80	ft
Froude Number	0.44	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.0	0+36.2	0.035

Natural Channel Points

Station (ft)	Elevation (ft)
0+00.0	2.50
0+05.7	2.00
0+14.8	0.00
0+20.2	0.00
0+28.1	2.00
0+36.2	4.00

APPENDIX F. 100-YR, 24-HR EXISTING CONDITIONS HEC-1 OUTPUT

HEC-1 INPUT

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              MAY  1991               *
*            VERSION 4.0.1E            *
*     Lahey F77L-EM/32 version 5.01    *
*       Dodson & Associates, Inc.      *
* RUN DATE  05/02/01  TIME  07:52:10   *
****************************************
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****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 551-1748             *
*                                      *
****************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

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

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


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

   1          ID   Project ID: GP - Major Basin: 01 - Return Period: 100 Years
   2          ID   ******************************************************************************
   3          ID   **                                                                          **
   4          ID   **                    Glendale/Peoria ADMP Update                           **
   5          ID   **                                                                          **
   6          ID   ******************************************************************************
   7          ID   ******************************************************************************
   8          ID   PROJECT:                Glendale Peoria ADMP Update
   9          ID   CLIENT:                 Flood Control Distric of Maricopa County
  10          ID   PREPARED BY:            Entellus, Inc.
  11          ID   PROJECT No:             FCD 99-44              Entellus 310.017
  12          ID   FILE NAME: 100yr24h.DAT                     CREATED DATE: Oct 21, 2000
  13          ID   MODIFIED: Pentacore AZ 01-23-01
  14          ID   STORM:                  100-year 24-hour Storm
  15          ID   DEVELOPMENT CONDITIONS: Existing Conditions
  16          ID
  17          ID   DDM MCUHP1
              *
              * ****************************************************************************
  18          IT       5                     500
  19          IO       5
              *
              *DIAGRAM
              * ****************************************************************************
              * **********************     PRECIPITATION DATA      ***************************
              * ****************************************************************************
  20          IN      15
  21          JD    4.00    0.01
  22          PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
  23          PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
  24          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
  25          PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
  26          PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
  27          PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
  28          PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
  29          PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
  30          PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
  31          PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
  32          JD   3.760   10.00
  33          JD   3.600   30.00
  34          JD   3.440   60.00
  35          JD   3.384   90.00
  36          JD   3.336  120.00
  37          JD   3.300  150.00
  38          JD   3.200  300.00
  39          JD   3.120  500.00
              * ****************************************************************************
              *
              *
              * ****************************************************************************
```

```
* ****************************************************************************
* **********************      ARROWHEAD LAKES MODEL      **********************
* ****************************************************************************
* ****************************************************************************
*
*  DDM   ***** Preserved *****
```



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

  40          KK    N23A   BASIN
  41          KM   SUB-BASIN N23A
  42          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
  43          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
  44          KM     L =  .84  Kb = .044  Adj. Slope =   30.0
  45          BA    .485
  46          LG    0.23    0.26    4.90    0.34      31
  47          UC   0.483   0.217
  48          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  49          UA     100
              *
              *
              * *** STORAGE ROUTING LN23A ***********************************************
              * *** HILLCREST RESIDENTIAL DEVELOPMENT STORAGE (ACCOUNTED) ***************
              * DDM   ***** Preserved *****

  50          KK   LN23A
  51          DT  LN23AD    13.4
  52          DI       0     100    1000   10000
  53          DQ       0     100    1000   10000
              *
              *
              * *** DIVERSION N23A *******************************************************
              * DIVERSION MAIN DEER VALLEY(WEST), SPLIT Arrohead Ranch(SOUTH)
              * ARROWHEAD RANCH TAKES A SMALL AMOUNT OF THIS FLOW (ASSUMED 25CFS MAX)
              *
              * DDM   ***** Preserved *****

  54          KK   DN23A
  55          DT   N23AI
  56          DI       1      92     274     365     456     546     700     800    1000
  57          DQ     .01       0       5      15      20      22      25      25      25
              *
              *
              * DDM   ***** Updated *****

  58          KK    A21C   BASIN
  59          KM   SUB-BASIN A21C
  60          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
  61          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
  62          KM     L = .51  Kb = .050  Adj. Slope = 90.0
  63          BA    .054
  64          LG    0.22    0.23    4.30    0.56      36
  65          UC    .158    .147
  66          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  67          UA     100
              *
              *
```



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

  68          KK  A21CRR
  69          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #6) IN SUB-BASIN A21C.
  70          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
  71          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
  72          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
  73          KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
  74          RS       1    ELEV    1304
  75          SV       0    1.42    2.89    4.42    6.00    7.64    9.34   11.08   12.85
  76          SE    1304  1304.5    1305  1305.5    1306  1306.5    1307  1307.5    1308
  77          SQ       0      19      60     119     187     262     345     435     531
              *
              *
              * *** ROUTE RA21C *********************************************************
              * ROUTE RA21C IS 900 FT WITH APPROX. SLOPE OF .0100 (MEASURED FROM 1996 TOPO)
              * CROSS SECTION IS EXISTING TRAPAZOIDAL CREEK THROUGH A GOLF COURSE
              * BETWEEN LAKE #6 AND LAKE #8.
              *
              * ROUTE FLOW TO CA21K FROM BASIN A21C
              * DDM   ***** Preserved *****
```

```
 78          KK   RA21C
 79          RS       5    FLOW       0
 80          RC    .035    .035     .035      900     .01
 81          RX       0     350      388      400     405     417     450     600
 82          RY       6       5        4        0       0       4       5       6
             *
             *
             *
             * DDM   ***** Updated *****

 83          KK    A21D   BASIN
 84          KM   SUB-BASIN A21D
 85          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
 86          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
 87          KM     L = .19  Kb = .033  Adj. Slope = 315.0
 88          BA    .019
 89          LG    0.15    0.35    3.95    0.47      65
 90          UC    .108    .079
 91          UA       0       3       5       8      12      20      43      75      90      96
 92          UA     100
             *
             *
             * *** ROUTE RA21D ************************************************************
             * ROUTE RA21D IS 950 FT WITH APPROX. SLOPE OF .0075 (MEASURED FROM 1996 TOPO)
             * CROSS SECTION IS THROUGH A TYPICAL LOCAL STREET.
             *
             * ROUTE FLOW TO CA21E FROM BASIN A21D
             * DDM   ***** Preserved *****
1                                          HEC-1 INPUT                                                    PAGE  4

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

 93          KK   RA21D
 94          KO       3
 95          RS       1    FLOW      -1
 96          RC    .030    .018    .030     950   .0075
 97          RX     100     100   107.5   107.5   142.5   142.5     150     150
 98          RY     3.5       1     .25       0       0     .25       1     3.5
             *
             *
             * DDM   ***** Updated *****

 99          KK    A21E   BASIN
100          KM   SUB-BASIN A21E
101          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
102          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
103          KM     L = .32  Kb = .053  Adj. Slope = 150.0
104          BA    .058
105          LG    0.23    0.23    4.45    0.47      56
106          UC    .104    .061
107          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
108          UA     100
             *
             *
             * *** COMBINE  CA21E *********************************************************
             * COMBINE  RA21D AND BASIN A21E
             * DDM   ***** Preserved *****

109          KK   CA21E
110          HC       2
             *
             *

111          KK  A21ERR
112          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #7) IN SUB-BASIN A21E.
113          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
114          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
115          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
116          KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
117          RS       1    ELEV  1301.5
118          SV       0    1.55    3.17    4.87    6.62    8.40   10.19   11.97   13.75
119          SE  1301.5    1302  1302.5    1303  1303.5    1304  1304.5    1305  1305.5
120          SQ       0      67     210     417     653     916    1207    1521    1859
             *
             *
             * *** DIVERSION  DA21E ********************************************************
             * DIVERSION OF LAKE #7: 70% MAIN SOUTH TO LAKE #8 (RA21ES),
             * 30% SPLIT WEST TO LAKE #11 (DA21EW).
             * DDM   ***** Preserved *****
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121          KK   DA21E
122          DT   A21EI
123          DI       1      78     100     200     500    1000    5000   10000
124          DQ     0.1      23      30      60     150     300    1500    3000
             *
             *
             * *** ROUTE RA21ES ***********************************************************
             * ROUTE RA21ES IS 850 FT WITH APPROX. SLOPE OF .0045 (MEASURED FROM 1996 TOPO)
             * CROSS SECTION IS EXISTING TRAPAZOIDAL CREEK
             * ALONG WEST SIDE OF ARROWHEAD LOOP RD.
             *
             * ROUTE FLOW TO CA21K FROM DIVERT DA21E
             * DDM   ***** Preserved *****
1                                          HEC-1 INPUT                                          PAGE  5

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

125          KK  RA21ES
126          RS       1    FLOW       0
127          RC    .030     .03    .030     850   .0045
128          RX       0     125     175     200     205     225     275     500
129          RY       6       5       4       0       0       4       5       6
             *
             *
             *
             * DDM   ***** Updated *****

130          KK    A21K   BASIN
131          KM   SUB-BASIN A21K
132          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
133          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
134          KM     L = .35  Kb = .050  Adj. Slope = 31.0
135          BA    .068
136          LG    0.22    0.23    4.50    0.48      37
137          UC    .175    .107
138          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
139          UA     100
             *
             *
             * *** COMBINE  CA21K *********************************************************
             * COMBINE  RA21C, RA21ES AND BASIN A21K
             * DDM   ***** Preserved *****

140          KK   CA21K
141          HC       3    0.20
             *
             *

142          KK  A21KRR
143          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #8) IN SUB-BASIN A21K.
144          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
145          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY). IN ADDITION,
146          KM   THE CHANNEL BETWEEN LAKE #8 & LAKE #9 IS THE CONTROLLING FACTOR.
147          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
148          KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
149          RS       1    ELEV  1289.5
150          SV       0    1.20    2.43    3.70    4.99    6.32    7.66    9.03   10.40
151          SE  1289.5    1290  1290.5    1291  1291.5    1292  1292.5    1293  1293.5
152          SQ       0      41     145     317     514     884    1457    2132    2899
             *
             *
             * DDM   ***** Updated *****

153          KK    A21L   BASIN
154          KM   SUB-BASIN A21L
155          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
156          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
157          KM     L = .36  Kb = .058  Adj. Slope = 25.0
158          BA    .028
159          LG    0.23    0.24    4.70    0.39      39
160          UC    .213    .225
1                                          HEC-1 INPUT                                          PAGE  6

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

161          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
162          UA     100
             *
             *
```

```
* *** COMBINE  CA21L ***********************************************************
* COMBINE A21KRR AND BASIN A21L
* DDM   ***** Preserved *****

KK   CA21L
HC       2    0.23
*
*

KK  A21LRR
KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #9) IN SUB-BASIN A21L.
KM   EXISTING WATER SURFACE ELEVATION WAS MEASURED BY PENTACORE.
KM   LAKE OUTFALL VIA 2 CONCRETE BOX CULVERTS (4'x3' & 6'x3').
KM   ASSUME CULVERTS ARE THE CONTROLLING FACTOR AND INVERT WAS ESTIMATED.
KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
RS       1    ELEV  1286.5
SV       0    0.42    0.88    1.35    1.83    2.33    2.84    3.35    3.86
SE  1286.5    1287  1287.5    1288  1288.5    1289  1289.5    1290  1290.5
SQ      74     103     134     164     194     219     241     264     286
*
*
* *** ROUTE RA21L ***************************************************************
* ROUTE RA21L IS 1225 FT WITH APPROX. SLOPE OF .0050 (MEASURED FROM 1996 TOPO)
* CROSS SECTION IS EXISTING TRAPAZOIDAL CREEK
* ALONG WEST SIDE OF ARROWHEAD LOOP RD.
*
* ROUTE FLOW TO CA21O FROM A21LRR
* DDM   ***** Preserved *****

KK   RA21L
RS       1   FLOW      -1
RC    .028    .028    .028    1225    .005
RX       0     100     164     200     205     241     300     400
RY       8       7       6       0       0       6       7       8
*
*
* DDM   ***** Updated *****

KK    A21M   BASIN
KM   SUB-BASIN A21M
KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
KM     L = .41  Kb = .064  Adj. Slope = 7.0
BA    .016
LG    0.23    0.23    4.70    0.38      44
UC    .392   0.677
UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
UA     100
*
*
```

1 HEC-1 INPUT PAGE 7

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

KK  A21MRR
KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #10) IN SUB-BASIN A21M.
KM   ASSUME LAKE OUTFALL BY OVERTOPPING ADJACENT ROADWAY ON WEST.
KM   EXISTING WATER SURFACE AND STREET ELEVATIONS WERE REFERENCE FROM
KM   THE 1996 FCD TOPO FILE.
KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
RS       1    ELEV  1284.5
SV       0    0.38    0.79    1.23    1.69    2.18    2.68    3.18    3.70
SE  1284.5    1285  1285.5    1286  1286.5    1287  1287.5    1288  1288.5
SQ       0       0       0       0       0       0      53     153     284
*
*
* *** ROUTE RA21M ***************************************************************
* ROUTE RA21M IS 950 FT WITH APPROX. SLOPE OF .0045 (MEASURED FROM 1996 TOPO)
* CROSS SECTION IS THROUGH A TYPICAL COLLECTOR STREET.
*
* ROUTE FLOW TO CA21O FROM A21MRR
* DDM   ***** Preserved *****

KK   RA21M
KO       3
RS       1   FLOW      -1
RC    .030    .018    .030     950   .0045
RX     100     100   110.5   110.5   149.5   149.5     160     160
RY     3.5       1     .25       0       0     .25       1     3.5
```

```
                 *
                 *
                 * *** DIVERSION RECOVER DA21EW  ***********************************************
                 * RECOVER WEST DIVERT FLOW FROM BASIN A21E (DA21E)
                 * DDM   ***** Preserved *****

 207             KK  DA21EW
 208             DR   A21EI
                 *
                 *
                 * DDM   ***** Updated *****

 209             KK    A21F   BASIN
 210             KM   SUB-BASIN A21F
 211             KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
 212             KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
 213             KM     L = .30  Kb = .031  Adj. Slope = 315.0
 214             BA    .046
 215             LG    0.15    0.35    3.95    0.47      65
 216             UC    .121    .078
 217             UA       0       3       5       8      12      20      43      75      90      96
 218             UA     100
                 *
                 *
                 * *** ROUTE RA21F ************************************************************
                 * ROUTE RA21F IS 550 FT WITH APPROX. SLOPE OF .0450 (MEASURED FROM 1996 TOPO)
                 * CROSS SECTION IS THROUGH A TYPICAL LOCAL STREET.
                 *
                 * ROUTE FLOW TO CA21G FROM BASIN A21F
                 * DDM   ***** Preserved *****
1                                          HEC-1 INPUT                                          PAGE  8

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

 219             KK   RA21F
 220             KO       3
 221             RS       1    FLOW      -1
 222             RC    .030    .018    .030     550   .0450
 223             RX     100     100   107.5   107.5   142.5   142.5     150     150
 224             RY     3.5       1     .25       0       0     .25       1     3.5
                 *
                 *
                 * *** ROUTE RA21F ************************************************************
                 * ROUTE RA21F IS 550 FT WITH APPROX. SLOPE OF .0220 (MEASURED FROM 1996 TOPO)
                 * CROSS SECTION IS THROUGH A TYPICAL GOLF COURSE SECTION.
                 *
                 * ROUTE FLOW TO CA21G FROM BASIN A21F
                 * DDM   ***** Preserved *****

 225             KK   RA21F
 226             KO       3
 227             RS       1    FLOW      -1
 228             RD     550   .0220    .030            TRAP      30       6
                 *
                 *
                 * DDM   ***** Updated *****

 229             KK    A21G   BASIN
 230             KM   SUB-BASIN A21G
 231             KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
 232             KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
 233             KM     L = .38  Kb = .049  Adj. Slope = 132.0
 234             BA    .041
 235             LG    0.23    0.24    5.10    0.37      53
 236             UC    .121    .101
 237             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 238             UA     100
                 *
                 *
                 * *** COMBINE  CA21G ******************************************************
                 * COMBINE DA21EW, RA21F AND BASIN A21G
                 * DDM   ***** Preserved *****

 239             KK   CA21G
 240             HC       3    0.16
                 *
                 *

 241             KK  A21GRR
 242             KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #11) IN SUB-BASIN A21G.
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243          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
244          KM   ELEVATION PER CITY OF GLENDALE (FCD 1996 TOPO FILE).
245          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
246          KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
247          RS       1    ELEV    1297
248          SV       0    0.43    0.90    1.39    1.91    2.45    3.01    3.57    4.13
249          SE    1297  1297.5    1298  1298.5    1299  1299.5    1300  1300.5    1301
250          SQ       0      19      60     119     187     262     345     435     531
             *
             *
             * DDM   ***** Updated *****
```



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

251          KK    A21H   BASIN
252          KM   SUB-BASIN A21H
253          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
254          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
255          KM     L = .12  Kb = .062  Adj. Slope = 67.0
256          BA    .007
257          LG    0.19    0.13    6.80    0.16      55
258          UC    .100    .089
259          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
260          UA     100
             *
             *
             * *** COMBINE  CA21H ***********************************************************
             * COMBINE A21GRR AND BASIN A21H
             * DDM   ***** Preserved *****

261          KK   CA21H    0.17
262          HC       2
             *
             *

263          KK  A21HRR
264          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #12) IN SUB-BASIN A21H.
265          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
266          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
267          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
268          KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
269          RS       1    ELEV    1295
270          SV       0    0.69    1.42    2.18    2.96    3.73    4.51    5.28    6.06
271          SE    1295  1295.5    1296  1296.5    1297  1297.5    1298  1298.5    1299
272          SQ       0      19      60     119     187     262     345     435     531
             *
             *
             * DDM   ***** Updated *****

273          KK    A21I   BASIN
274          KM   SUB-BASIN A21I
275          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
276          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
277          KM     L = .37  Kb = .031  Adj. Slope = 315.0
278          BA    .037
279          LG    0.15    0.35    4.45    0.36      44
280          UC    .117    .076
281          UA       0       3       5       8      12      20      43      75      90      96
282          UA     100
             *
             *
             * *** ROUTE RA21I ***********************************************************
             * ROUTE RA21I IS 1910 FT WITH APPROX. SLOPE OF .0085 (MEASURED FROM 1996 TOPO)
             * CROSS SECTION IS THROUGH A TYPICAL LOCAL STREET
             * WITH A VALLEY GUTTER AT ROAD CENTERLINE.
             *
             * ROUTE FLOW TO CA21J FROM BASIN A21I
             * DDM   ***** Preserved *****
```



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

283          KK   RA21I
284          KO       3
285          RS       5    FLOW      -1
286          RC    .030    .018    .030    1910   .0085
287          RX     100     100   107.5   107.5   142.5   142.5     150     150
288          RY     3.5       1     .25       0       0     .25       1     3.5
```

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*
*
* DDM   ***** Updated *****

KK    A21J   BASIN
KM   SUB-BASIN A21J
KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
KM     L = .50  Kb = .051  Adj. Slope = 36.0
BA    .112
LG    0.24    0.25    4.90    0.37      46
UC    .183    .112
UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
UA     100
*
*
* *** COMBINE  CA21J ************************************************************
* COMBINE A21HRR, RA21I AND BASIN A21J
* DDM   ***** Preserved *****

KK   CA21J
HC       3    0.32
*
*

KK  A21JRR
KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #13) IN SUB-BASIN A21J.
KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
RS       1    ELEV  1289.5
SV       0    0.40    0.83    1.29    1.78    2.29    2.81    3.34    3.88
SE  1289.5    1290  1290.5    1291  1291.5    1292  1292.5    1293  1293.5
SQ       0      24      75     149     233     327     431     544     664
*
*
* *** ROUTE RA21J ***************************************************************
* ROUTE RA21J IS 1325 FT WITH APPROX. SLOPE OF .0075 (MEASURED FROM 1996 TOPO)
* CROSS SECTION IS EXISTING TRAPAZOIDAL CREEK AND GOLF COURSE
* BETWEEN LAKE #13 AND LAKE #14
*
* ROUTE FLOW TO CA21N FROM A21JRR
* DDM   ***** Preserved *****
```



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

KK   RA21J
KO       3
RS       5    FLOW      -1
RC    .025    .025    .025    1325   .0075
RX       0     100     220     400     406     586     700     800
RY       8       7       6       0       0       6       7       8
*
*
* DDM   ***** Updated *****

KK    A21N   BASIN
KM   SUB-BASIN A21N
KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
KM     L = .71  Kb = .043  Adj. Slope = 28.0
BA    .258
LG    0.23    0.24    4.65    0.44      33
UC    .208    .107
UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
UA     100
*
*
* *** COMBINE  CA21N ************************************************************
* COMBINE RA21L, RA21M, RA21J AND BASIN A21N
* DDM   ***** Preserved *****

KK   CA21N
HC       4    0.75
*
*

KK  A21NRR
```

```
330          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #14) IN SUB-BASIN A21N.
331          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
332          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
333          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
334          KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
335          RS       1    ELEV    1277
336          SV       0    2.93    5.97    9.12   12.39   15.76   19.19   22.67   26.20
337          SE    1277  1277.5    1278  1278.5    1279  1279.5    1280  1280.5    1281
338          SQ       0      24      75     149     233     327     431     544     664
             *
             *
             * DDM   ***** Updated *****

339          KK    A21O   BASIN
340          KM   SUB-BASIN A21O
341          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
342          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
343          KM     L = .16  Kb = .035  Adj. Slope = 12.0
344          BA    .011
345          LG    0.08    0.19    4.80    0.42      76
346          UC    .150    .136
347          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
```



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

348          UA     100
             *
             *
             * *** COMBINE  CA21O ***********************************************************
             * COMBINE A21NRR AND BASIN A21O
             * DDM   ***** Preserved *****

349          KK   CA21O
350          HC       2    0.76
             *
             *

351          KK  A21ORR
352          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #15) IN SUB-BASIN A21O.
353          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
354          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
355          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
356          KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
357          RS       1    ELEV  1272.5
358          SV       0    0.76    1.55    2.36    3.19    4.05    4.91    5.80    6.69
359          SE  1272.5    1273  1273.5    1274  1274.5    1275  1275.5    1276  1276.5
360          SQ       0      44     134     268     420     589     776     978    1195
             *
             *
             * DDM   ***** Updated *****

361          KK    A21U   BASIN
362          KM   SUB-BASIN A21U
363          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
364          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
365          KM     L = .62  Kb = .045  Adj. Slope = 16.0
366          BA    .145
367          LG    0.22    0.23    4.70    0.42      34
368          UC    .258    .169
369          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
370          UA     100
             *
             *
             * *** STORAGE LA21U ************************************************************
             * APPROX. 17.3 ACRES FROM ARROWHEAD RANCH PARCEL 8
             * RETAINED FOR THE 100-YR, 2-HR STORM EVENT.
             * REQUIRED VOLUME = 2 AC.-FT.
             * DDM   ***** Updated *****

371          KK   LA21U
372          DT   A21UR       2
373          DI       0   10000
374          DQ       0   10000
             *
             *
             * *** COMBINE  CA21U ************************************************************
             * COMBINE A21ORR AND BASIN A21U (LA21U)
             * DDM   ***** Preserved *****
```

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

 375          KK   CA21U
 376          HC       2    0.90
              *
              *

 377          KK  A21URR
 378          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #16) IN SUB-BASIN A21U.
 379          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
 380          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
 381          KM   NOTE: WEIR CREST IS APPROX. 2-3 FT ABOVE THE EXISTING WATER SURFACE IN LAKE.
 382          KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
 383          KO       3       2
 384          RS       1    ELEV  1267.5
 385          SV       0    3.75    7.54   11.36   15.21   19.08   22.97   26.89   30.84   34.81
 386          SV   38.81
 387          SE  1267.5    1268  1268.5    1269  1269.5    1270  1270.5    1271  1271.5    1272
 388          SE  1272.5
 389          SQ       9      25      84     159     229     310     380     449     504     550
 390          SQ     596
              *
              *
              * *** DIVERSION  DA21U ***********************************************************
              * DIVERSION OF LAKE #16: MAIN WEST TO LAKE WEST OF 67TH AVE.
              * SPLIT SOUTH TO BEARDSLEY RD. VIA LAKE'S EMERGENCY STORM DRAIN ON 67TH AVE.
              * ASSUME FLOW IN 24" PVC S.D. IS FULL AT A APPROX. SLOPE OF 0.0025 = 15 CFS.
              * CONSERVATIVE: DIVERTED FLOW AFTER STORAGE ROUTING.
              * DDM   ***** Updated *****

 391          KK   DA21U
 392          DT  DA21US
 393          DI       0      15     100     500    1000    5000
 394          DQ       0      15      15      15      15      15
              *
              *

 395          KK  N21A36   BASIN
 396          BA    .016
 397          LG    0.25    0.35    2.65    1.40      30
 398          UC   0.317   0.336
 399          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 400          UA     100
              *
              *

 401          KK  N21AP3   BASIN
 402          KO       3       2
 403          BA    .009
 404          LG    0.16    0.35    2.65    1.31      52
 405          UC   0.346   0.517
 406          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 407          UA     100
              *
              *
              * DDM   ***** Preserved *****
```



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

 408          KK  C21AP3
 409          HC       3
              *
              * *** STORAGE L21AP3 ************************************************************
              *
              * ASSUMED A 110' WEIR- 1' WIDE (REPORT)
              * WEIR ELEVATION IS 1267.5' (SURVEY) WSEL = 1267.5' (SURVEY)
              * WEIR COEFF = 3.11
              *

 410          KK  L21AP3
 411          KO       3       0       0       0      21
 412          RS       1    STOR       0
 413          SQ       0     121     629    1352
 414          SE  1267.5    1268    1269    1270
 415          SV       0    1.05    3.23    5.55
 416          SE  1267.5    1268    1269    1270
              *
              *
```

```
417          KK  N21A25   BASIN
418          BA    .004
419          LG    0.10    0.35    2.65    1.70      80
420          UC   0.121   0.151
421          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
422          UA     100
             *
             *
             * *** ROUTE R21A25 ************************************************************
             * ROUTE R21A25 IS 978 FT WITH A SLOPE OF 0.0082
             * CROSS SECTION IS A SUBDIVISION ROAD
             *
             * DDM   ***** Preserved *****

423          KK  R21A25
424          RS       5    FLOW       0
425          RC    0.03    0.02    0.03     978  0.0082
426          RX       0       1      50      55      90      95     145     146
427          RY       8       3     0.5       0       0     0.5       3       8
             *
             *

428          KK  N21A24   BASIN
429          BA    .018
430          LG    4.00    0.35    2.65    1.40      30
431          UC   0.400   0.422
432          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
433          UA     100
             *
             *
```



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

434          KK  N21A26   BASIN
435          BA    .026
436          LG    0.25    0.35    2.65    1.40      30
437          UC   0.446   0.522
438          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
439          UA     100
             *
             *

440          KK  N21A27   BASIN
441          BA    .004
442          LG    0.20    0.29    2.65    1.90       0
443          UC   0.358   0.561
444          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
445          UA     100
             *
             *
             * DDM   ***** Preserved *****

446          KK  C21A27
447          HC       4
             *
             * *** STORAGE L21A27 ************************************************************
             *
             * 30' WEIR (10' WIDE) (DRAINAGE REPORT), WEIR ELEVATION = 1284 (SURVEY & REPORT)
             *    WEIR COEFF = 2.543
             * THE 1-8"PVC THAT DRAINS THIS BASIN WAS TAKEN FROM THE DRAINAGE REPORT.
             *

448          KK  L21A27
449          RS       1    STOR       0
450          SQ       0       1       3      76     216
451          SE    1281    1282    1284    1285    1286
452          SV       0     0.2    2.07     2.1     2.1
453          SE    1281    1282    1284    1285    1286
             *
             *

454          KK  N21A23   BASIN
455          BA    .026
456          LG    0.25    0.35    2.65    1.40      30
457          UC   0.450   0.501
458          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
459          UA     100
             *
```

```
                 *
                 * *** ROUTE R21A23 ***********************************************************
                 * ROUTE R21A23 IS 1204 FT WITH A SLOPE OF 0.005
                 * CROSS SECTION IS A SWALE
                 *
                 * DDM   ***** Preserved *****
1                                          HEC-1 INPUT                                          PAGE 16

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

 460             KK  R21A23
 461             RS       4    FLOW       0
 462             RC    0.03     .03    0.03    1204    .005
 463             RX       0       1      11      66      86      97     108     109
 464             RY       8       4       3       0       0       3       4       8
                 *
                 *

 465             KK  N21A28   BASIN
 466             BA    .006
 467             LG    0.20    0.35    2.65    1.90       0
 468             UC   1.242   3.148
 469             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 470             UA     100
                 *
                 *

 471             KK  N21A29   BASIN
 472             BA    .017
 473             LG    0.25    0.35    2.65    1.40      30
 474             UC   0.467   0.749
 475             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 476             UA     100
                 *
                 *
                 * DDM   ***** Preserved *****

 477             KK  C21A28
 478             HC       4
                 *
                 *
                 * *** STORAGE L2A281 *********************************************************
                 *
                 * 30' WEIR (30' WIDE)(DRAINAGE REPORT), WEIR ELEVATION = 1284 (SURVEY),
                 * WEIR COEF = 2.7
                 * THE 2-8" PVC PIPES THAT DRAIN THE BASIN WERE ASSUMED TO BE 1-12" WITH
                 * INLET CONTROL. (IE = 1280.0 - SURVEY)
                 *

 479             KK  L2A281
 480             RS       1    STOR       0
 481             SQ       2       5       7     116     314
 482             SE    1281    1282    1284    1285    1286
 483             SV       0    0.14    1.56    1.56     1.6
 484             SE    1281    1282    1284    1285    1286
                 *
                 *
                 * *** STORAGE L2A282 *********************************************************
                 *
                 * ASSUMED A 50' WEIR-20' WIDE (SURVEY), WEIR ELEVATION = 1281' (SURVEY)
                 * WEIR COEFF = 2.685
                 * THE 8" PVC PIPES THAT DRAIN THE BASIN WERE ASSUMED TO BE 1-12" WITH
                 * INLET CONTROL. (IE = 1277.4 - SURVEY)
                 *
1                                          HEC-1 INPUT                                          PAGE 17

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

 485             KK  L2A282
 486             RS       1    STOR       0
 487             SQ       4       6     143     391
 488             SE    1279    1280    1282    1283
 489             SV       0    0.19    1.59     1.6
 490             SE    1279    1280    1282    1283
                 *
                 *

 491             KK  N21A32   BASIN
 492             BA    .004
```

```
493          LG    0.20    0.35    2.65    1.90       0
494          UC   0.404   0.675
495          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
496          UA     100
             *
             *
             * DDM   ***** Preserved *****

497          KK  C21A32
498          HC       2
             *
             *
             * *** STORAGE L2A283 ***********************************************************
             *
             * ASSUMED A 40' WEIR-30' WIDE (SURVEY & REPORT)
             * WEIR ELEVATION = 1277' (SURVEY & REPORT)
             * WEIR COEFF = 2.69
             * THE 8" PVC PIPES THAT DRAIN THE BASIN WERE ASSUMED TO BE 1-12" WITH
             * INLET CONTROL. (IE = 1274 - SURVEY)
             *
             *

499          KK  L2A283
500          RS       1    STOR       0
501          SQ       0       5       6     108     304
502          SE    1274    1276    1277    1278    1279
503          SV       0    0.19    0.44    0.44    0.44
504          SE    1274    1276    1277    1278    1279
             *
             *

505          KK  N21A31   BASIN
506          BA    .017
507          LG    0.25    0.35    2.65    1.40      30
508          UC   0.308   0.299
509          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
510          UA     100
             *
             *
```



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

511          KK  N21A33   BASIN
512          BA    .039
513          LG    0.24    0.35    2.65    1.38      28
514          UC   0.504   0.541
515          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
516          UA     100
             *
             *
             * DDM   ***** Preserved *****

517          KK  C21A33
518          HC       3
             *
             *

519          KK  N21A22   BASIN
520          BA    .007
521          LG    0.05    0.35    2.65    1.80      95
522          UC   0.333   0.864
523          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
524          UA     100
             *
             *
             * *** DIVERSION RECOVER DRN23A  ***********************************************
             * RECOVER DIVERTED FLOW FROM  DEER VALLEY RD (CN23A)
             * DDM   ***** Preserved *****

525          KK  DRN23A
526          DR   N23AI
             *
             *
             * *** ROUTE RN23AS *************************************************************
             * ROUTE RN23AS IS 6853 FT WITH A SLOPE OF 0.005
             * CROSS SECTION IS A MEDIUM ROAD WITH FENCE ON BOTH SIDES
             * ALONG local STREETS
             * ROUTE FLOW TO Loop 101 (CN21A) FROM DEER VALLEY RD (CN23A)
             * DDM   ***** Preserved *****
```

```
527          KK  RN23AS
528          RS       2    FLOW       0
529          RC    0.04    0.03    0.04    6853   0.005
530          RX       0       1      29      30      80      81     109     110
531          RY    9.25    1.25    0.25       0       0    0.25    1.25    9.25
             *
             * DDM   ***** Preserved *****

532          KK  C21A22
533          HC       2
             *
             *
             * *** DIVERSION DN21A22 ******************************************************
             * CURB INLETS WILL CAPTURE 2.6 CFS MAX, THE REMAINING FLOW CONTINUES DOWN THE
             * STREET.
             * DDM   ***** Preserved *****
1                                        HEC-1 INPUT                                                    PAGE 19

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

534          KK  D21A22
535          DT  21A22I
536          DI       0       1       2       3       4       6       8       9      10
537          DQ       0       0       0      .4     1.4     3.4     5.4     6.4     7.4
             *
             *

538          KK  N21A30   BASIN
539          BA    .024
540          LG    0.25    0.35    2.65    1.40      30
541          UC   0.412   0.476
542          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
543          UA     100
             *
             *

544          KK  N21AP1   BASIN
545          BA    .017
546          LG    0.14    0.35    2.65    1.28      57
547          UC   1.004   1.592
548          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
549          UA     100
             *
             * DDM   ***** Preserved *****

550          KK  C21AP1
551          HC       4
             *
             *
             * *** STORAGE L21AP1 *********************************************************
             *
             * ASSUMED A 25' WEIR-10'WIDE (SURVEY)
             * WEIR ELEVATION AT 1275'(SURVEY & REPORT)
             * MAX WSEL = 1275'
             * WEIR COEFF = 2.695
             *

552          KK  L21AP1
553          KO       3
554          RS       1    STOR       0
555          SQ       0      67     191     355
556          SE    1275    1276    1277    1278
557          SV       0    5.11   10.69   17.07
558          SE    1275    1276    1277    1278
             *
             *

559          KK  N21AP2   BASIN
560          BA    .015
561          LG    0.23    0.35    2.65    1.42      32
562          UC   0.346   0.304
563          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
564          UA     100
             *
             *
             * DDM   ***** Preserved *****
1                                        HEC-1 INPUT                                                    PAGE 20

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

```
565          KK  C21AP2
566          HC       2
             *
             *
             * *** STORAGE L21AP2 ********************************************************
             *
             * ASSUMED A 100 FOOT WIER  WIER ELEVATION AT 1272'  WSEL = 1272'
             * THIS LAKE HAS VIRTUALLY NO STORAGE AND WAS PLACED IN THE PROGRAM TO GET
             * THE WSEL AT THE WEIR.
             *

567          KK  L21AP2
568          KO       3
569          RS       1    STOR       0
570          SQ       0       5     270     765
571          SE    1271    1272    1273    1274
572          SV       0       0    0.06    0.16
573          SE    1271    1272    1273    1274
             *
             *
             *

574          KK  N21A37   BASIN
575          BA    .013
576          LG    0.25    0.35    2.65    1.40      30
577          UC   0.313   0.320
578          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
579          UA     100
             *
             *
             * DDM   ***** Preserved *****

580          KK  C21APA
581          HC       3
             *
             *

582          KK  N21A34   BASIN
583          BA    .016
584          LG    0.25    0.29    2.65    1.40      30
585          UC   0.300   0.329
586          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
587          UA     100
             *
             *

588          KK  N21A35   BASIN
589          BA    .012
590          LG    0.25    0.35    2.65    1.40      30
591          UC   0.250   0.263
592          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
593          UA     100
             *
             *
```



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

594          KK  N21AP5   BASIN
595          BA    .008
596          LG    0.14    0.35    2.65    1.46      42
597          UC   0.246   0.305
598          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
599          UA     100
             *
             * *** STORAGE L21AP5 ********************************************************
             *
             * ASSUMED A 40' WEIR-40'WIDE (SURVEY)
             * WEIR ELEVATION IS 1268.5' (SURVEY)  WSEL = 1266' (FULL - SURVEY)
             * WEIR COEFF = 2.68
             * 36" RCP EQUALIZER CULVERT 1/2 SUBMERGED IE = 1263.1' (ASSUMED NO EFFECT)
             *

600          KK  L21AP5
601          KO                                      21
602          RS       1    STOR       0
603          SQ       0       0       7      38     197
604          SE    1265    1266    1268    1269    1270
605          SV       0       0    3.63    5.72    8.12
```

```
606          SE    1265    1266    1268    1269    1270
             *
             *

607          KK  N21AP4   BASIN
608          BA    .030
609          LG    0.12    0.35    2.65    1.38      52
610          UC   0.471   0.419
611          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
612          UA     100
             *
             *
             * DDM   ***** Preserved *****

613          KK  C21APB
614          HC       5
             *
             * *** STORAGE L21AP4 ***********************************************************
             *
             * WEIR = 87' 1' WIDE (SURVEY)
             * WEIR ELEVATION IS 1265.7' (SURVEY) WSEL = 1265.7' (FULL)
             * WEIR COEFF = 3.24  (CULVERT REDUCES WEIR FLOW AT 1268' FROM 820CFS TO 768CFS)
             *

615          KK  L21AP4
616          KO       3
617          RS       1    STOR       0
618          SQ       0      46     418     768
619          SE    1265    1266    1267    1268
620          SV       0    2.79   11.60   21.28
621          SE    1265    1266    1267    1268
             *
             *
             *
```



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

622          KK  N21A39   BASIN
623          BA    .010
624          LG    0.05    0.35    2.65    1.80      95
625          UC   0.512   1.409
626          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
627          UA     100
             *
             *
             * *** DIVERSION RECOVER DR21A22  ******************************************
             * RECOVER FLOWS FROM D21A22

628          KK  DR2122
629          DR  21A22I
             *
             *
             * *** ROUTE R21A22 *************************************************************
             * ROUTE R21A22 IS 2699 FT WITH A SLOPE OF 0.0041
             * CROSS SECTION IS A SWALE
             *
             * DDM   ***** Preserved *****

630          KK  R21A22
631          RS      14    FLOW       0
632          RC    0.03     .03    0.03    2699   .0041
633          RX       0       1      21      22      64      65      85      90
634          RY       8       4       3     2.5     2.5       3       4       5
             *
             *
             * DDM   ***** Preserved *****

635          KK  C21A39
636          HC       3
             *
             *
             * *** ROUTE R21A39 *************************************************************
             * ROUTE R21A39 IS 1068 FT WITH A SLOPE OF 0.0056
             * CROSS SECTION IS A DRAINAGE CHANNEL
             *
             * DDM   ***** Preserved *****

637          KK  R21A39
638          KO       0       0       0       0      21
```

```
 639          RS       4    FLOW       0
 640          RC   0.035   0.035   0.035    1068  0.0056
 641          RX       0       1      30      55      90     115     145     146
 642          RY       8       4       2       0       0       2       4       8
              *
              *
1                                          HEC-1 INPUT                                                          PAGE 23

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

 643          KK  N21A40   BASIN
 644          BA    .053
 645          LG    0.24    0.35    2.65    1.48      25
 646          UC   0.546   0.525
 647          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 648          UA     100
              *
              *
              * DDM   ***** Preserved *****

 649          KK  C21A40
 650          HC       2
              *
              *

 651          KK  N21A41   BASIN
 652          BA    .028
 653          LG    0.25    0.35    2.65    1.40      30
 654          UC   0.475   0.507
 655          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 656          UA     100
              *
              *

 657          KK  N21A42   BASIN
 658          BA    .021
 659          LG    0.25    0.35    2.65    1.40      30
 660          UC   0.475   0.495
 661          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 662          UA     100
              *
              *

 663          KK  N21A43   BASIN
 664          BA    .004
 665          LG    0.22    0.35    2.65    1.70      12
 666          UC   0.242   0.287
 667          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 668          UA     100
              *
              *
              * DDM   ***** Preserved *****

 669          KK  C21A42
 670          HC       4
              *
              * *** STORAGE L21A43 ***********************************************************
              *
              * WEIR = 65'-15'WIDE (SURVEY)  WEIR ELEVATION IS 1257' (SURVEY)
              * WEIR COEFFECIENT = 2.64
              * 24"RCP RELIEF SEWER FL=1252.3 (SURVEY)
              *
1                                          HEC-1 INPUT                                                          PAGE 24

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

 671          KK  L21A43
 672          KO       3
 673          RS       1    STOR       0
 674          SQ       0      10      16      24      29     205     525     928
 675          SE    1253    1254    1255    1256    1257    1258    1259    1260
 676          SV       0    0.16    0.76    1.42    1.84    3.74    3.75    3.75
 677          SE    1253    1254    1255    1256    1257    1258    1259    1260
              *
              *
              *
              * DDM   ***** Updated *****

 678          KK    A21P   BASIN
```

```
679          KM   SUB-BASIN A21P
680          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
681          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
682          KM     L = .40  Kb = .058  Adj. Slope = 12.0
683          BA    .035
684          LG    0.22    0.14    7.60    0.12      46
685          UC    .267    .277
686          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
687          UA     100
             *
             *

688          KK  A21PRR
689          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #17) IN SUB-BASIN A21P.
690          KM   ASSUME LAKE OUTFALL BY OVERTOPPING ADJACENT ROADWAY ON WEST.
691          KM   EXISTING WATER SURFACE AND STREET ELEVATIONS WERE REFERENCE FROM
692          KM   THE 1996 FCD TOPO FILE.
693          KM   NOTE 24" PIPE OUTLET PER CAMELOT VIEWS AT ARROWHEAD RANCH REPORT - 1993.
694          KM   ASSUME PIPE IS RUNNING FULL WITH GRATED INLET AT WATER SUFACE LEVEL.
695          KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
696          RS       1    ELEV    1278
697          SV       0    0.65    1.35    2.07    2.81    5.02    5.78    8.05    8.81
698          SE    1278  1278.5    1279  1279.5    1280  1280.5    1281  1281.5    1282
699          SQ       0      16      16      16      16      16      16     122     322
             *
             *
             * *** ROUTE  RA21P ***********************************************************
             * FLOW IN 24" OUTLET STROM DRAIN WEST TO LAKE #18
             * ROUTE RA21P IS 500 FT WITH APPROX. SLOPE OF 0.0050 (MEASURED)
             * CROSS SECTION IS A 24" CONCRETE PIPE PER CAMELOT VIEWS REPORT - 1993.
             *
             * *** ROUTE FLOW TO CA21Q FROM BASIN A21PRR (LAKE #17) *************************
             * DDM   ***** Updated *****

700          KK  RA21P
701          RS       1    FLOW      -1
702          RD     500   .0050    .013            CIRC       2
             *
             * DDM   ***** Updated *****
```



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

703          KK    A21V   BASIN
704          KM   SUB-BASIN A21V
705          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
706          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
707          KM     L = .31  Kb = .031  Adj. Slope = 26.0
708          BA    .037
709          LG    0.19    0.14    8.40    0.12       7
710          UC    .142    .109
711          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
712          UA     100
             *
             *
             * *** STORAGE LA21V ***********************************************************
             * APPROX. 23.9 ACRES FROM BASIN A21V, ARROWHEAD LAKES GOLF COURSES
             * RETAINED FOR THE 100-YR, 24-HR  STORM EVENT.
             * REQUIRED VOLUME = 2 AC.-FT.
             * ASSUME GOLF COURSE IS 100% RETAINED ITSELF, AND DRAINS VIA DRYWELLS.
             * DDM   ***** Updated *****

713          KK   LA21V
714          DT   A21VR
715          DI       0   10000
716          DQ       0   10000
             *
             *
             *
             * DDM   ***** Updated *****

717          KK    A21Q   BASIN
718          KM   SUB-BASIN A21Q
719          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
720          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
721          KM     L = .82  Kb = .060  Adj. Slope = 43.0
722          BA    .043
723          LG    0.24    0.24    4.70    0.38      41
724          UC    .254    .415
725          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
```

```
726          UA     100
             *
             *
             * *** COMBINE  CA21Q ********************************************************
             * COMBINE RA21P AND BASIN A21Q
             * DDM   ***** Preserved *****

727          KK   CA21Q
728          HC       3
             *
             *
```



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

729          KK  A21QRR
730          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #18) IN SUB-BASIN A21Q.
731          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
732          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
733          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
734          KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
735          KO       0       0       0       0      21
736          RS       1    ELEV  1277.5
737          SV       0    0.39    0.80    1.22    1.66    2.12    2.58    3.04    3.51
738          SE  1277.5    1278  1278.5    1279  1279.5    1280  1280.5    1281  1281.5
739          SQ       0      29      89     179     280     393     518     652     797
             *
             *
             * DDM   ***** Updated *****

740          KK    A21R   BASIN
741          KM   SUB-BASIN A21R
742          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
743          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
744          KM     L = .15  Kb = .066  Adj. Slope = 20.0
745          BA    .008
746          LG    0.22    0.22     4.8    0.36      48
747          UC    .162    .169
748          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
749          UA     100
             *
             *
             * *** COMBINE  CA21R ********************************************************
             * COMBINE A21QRR AND BASIN A21R
             * DDM   ***** Preserved *****

750          KK   CA21R
751          HC       2
             *
             *

752          KK  A21RRR
753          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #19) IN SUB-BASIN A21R.
754          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
755          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
756          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
757          KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
758          RS       1    ELEV    1276
759          SV       0    0.34    0.71    1.08    1.47    1.88    2.30    2.71    3.13
760          SE    1276  1276.5    1277  1277.5    1278  1278.5    1279  1279.5    1280
761          SQ       0      24      75     149     233     327     431     544     664
             *
             *
             * DDM   ***** Updated *****
```



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

762          KK    A21S   BASIN
763          KM   SUB-BASIN A21S
764          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
765          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
766          KM     L = .23  Kb = .064  Adj. Slope = 22.0
767          BA    .015
768          LG    0.23    0.23    4.70    0.36      44
769          UC    .188    .196
770          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
771          UA     100
             *
```

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                 *
                 * *** COMBINE  CA21S ***********************************************************
                 * COMBINE A21RRR AND BASIN A21S
                 * DDM   ***** Preserved *****

 772             KK   CA21S
 773             HC       2
                 *
                 *

 774             KK  A21SRR
 775             KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #20) IN SUB-BASIN A21S.
 776             KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
 777             KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
 778             KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
 779             KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
 780             RS       1    ELEV    1273
 781             SV       0    0.33    0.67    1.03    1.40    1.78    2.16    2.54    2.93
 782             SE    1273  1273.5    1274  1274.5    1275  1275.5    1276  1276.5    1277
 783             SQ       0      29      89     179     280     393     518     652     797
                 *
                 *
                 * DDM   ***** Updated *****

 784             KK    A21T   BASIN
 785             KM   SUB-BASIN A21T
 786             KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
 787             KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
 788             KM     L = .31  Kb = .056  Adj. Slope = 23.0
 789             BA    .038
 790             LG    0.21    0.22    5.00    0.33      48
 791             UC    .188    .146
 792             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 793             UA     100
                 *
                 *
                 * *** COMBINE  CA21T ***********************************************************
                 * COMBINE A21SRR AND BASIN A21T
                 * DDM   ***** Preserved *****
```



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

 794             KK   CA21T
 795             HC       2
                 *
                 *

 796             KK  A21TRR
 797             KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #21) IN SUB-BASIN A21T.
 798             KM   ASSUME LAKE OUTFALL BY OVERTOPPING ADJACENT ROADWAY ON WEST.
 799             KM   EXISTING WATER SURFACE ELEVATION WAS MEASURED BY PENTACORE, AND
 800             KM   STREET ELEVATION WAS ESTIMATED FROM THE 1996 FCD TOPO FILE.
 801             KM   NOTE 24" PIPE OUTLET TO ADOT 42" STROM DRAIN ALONG BEARDSLEY RD. PER
 802             KM   CAMELOT VIEWS AT ARROWHEAD RANCH REPORT-1993.
 803             KM   ASSUME PIPE IS RUNNING FULL WITH GRATED INLET AT WATER SUFACE LEVEL.
 804             KM   SOURCE: NEW ANALYSIS FOR ARROWHEAD RANCH.
 805             RS       1    ELEV    1268
 806             SV       0    1.71    3.50    5.34    7.22    9.12   11.01   12.91   14.81
 807             SE    1268  1268.5    1269  1269.5    1270  1270.5    1271  1271.5    1272
 808             SQ       0      16      16      16      16      16      16      53     153
                 *
                 *
                 * *** ROUTE RA21T **************************************************************
                 * ROUTE RA21T IS 1050 FT WITH APPROX. SLOPE OF .0050 (MEASURED)
                 * CROSS SECTION IS A 24" CONCRETE PIPE PER CAMELOT VIEWS REPORT - 1993.
                 * ROUTE FLOW TO C21AE FROM A21TRR, AND ULTIMATELY TO THE EXISTING ADOT
                 * 42" STORM DRAIN ALONG NORTH SIDE OF BEARDSLEY RD.
                 * DDM   ***** Preserved *****

 809             KK   RA21T
 810             RS       3    FLOW      -1
 811             RD    1050   .0050    .013            CIRC       2
                 *
                 *
                 * DDM   ***** Updated *****

 812             KK   A21AE   BASIN
 813             KM   SUB-BASIN A21AE
 814             KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
```

```
815          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
816          KM     L = .24  Kb = .055  Adj. Slope = 29.0
817          BA    .047
818          LG    0.23    0.18    7.00    0.13      34
819          UC    .150    .082
820          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
821          UA     100
             *
             *
             * *** STORAGE LA21AE ***********************************************************
             * APPROX. 30.2 ACRES FROM BASIN A21AE, ARROWHEAD LAKES RESIDENTIAL DEVELOPMENT
             * RETAINED FOR THE 100-YR, 2-HR STORM EVENT.
             * REQUIRED VOLUME = 3.4 AC.-FT.
             * DDM   ***** Updated *****
1                                          HEC-1 INPUT                                          PAGE 29
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

822          KK  LA21AE
823          DT  A21AER     3.4
824          DI       0   10000
825          DQ       0   10000
             *
             *
             * DDM   ***** Updated *****

826          KK   A21AF   BASIN
827          KM   SUB-BASIN A21AF
828          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
829          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
830          KM     L = .10  Kb = .071  Adj. Slope = 40.0
831          BA    .004
832          LG    0.23    0.27    5.60    0.24      35
833          UC    .117    .126
834          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
835          UA     100
             *
             *
             * *** STORAGE LA21AF ***********************************************************
             * APPROX. 2.75 ACRES FROM BASIN A21AF, ARROWHEAD LAKES RESIDENTIAL DEVELOPMENT
             * RETAINED FOR THE 100-YR, 2-HR STORM EVENT.
             * REQUIRED VOLUME = 0.35 AC.-FT.
             * DDM   ***** Updated *****

836          KK  LA21AF
837          DT  A21AFR    0.35
838          DI       0   10000
839          DQ       0   10000
             *
             *
             * DDM   ***** Updated *****

840          KK    A21X   BASIN
841          KM   SUB-BASIN A21X
842          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
843          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
844          KM     L = .56  Kb = .033  Adj. Slope = 29.0
845          BA    .024
846          LG    0.20    0.25    5.70    0.33       2
847          UC    .200    .327
848          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
849          UA     100
             *
             *
             * *** STORAGE LA21X ************************************************************
             * APPROX. 15.45 ACRES FROM BASIN A21X, ARROWHEAD LAKES GOLF COURSES
             * RETAINED FOR THE 100-YR, 24-HR STORM EVENT.
             * REQUIRED VOLUME = 1.3 AC.-FT.
             * ASSUME GOLF COURSE IS 100% RETAINED ITSELF, AND DRAINS VIA DRYWELLS.
             * DDM   ***** Updated *****
1                                          HEC-1 INPUT                                          PAGE 30
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

850          KK   LA21X
851          DT   A21XR
852          DI       0   10000
853          DQ       0   10000
             *
```

```
                *
                * DDM   ***** Updated *****

 854            KK    A21W   BASIN
 855            KM   SUB-BASIN A21W
 856            KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
 857            KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
 858            KM     L = .41  Kb = .033  Adj. Slope = 22.0
 859            BA    .018
 860            LG    0.20    0.25    4.70    0.51       2
 861            UC    .196    .293
 862            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 863            UA     100
                *
                *
                * *** STORAGE LA21W ***********************************************************
                * APPROX. 11.25 ACRES FROM BASIN A21W, ARROWHEAD LAKES GOLF COURSES
                * RETAINED FOR THE 100-YR, 24-HR STORM EVENT.
                * REQUIRED VOLUME = 1 AC.-FT.
                * ASSUME GOLF COURSE IS 100% RETAINED ITSELF, AND DRAINS VIA DRYWELLS.
                * DDM   ***** Updated *****

 864            KK   LA21W
 865            DT   A21WR
 866            DI       0   10000
 867            DQ       0   10000
                *
                *
                * *** COMBINE  CA21AE ***********************************************************
                * COMBINE RA21T, A21AE, A21AF, A21X, AND A21W
                * DDM   ***** Preserved *****

 868            KK  CA21AE
 869            HC       5
                *
                *
                * DDM   ***** Updated *****

 870            KK    A21Y   BASIN
 871            KM   SUB-BASIN A21Y
 872            KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
 873            KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
 874            KM     L = .39  Kb = .064  Adj. Slope = 38.0
 875            BA    .050
 876            LG    0.23    0.16    8.00    0.10      32
 877            UC    .196    .157
 878            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 879            UA     100
                *
                *
                * *** STORAGE LA21Y ***********************************************************
                * APPROX. 32.2 ACRES FROM BASIN A21Y, ARROWHEAD LAKES RESIDENTIAL DEVELOPMENT
                * RETAINED FOR THE 100-YR, 2-HR STORM EVENT.
                * REQUIRED VOLUME = 3.65 AC.-FT.
                * DDM   ***** Updated *****
1                                        HEC-1 INPUT                                          PAGE 31

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

 880            KK   LA21Y
 881            DT   A21YR    3.65
 882            DI       0   10000
 883            DQ       0   10000
                *
                *
                * DDM   ***** Updated *****

 884            KK    A21Z   BASIN
 885            KM   SUB-BASIN A21Z
 886            KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
 887            KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
 888            KM     L = .44  Kb = .052  Adj. Slope = 39.0
 889            BA    .065
 890            LG    0.22    0.26    6.20    0.18      32
 891            UC    .188    .143
 892            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 893            UA     100
                *
                *
                * *** STORAGE LA21Z ***********************************************************
```

```
                * APPROX. 41.4 ACRES FROM BASIN A21Z, ARROWHEAD LAKES RESIDENTIAL DEVELOPMENT
                * RETAINED FOR THE 100-YR, 2-HR STORM EVENT.
                * REQUIRED VOLUME = 4.7 AC.-FT.
                * DDM   ***** Updated *****

894             KK   LA21Z
895             DT   A21ZR      4.7
896             DI       0    10000
897             DQ       0    10000
                *
                *
                * *** ROUTE RA21Z ***********************************************************
                * ROUTE RA21Z IS 750 FT WITH APPROX. SLOPE OF .0050 (MEASURED FROM 1996 TOPO)
                * CROSS SECTION IS EXISTING SWALE ALONG NORTH SIDE OF BEARDSLEY RD.
                *
                * ROUTE FLOW TO CA21AB FROM LA21Z
                * DDM   ***** Preserved *****

898             KK   RA21Z
899             RS       1    FLOW      -1
900             RC    .033    .033    .033     750    .005
901             RX       0     100     282     300     305     323     500     600
902             RY       8       7       6       0       0       6       7       8
                *
                *
                * DDM   ***** Updated *****

903             KK   A21AB   BASIN
904             KM   SUB-BASIN A21AB
905             KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
906             KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
907             KM     L = .26  Kb = .031  Adj. Slope = 12.0
908             BA    .036
```



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

909             LG    0.10    0.16    9.70    0.06      74
910             UC    .167    .115
911             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
912             UA     100
                *
                *
                * *** STORAGE LA21AB *******************************************************
                * APPROX. 23 ACRES FROM BASIN A21AB, COMMERCIAL DEVELOPMENT
                * ASSUME RETAINED 80% FOR THE 100-YR, 2-HR STORM EVENT.
                * REQUIRED VOLUME = 4.6 AC.-FT.
                * DDM   ***** Updated *****

913             KK  LA21AB
914             DT  A21ABR      3.7
915             DI       0    10000
916             DQ       0    10000
                *
                *
                * *** COMBINE  A21AB ********************************************************
                * COMBINE BASINS A21Y (LA21Y), A21Z (RA21Z),  AND A21AB (LA21AB)
                * DDM   ***** Preserved *****

917             KK  CA21AB
918             HC       3
                *
                *
                * *** ROUTE RA21AB **********************************************************
                * ROUTE RA21AB IS 1300 FT WITH APPROX. SLOPE OF .0025 (MEASURED)
                * CROSS SECTION IS EXISTING 42" ADOT STORM DRAIN ALONG BEARDSLEY RD.
                *
                * ROUTE FLOW TO CA21AD FROM CA21AB
                * DDM   ***** Preserved *****

919             KK  RA21AB
920             RS       2    FLOW      -1
921             RD    1300   .0025    .013            CIRC     3.5
                *
                *
                * DDM   ***** Updated *****

922             KK   A21AC   BASIN
923             KM   SUB-BASIN A21AC
924             KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
925             KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
```

```
926          KM     L = .20  Kb = .033  Adj. Slope = 30.0
927          BA    .022
928          LG    0.10    0.16    8.80    0.07      72
929          UC    .117    .083
930          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
931          UA     100
             *
             *
             * *** STORAGE LA21AC ***********************************************************
             * APPROX. 14.27 ACRES FROM BASIN A21AC, COMMERICAL DEVELOPMENT
             * ASSUME RETAINED 80% FOR THE 100-YR, 2-HR STORM EVENT.
             * REQUIRED VOLUME = 2.85 AC.-FT.
             * DDM   ***** Updated *****
1                                          HEC-1 INPUT                                          PAGE 33

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

932          KK  LA21AC
933          DT  A21ACR     2.3
934          DI       0   10000
935          DQ       0   10000
             *
             *
             * DDM   ***** Updated *****

936          KK   A21AA   BASIN
937          KM   SUB-BASIN A21AA
938          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
939          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
940          KM     L = .13  Kb = .066  Adj. Slope = 31.0
941          BA    .011
942          LG    0.24    0.14   10.10    0.04      37
943          UC    .129    .097
944          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
945          UA     100
             *
             *
             * *** STORAGE LA21AA ***********************************************************
             * APPROX. 7.0 ACRES FROM BASIN A21AA, ARROWHEAD LAKES RESIDENTIAL DEVELOPMENT
             * RETAINED FOR THE 100-YR, 2-HR STORM EVENT.
             * REQUIRED VOLUME = 0.8 AC.-FT.
             * DDM   ***** Updated *****

946          KK  LA21AA
947          DT  A21AAR     0.8
948          DI       0   10000
949          DQ       0   10000
             *
             *
             * DDM   ***** Updated *****

950          KK   A21AD   BASIN
951          KM   SUB-BASIN A21AD
952          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
953          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
954          KM     L = .41  Kb = .056  Adj. Slope = 20.0
955          BA    .053
956          LG    0.24    0.16    8.80    0.07      36
957          UC    .237    .196
958          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
959          UA     100
             *
             *
             * *** STORAGE LA21AD ***********************************************************
             * APPROX. 33.65 ACRES FROM BASIN A21AD, ARROWHEAD LAKES RESIDENTIAL DEVELOPMENT
             * RETAINED FOR THE 100-YR, 2-HR STORM EVENT.
             * REQUIRED VOLUME = 3.8 AC.-FT.
             * DDM   ***** Updated *****
1                                          HEC-1 INPUT                                          PAGE 34

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

960          KK  LA21AD
961          DT  A21ADR     3.8
962          DI       0   10000
963          DQ       0   10000
             *
             *
             * *** COMBINE  CA21AD ***********************************************************
```

```
                * COMBINE RA21AB, BASINS A21AA, A21AC (LA21AC) AND A21AD
                * DDM   ***** Preserved *****

 964            KK  CA21AD
 965            HC       4
                *
                *
                * *** ROUTE RA21AD ************************************************************
                * ROUTE RA21AD IS 1300 FT WITH APPROX. SLOPE OF .0025 (MEASURED)
                * CROSS SECTION IS EXISTING 42" ADOT STORM DRAIN ALONG BEARDSLEY RD.
                *
                * ROUTE FLOW TO A21AEC FROM CA21AD
                * DDM   ***** Preserved *****

 966            KK  RA21AD
 967            RS       2    FLOW      -1
 968            RD    1300   .0025    .013            CIRC     3.5
                *
                *
                * *** COMBINE  A21AEC ******************************************************
                * COMBINE CA21AE AND RA21AD
                * DDM   ***** Preserved *****

 969            KK  A21AEC
 970            HC       2
                *
                *
                * *** ROUTE RA21AE ************************************************************
                * ROUTE RA21AE IS 1225 FT WITH APPROX. SLOPE OF .0025 (MEASURED)
                * CROSS SECTION IS EXISTING 42" ADOT STORM DRAIN ALONG BEARDSLEY RD.
                * ROUTE FLOW TO CA21AG FROM A21AEC
                * DDM   ***** Preserved *****

 971            KK  RA21AE
 972            RS       2    FLOW      -1
 973            RD    1225   .0025    .013            CIRC     3.5
                *
                *
                * DDM   ***** Updated *****

 974            KK   A21AG   BASIN
 975            KM   SUB-BASIN A21AG
 976            KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
 977            KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
 978            KM     L = .23  Kb = .059  Adj. Slope = 30.0
 979            BA    .031
 980            LG    0.23    0.27    5.60    0.24      35
1                                             HEC-1 INPUT                                          PAGE 35

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

 981            UC    .154    .104
 982            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 983            UA     100
                *
                *
                * *** STORAGE LA21AG ******************************************************
                * APPROX. 19.75 ACRES FROM BASIN A21AG, ARROWHEAD LAKES RESIDENTIAL DEVELOPMENT
                * RETAINED FOR THE 100-YR, 2-HR STORM EVENT.
                * REQUIRED VOLUME = 2.25 AC.-FT.
                * DDM   ***** Updated *****

 984            KK  LA21AG
 985            DT  A21AGR    2.25
 986            DI       0   10000
 987            DQ       0   10000
                *
                *
                * *** COMBINE  CA21AG ******************************************************
                * COMBINE RA21AE AND BASIN A21AG (LA21AG)
                * DDM   ***** Preserved *****

 988            KK  CA21AG
 989            HC       2
                *
                *
                * *** ROUTE RA21AG ************************************************************
                * ROUTE RA21AG IS 950 FT WITH APPROX. SLOPE OF .0025 (MEASURED)
                * CROSS SECTION IS EXISTING 42" ADOT STORM DRAIN ALONG BEARDSLEY RD.
                *
                * ROUTE FLOW TO CA21AK (67TH AVE. & BEARDSLEY RD.) FROM CA21AG
```

```
                 * DDM    ***** Preserved *****

 990             KK  RA21AG
 991             RS       1    FLOW      -1
 992             RD     950   .0025    .013            CIRC     3.5
                 *
                 *
                 * DDM    ***** Updated *****

 993             KK   A21AH   BASIN
 994             KM   SUB-BASIN A21AH
 995             KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
 996             KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
 997             KM     L = .21  Kb = .060  Adj. Slope = 33.0
 998             BA    .025
 999             LG    0.23    0.26    4.90    0.33      36
1000             UC    .150    .106
1001             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1002             UA     100
                 *
                 *
                 * *** STORAGE LA21AH ***********************************************************
                 * APPROX. 16.1 ACRES FROM BASIN A21AH, ARROWHEAD LAKES RESIDENTIAL DEVELOPMENT
                 * RETAINED FOR THE 100-YR, 2-HR STORM EVENT.
                 * REQUIRED VOLUME = 1.85 AC.-FT.
                 * DDM    ***** Updated *****
1                                          HEC-1 INPUT                                          PAGE 36

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

1003             KK  LA21AH
1004             DT  A21AHR    1.85
1005             DI       0   10000
1006             DQ       0   10000
                 *
                 *
                 * DDM    ***** Updated *****

1007             KK   A21AI   BASIN
1008             KM   SUB-BASIN A21AI
1009             KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
1010             KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
1011             KM     L = .12  Kb = .068  Adj. Slope = 33.0
1012             BA    .007
1013             LG    0.24    0.26    4.80    0.35      37
1014             UC    .129    .118
1015             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1016             UA     100
                 *
                 *
                 * *** STORAGE LA21AI ***********************************************************
                 * APPROX. 4.65 ACRES FROM BASIN A21AI, ARROWHEAD RESIDENTIAL DEVELOPMENT
                 * RETAINED FOR THE 100-YR, 2-HR STORM EVENT.
                 * REQUIRED VOLUME = 0.55 AC.-FT.
                 * DDM    ***** Updated *****

1017             KK  LA21AI
1018             DT  A21AIR    0.55
1019             DI       0   10000
1020             DQ       0   10000
                 *
                 *
                 * DDM    ***** Updated *****

1021             KK   A21AJ   BASIN
1022             KM   SUB-BASIN A21AJ
1023             KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
1024             KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
1025             KM     L = .14  Kb = .067  Adj. Slope = 29.0
1026             BA    .011
1027             LG    0.24    0.26    4.80    0.35      43
1028             UC    .162    .198
1029             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1030             UA     100
                 *
                 *
                 * *** STORAGE LA21AJ ***********************************************************
                 * APPROX. 6.25 ACRES FROM BASIN A21AJ, ARROWHEAD MULTI-FAMILY DEVELOPMENT
                 * RETAINED FOR THE 100-YR, 2-HR STORM EVENT.
                 * REQUIRED VOLUME = 1.1 AC.-FT.
```

```
                * DDM   ***** Updated *****
1                                   HEC-1 INPUT                                                    PAGE 37

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

1031            KK  LA21AI
1032            DT  A21AIR     1.1
1033            DI       0   10000
1034            DQ       0   10000
                *
                *
                * *** COMBINE  CA21AJ ***********************************************************
                * COMBINE LA21AI,LA21AJ,L21AH
                *
                * DDM   ***** Preserved *****

1035            KK  CA21AJ
1036            HC       3
                *
                *
                * DDM   ***** Updated *****

1037            KK   A21AK   BASIN
1038            KM   SUB-BASIN A21AK
1039            KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
1040            KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
1041            KM     L = .23  Kb = .031  Adj. Slope = 35.0
1042            BA    .043
1043            LG    0.10    0.26    4.80    0.37      73
1044            UC    .167    .094
1045            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1046            UA     100
                *
                *
                * *** STORAGE LA21AK ************************************************************
                * APPROX. 27.6 ACRES FROM BASIN A21AK, COMMERICAL DEVELOPMENT
                * ASSUME RETAINED 80% FOR THE 100-YR, 2-HR STORM EVENT.
                * REQUIRED VOLUME = 5.5 AC.-FT.
                * DDM   ***** Updated *****

1047            KK  LA21AK
1048            DT  A21AKR     4.4
1049            DI       0   10000
1050            DQ       0   10000
                *
                *
                *
                * *** DIVERSION RECOVER DA21US ***************************************************
                * RECALL THE DIVERTED FLOW FROM LAKE #16 (DA21U)
                * DDM   ***** Updated *****

1051            KK  DA21US
1052            DR  DA21US
                *
                *
                * *** ROUTE  RA21US *************************************************************
                * FLOW IN 24" PVC STROM DRAIN ON 67TH AVE. SOUTH TO BEARDSLEY RD.
                * ROUTE RA21US IS 2200 FT WITH APPROX. SLOPE OF 0.0025 (MEASURED)
                * CROSS SECTION IS EXISTING 24" PVC STORM DRAIN PIPE
                *
                * *** ROUTE FLOW TO CA21AK FROM A21URR (LAKE #16) *************************
                * DDM   ***** Updated *****
1                                   HEC-1 INPUT                                                    PAGE 38

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

1053            KK  RA21US
1054            RS       3    FLOW      -1
1055            RD    2200   .0025   0.010            CIRC       2
                *
                *

1056            KK  N21A38   BASIN
1057            BA    .023
1058            LG    0.24    0.35    2.65    1.46      27
1059            UC   0.421   0.475
1060            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1061            UA     100
                *
```

```
            * *** STORAGE L21A38 ********************************************************
            *
            * WEIR = 40'-50' WIDE (TOPO)  WEIR ELEVATION IS 1265'  (TOPO)
            * WEIR COEFFECIENT = 2.68
            *

1062        KK  L21A38
1063        RS       1    STOR       0
1064        SQ       0       0       0     108
1065        SE    1263    1264    1265    1266
1066        SV       0     .16     .73    1.46
1067        SE    1263    1264    1265    1266
            *
            *
            * *** ROUTE R21A38 ************************************************************
            * ROUTE R21A38 IS 1166 FT WITH A SLOPE OF 0.0069
            * CROSS SECTION IS 67TH AVENUE (FLOW MIGHT ENTER STORM SEWER)
            *
            * DDM   ***** Preserved *****

1068        KK  R21A38
1069        RS       6    FLOW       0
1070        RC   0.035   0.035   0.035    1162   .0069
1071        RX       0      50      75      80     145     150     175     225
1072        RY       5       2       1       0       0       1       2       4
            *
            *
            * *** COMBINE  CN21B ******************************************************
            * COMBINE R21A38, RA21US, AND CA21AK, CA21AJ
            *
            * DDM   ***** Preserved *****

1073        KK   CN21B
1074        HC       5    0.65
            *
            *
            * *** ROUTE RN21B *********************************************************
            * ROUTE RN21B IS 1808 FT WITH A SLOPE OF 0.0024
            * CROSS SECTION IS A MAN-MADE CHANNEL TO THE SOUTH SIDE OF BASIN N21A (MEASURED)
            * Man made CHANNEL
            * ROUTE FLOW TO 75th AVE (CN21A) FROM 67th AVE (CN21B)
            * DDM   ***** Preserved *****
```



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

1075        KK   RN21B
1076        RS       1    FLOW      -1
1077        RC    0.04    0.02    0.04    1808  0.0024
1078        RX       0     100     150     162     182     194     244     294
1079        RY      16       6       6       0       0       6       7      11
            *
            *
            *

1080        KK  N21A44   BASIN
1081        BA    .025
1082        LG    0.21    0.35    2.65    1.34      53
1083        UC   0.383   0.355
1084        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1085        UA     100
            *
            * *** STORAGE L21A44 ******************************************************
            *
            * STORAGE FOR THE APARTMENT COMPLEX
            * NO WEIR, ONCE POND IS FILLED EXCESS SPILLS OUT INTO 101 CHANNEL
            *

1086        KK  L21A44
1087        RS       1    STOR       0
1088        SQ       0       0     100
1089        SE  1259.7    1262    1263
1090        SV       0    5.37    5.38
1091        SE  1259.7    1262    1263
            *
            * *** ROUTE R21A44 ********************************************************
            * ROUTE R21A44 IS 1334 FT WITH A SLOPE OF 0.0026
            * CROSS SECTION IS THE 101 CHANNEL
            *
            * DDM   ***** Preserved *****
```

```
1092          KK  R21A44
1093          RS       0    FLOW       0
1094          RC   0.035    0.02   0.035    1334  0.0026
1095          RX       0       1      17      32      47      62      87     117
1096          RY      12       7       6       0       0       6       8      10
              *
              *
              *

1097          KK  N21A90   BASIN
1098          BA    .012
1099          LG    0.07    0.35    2.65    1.65      75
1100          UC   0.608   1.704
1101          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1102          UA     100
              *
              * *** COMBINE  C21A43 ***********************************************************
              * COMBINE RN21B, L21A43, N21A90, AND R21A44
              *
              * DDM   ***** Preserved *****
```



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

1103          KK  C21A43
1104          HC       4
              *
              *
              * *** ROUTE R21A43 ***************************************************************
              * ROUTE R21A43 IS 2955 FT WITH A SLOPE OF 0.0014
              * CROSS SECTION IS I-101 CHANNEL
              *
              * DDM   ***** Preserved *****

1105          KK  R21A43
1106          RS       7    FLOW       0
1107          RC   0.035    0.02   0.035    2955  0.0014
1108          RX       0       1      17      32      47      62      87     117
1109          RY      12       7       6       0       0       6       8      10
              *
              *

1110          KK  N21A19   BASIN
1111          BA    .006
1112          LG    0.25    0.35    2.65    1.40      30
1113          UC   0.279   0.273
1114          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1115          UA     100
              *
              *

1116          KK  N21A91   BASIN
1117          BA    .005
1118          LG    0.05    0.35    2.65    1.80      95
1119          UC   0.346   0.987
1120          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1121          UA     100
              *
              *
              * DDM   ***** Preserved *****

1122          KK  C21A91
1123          HC       3
              *
              *
              * *** ROUTE R21A91 ***************************************************************
              * ROUTE R21A91 IS 1249 FT WITH A SLOPE OF 0.0014
              * CROSS SECTION IS I-101 CHANNEL
              *
              * DDM   ***** Preserved *****

1124          KK  R21A91
1125          RS      -1    FLOW      -1
1126          RC   0.035    0.02   0.035    1249  0.0014
1127          RX       0       1      17      32      47      62      87     117
1128          RY      12       7       6       0       0       6       8      10
              *
              *
```

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

1129          KK   N21A4   BASIN
1130          BA    .009
1131          LG    0.25    0.35    2.65    1.40      30
1132          UC   0.275   0.327
1133          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1134          UA     100
              *
              * *** DIVERSION DN21A4 ********************************************************
              * FLOW IS CURB TO CURB, 60% WILL CONTINUE WEST AND 40% WILL FLOW SOUTH.
              *
              * DDM   ***** Preserved *****

1135          KK   D21A4
1136          DT   21A4I
1137          DI       0       1       2       5      10      20
1138          DQ       0      .4      .8       2       4       8
              *
              *
              *

1139          KK   N21A2   BASIN
1140          BA    .009
1141          LG    0.25    0.35    2.65    1.40      30
1142          UC   0.333   0.382
1143          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1144          UA     100
              *
              *

1145          KK   N21A3   BASIN
1146          BA    .016
1147          LG    0.25    0.35    2.65    1.40      30
1148          UC   0.354   0.461
1149          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1150          UA     100
              *
              *
              * DDM   ***** Preserved *****

1151          KK   C21A3
1152          HC       3
              *
              *
              * *** ROUTE R21A3 ***************************************************************
              * ROUTE R21A3 IS  421 FT WITH A SLOPE OF 0.0095
              * CROSS SECTION IS A GRASSED SWALE
              *
              * DDM   ***** Preserved *****
1                                    HEC-1 INPUT                                          PAGE 42

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

1153          KK   R21A3
1154          RS       1    FLOW       0
1155          RC   0.035   0.035   0.035     421  0.0095
1156          RX       0       1      30      80     110     120     150     151
1157          RY       6       3       0       0       3       4       5       7
              *
              *

1158          KK   N21A1   BASIN
1159          BA    .022
1160          LG    0.24    0.37    5.30    0.28      28
1161          UC   0.313   0.333
1162          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1163          UA     100
              *
              * *** ROUTE R21A1 ***************************************************************
              * ROUTE R21A1 IS  533 FT WITH A SLOPE OF 0.0019
              * CROSS SECTION IS THE PARKWAY
              *
              * DDM   ***** Preserved *****

1164          KK   R21A1
1165          RS       4    FLOW       0
1166          RC   0.035   0.035   0.035     533  0.0019
1167          RX       0       1      30      80     110     120     150     151
```

```
1168          RY       6       3       0       0       3       4       5       7
              *
              *

1169          KK   N21A5   BASIN
1170          BA    .010
1171          LG    0.20    0.35    2.65    1.62      11
1172          UC   0.583   0.872
1173          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1174          UA     100
              *
              *
              * DDM   ***** Preserved *****

1175          KK   C21A5
1176          HC       3
              *
              * *** ROUTE R21A5 ************************************************************
              * ROUTE R21A5 IS  378 FT WITH A SLOPE OF 0.0013
              * CROSS SECTION IS THE PARKWAY
              *
              * DDM   ***** Preserved *****

1177          KK   R21A5
1178          RS       5    FLOW       0
1179          RC   0.035   0.035   0.035     378  0.0013
1180          RX       0       1      30      80     110     120     150     151
1181          RY       6       3       0       0       3       4       5       7
              *
              *
              * *** DIVERSION RECOVER DR21A4  ******************************************
              * RECOVER FLOWS FROM D21A4
1                                          HEC-1 INPUT                                          PAGE 43

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


1182          KK  DR21A4
1183          DR   21A4I
              *
              * *** ROUTE R21A4 ************************************************************
              * ROUTE R21A4 IS  860 FT WITH A SLOPE OF 0.007
              * CROSS SECTION IS THE PARKWAY
              *
              * DDM   ***** Preserved *****

1184          KK   R21A4
1185          RS       3    FLOW       0
1186          RC   0.035    0.02   0.035     860   0.007
1187          RX       0       1      30      31      65      66      96      97
1188          RY       6       3     1.5       1       1     1.5       3       7
              *
              *
              *

1189          KK   N21A6   BASIN
1190          BA    .020
1191          LG    0.25    0.35    2.65    1.40      30
1192          UC   0.304   0.288
1193          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1194          UA     100
              *
              * DDM   ***** Preserved *****

1195          KK   C21A6
1196          HC       2
              *
              * *** ROUTE R21A6 ************************************************************
              * ROUTE R21A6 IS  441 FT WITH A SLOPE OF 0.0023
              * CROSS SECTION IS THE PARKWAY
              *
              * DDM   ***** Preserved *****

1197          KK   R21A6
1198          RS       3    FLOW       0
1199          RC   0.035   0.035   0.035     441  0.0023
1200          RX       0       1      30      80     110     120     150     151
1201          RY       6       3       0       0       3       4       5       7
              *
              *
              *
```

```
1202          KK   N21A7   BASIN
1203          BA    .013
1204          LG    0.25    0.35    2.65    1.40      30
1205          UC   0.262   0.303
1206          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1207          UA     100
              *
              * *** ROUTE R21A7 ************************************************************
              * ROUTE R21A7 IS  1314 FT WITH A SLOPE OF 0.003
              * CROSS SECTION IS THE PARKWAY
              *
              * DDM   ***** Preserved *****
1                                          HEC-1 INPUT                                          PAGE 44

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

1208          KK   R21A7
1209          RS      11    FLOW       0
1210          RC   0.035   0.035   0.035    1314   0.003
1211          RX       0       1      30      80     110     120     150     151
1212          RY       6       3       0       0       3       4       5       7
              *
              *

1213          KK   N21A8   BASIN
1214          BA    .009
1215          LG    5.00    0.35    2.65    1.90       0
1216          UC   1.500   3.028
1217          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1218          UA     100
              *
              *
              * DDM   ***** Preserved *****

1219          KK   C21A8
1220          HC       4
              *
              * *** STORAGE L21A8 ********************************************************
              *  WEIR = 60'-15' WIDE (TOPO) WEIR ELEVATION = 1278 (TOPO)
              *  WEIR COEFF = 2.68
              *

1221          KK   L21A8
1222          RS       1    STOR       0
1223          SQ       0       4     161
1224          SE    1276    1278    1279
1225          SV       0   10.16    10.2
1226          SE    1276    1278    1279
              *
              *
              * *** ROUTE R21A8 ************************************************************
              * ROUTE R21A8 IS  1108 FT WITH A SLOPE OF 0.0072
              * CROSS SECTION IS THE PARKWAY
              *
              * DDM   ***** Preserved *****

1227          KK   R21A8
1228          RS       4    FLOW       0
1229          RC   0.035   0.035   0.035    1108  0.0072
1230          RX       0       1      30      80     110     120     150     151
1231          RY       6       3       0       0       3       4       5       7
              *
              *

1232          KK   N21A9   BASIN
1233          BA    .025
1234          LG    0.25    0.35    2.65    1.40      30
1235          UC   0.367   0.330
1236          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1237          UA     100
              *
              *
              * *** ROUTE R21A9 ************************************************************
              * ROUTE R21A9 IS  672 FT WITH A SLOPE OF 0.0074
              * CROSS SECTION IS THE PARKWAY
              *
              * DDM   ***** Preserved *****
1                                          HEC-1 INPUT                                          PAGE 45
```

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

1238          KK   R21A9
1239          RS       4    FLOW       0
1240          RC   0.035   0.035   0.035     672  0.0074
1241          RX       0       1      30      80     110     120     150     151
1242          RY       6       3       0       0       3       4       5       7
              *
              *

1243          KK  N21A10   BASIN
1244          BA    .045
1245          LG    0.25    0.35    2.65    1.40      30
1246          UC   0.387   0.313
1247          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1248          UA     100
              *
              *

1249          KK  N21A11   BASIN
1250          BA    .015
1251          LG    0.22    0.35    2.65    1.74      10
1252          UC   0.504   0.609
1253          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1254          UA     100
              *
              *

1255          KK  N21A12   BASIN
1256          BA    .013
1257          LG    0.25    0.35    2.65    1.40      30
1258          UC   0.408   0.555
1259          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1260          UA     100
              *
              *
              * DDM   ***** Preserved *****

1261          KK  C21A11
1262          HC       5
              *
              * *** STORAGE L21A11 ********************************************************
              *
              * WEIR = 1270' (SURVEY) WEIR LENGTH >> 100 FT-25' WIDE  (TOPO)
              * WEIR COEFF = 2.68
              * 36" RCP DRAINS DETENTION BASIN IE=1267'
              *
              *

1263          KK  L21A11
1264          RS       1    STOR       0
1265          SQ       0      10      35     305
1266          SE    1267    1268    1270    1271
1267          SV       0    0.28    3.67     3.7
1268          SE    1267    1268    1270    1271
              *
              *
              * *** STORAGE L21A14 ********************************************************
              *
              * THIS IS A SMALL DETENTION BASIN AFTER THE LARGE BASIN. ONCE THIS BASIN IS
              * FILLED, THE FLOW WILL RUN DOWN THE ROAD AND INTO R21A11
              * WEIR = 1270' WEIR LENGTH = 50'-25' WIDE
              * WEIR COEFFECIENT = 2.68
              * 36" RCP DRAINS DETENTION BASIN IE=1263'
              *
```



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

1269          KK  L21A14
1270          RS       1    STOR       0
1271          SQ       0      35      60      76     214     469
1272          SE    1264    1266    1268    1270    1271    1272
1273          SV       0     .09    0.26    1.06     1.1     1.1
1274          SE    1264    1266    1268    1270    1271    1272
              *
              * *** ROUTE R21A11 *********************************************************
              * ROUTE R21A11 IS  402 FT WITH A SLOPE OF 0.005
              * CROSS SECTION IS MAINLY A ROADSIDE CHANNEL WITH HOMES ON THE WEST SIDE
```

```
                 *
                 * DDM   ***** Preserved *****

1275             KK  R21A11
1276             RS       1    FLOW       0
1277             RC   0.035   0.035   0.035     402   0.005
1278             RX       0       1      21      31      36      46      66     166
1279             RY       8       4       3       0       0       3       4       6
                 *
                 *

1280             KK  N21A14   BASIN
1281             BA    .062
1282             LG    0.19    0.35    2.65    1.72       9
1283             UC   0.863   0.678
1284             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1285             UA     100
                 *
                 * DDM   ***** Preserved *****

1286             KK  C21A14
1287             HC       2
                 *
                 *

1288             KK  N21A13   BASIN
1289             BA    .021
1290             LG    0.25    0.35    2.65    1.40      30
1291             UC   0.346   0.318
1292             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1293             UA     100
                 *
                 *

1294             KK  N21A15   BASIN
1295             BA    .015
1296             LG    0.24    0.35    2.65    1.50      24
1297             UC   0.350   0.382
1298             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1299             UA     100
                 *
                 *
                 * DDM   ***** Preserved *****
1                                    HEC-1 INPUT                                                PAGE 47

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

1300             KK  C21A15
1301             HC       3
                 *
                 * *** STORAGE L21A15 ********************************************************
                 *
                 * WEIR = 1261.3' (SURVEY)
                 * WEIR COEFFECIENT = 2.7
                 * WEIR LENGTH = 55'-40' WIDE (SURVEY)
                 * 24" RCP DRAINS DETENTION BASIN IE=1255.7' (SURVEY)
                 *

1302             KK  L21A15
1303             RS       1    STOR       0
1304             SQ       0      15      26     127     369
1305             SE    1256    1258    1260    1262    1263
1306             SV       0     0.5     2.3     5.3     5.4
1307             SE    1256    1258    1260    1262    1263
                 *
                 *

1308             KK  N21A17   BASIN
1309             BA    .011
1310             LG    0.23    0.35    2.65    1.61      18
1311             UC   0.512   0.841
1312             UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1313             UA     100
                 *
                 * *** STORAGE L21A17 ********************************************************
                 *
                 * WEIR = 1261' (SURVEY)
                 * WEIE COEFFECIENT = 2.68
                 * WEIR LENGTH = 30'-20' WIDE (SURVEY)
                 * 12" PVC DRAINS DETENTION BASIN IE=1255.4' (SURVEY)
```

```
                *
1314            KK  L21A17
1315            RS       1    STOR       0
1316            SQ       0       6       8      90
1317            SE    1256    1258    1260    1262
1318            SV       0    0.15    1.14    3.66
1319            SE    1256    1258    1260    1262
                *
                * DDM   ***** Preserved *****

1320            KK  C21A17
1321            HC       2
                *
                *
                *
1                                   HEC-1 INPUT                                                    PAGE 48

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

1322            KK  N21A16   BASIN
1323            BA    .022
1324            LG    0.25    0.35    2.65    1.40      30
1325            UC   0.429   0.494
1326            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1327            UA     100
                *
                * *** STORAGE L21A16 ***************************************************
                *
                * WEIR = 1260' (SURVEY)
                * WEIR COEFFECIENT = 2.68
                * WEIR LENGTH = 100'~100' WIDE (SURVEY)
                * 3-24" RCP DRAINS BASIN IE=1255.1' (SURVEY)
                * VERY SMALL RETENTION AREA WITH LIKELY VERY LITTLE EFFECT
                *

1328            KK  L21A16
1329            RS       1    STOR       0
1330            SQ      12      60      84     367
1331            SE    1256    1258    1260    1261
1332            SV       0     0.1    0.31    0.35
1333            SE    1256    1258    1260    1261
                *
                *
                * DDM   ***** Preserved *****

1334            KK  C21A16
1335            HC       2
                *
                *
                * *** ROUTE R21A16 ******************************************************
                * ROUTE R21A16 IS  585 FT WITH A SLOPE OF 0.0034
                * CROSS SECTION IS MAINLY A ROADSIDE CHANNEL WITH HOMES ON THE WEST SIDE
                *
                * DDM   ***** Preserved *****

1336            KK  R21A16
1337            RS       1    FLOW       0
1338            RC   0.035   0.035   0.035     585  0.0034
1339            RX       0       1      11      27      31      47      57      67
1340            RY      13       5       4       0       0       4       5       9
                *
                *

1341            KK  N21A20   BASIN
1342            BA    .003
1343            LG    0.22    0.35    2.65    1.69      13
1344            UC   0.363   0.628
1345            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1346            UA     100
                *
                * DDM   ***** Preserved *****
1                                   HEC-1 INPUT                                                    PAGE 49

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

1347            KK  C21A20
1348            HC       2
                *
```

```
            * *** STORAGE L21A20 ********************************************************
            *
            * THERE ARE TWO WEIRS IN THIS LOCATION. THE NORTHERN MOST WEIR WAS THE
            * ONLY ONE ANALYZED BECAUSE OF THE STORAGE VOLUME BEHIND IT.
            * WEIR = 1258' WEIR LENGTH = 45'-20' WIDE  1-8" PVC DRAINS BASIN IE=1254.8'
            * WEIR COEFFECIENT = 2.7
            * VERY SMALL RETENTION AREA WITH LIKELY VERY LITTLE EFFECT (SUMP INLET)
            *

1349        KK  L21A20
1350        RS       1    STOR       0
1351        SQ       1       3     125     350
1352        SE    1256    1258    1259    1260
1353        SV       0    0.26     0.3     0.3
1354        SE    1256    1258    1259    1260
            *
            *

1355        KK  N21A18   BASIN
1356        BA    .026
1357        LG    0.25    0.35    2.65    1.40      30
1358        UC   0.450   0.456
1359        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1360        UA     100
            *
            *
            * DDM   ***** Preserved *****

1361        KK  C21A18
1362        HC       2
            *
            *
            * *** ROUTE R21A18 ************************************************************
            * ROUTE R21A18 IS 877 FT WITH A SLOPE OF 0.0091
            * CROSS SECTION IS I-101 CHANNEL
            *
            * DDM   ***** Preserved *****

1363        KK  R21A18
1364        RS       3    FLOW       0
1365        RC   0.035    0.02   0.035     877  0.0091
1366        RX       0       1      17      32      47      62      87     117
1367        RY      12       7       6       0       0       6       8      10
            *
            *
```



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

1368        KK  N21A21   BASIN
1369        BA    .016
1370        LG    0.22    0.35    2.65    1.36      51
1371        UC   0.329   0.269
1372        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1373        UA     100
            *
            * *** STORAGE L21A21 *********************************************************
            *
            * THERE ARE TWO PONDS IN THIS COMPLEX. THE WEST POND HAS VERY LITTLE RETENTION
            * AREA. IF THE POND IS FULL, IT HAS NO RETENTION. IT SPILLS OVER INTO THE EAST
            * POND AND THEN DRAINS TO THE SOUTH.
            * WEIR = 1261.4' WEIR LENGTH = 45'-140' WIDE
            * WEIR COEFFECIENT = 2.69
            * VERY SMALL RETENTION AREA WITH LIKELY VERY LITTLE EFFECT
            * THE WATER LEVEL IN THE LAKES IS = 1259.3, THE PONDS ARE FULL AT 1260.0
            *

1374        KK  L21A21
1375        RS       1    STOR       0
1376        SQ       0       0      56     246
1377        SE  1259.3    1260    1262    1263
1378        SV       0    0.72    2.82    2.85
1379        SE  1259.3    1260    1262    1263
            *
            *

1380        KK  N21A92   BASIN
1381        BA    .006
1382        LG    0.06    0.35    2.65    1.71      83
1383        UC   0.442   1.371
```

```
1384          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1385          UA     100
              *
              *
              *
              *
              * *** COMBINE  CN21A ************************************************************
              * COMBINE  RN23AS C21A92
              * Loop 101 AND 75th AVE
              * DDM   ***** Preserved *****

1386          KK   CN21A
1387          HC       4    3.72
              *
              *
              * ****************************************************************************
              * *********************   EAST SIDE OF ARROWHEAD LAKES   ************************
              * ****************************************************************************
              *
              * DDM   ***** Preserved *****
1                                        HEC-1 INPUT                                          PAGE 51

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

1388          KK    N19E   BASIN
1389          KM   SUB-BASIN N19E
1390          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
1391          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
1392          KM     L = 1.24  Kb = .044  Adj. Slope =   15.0
1393          BA    .703
1394          LG    0.35    0.35    4.45    0.37      19
1395          UC   0.954   0.510
1396          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
1397          UA     100
              *
              *
              * DDM   ***** Preserved *****

1398          KK    N19F   BASIN
1399          KM   SUB-BASIN N19F
1400          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
1401          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
1402          KM     L = 1.24  Kb = .047  Adj. Slope =   18.0
1403          BA    .374
1404          LG    0.35    0.35    4.70    0.31       1
1405          UC   0.942   0.720
1406          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
1407          UA     100
              *
              *
              * *** COMBINE CN19E ***********************************************************
              * COMBINE BASINS N19E AND N19F
              * DDM   ***** Preserved *****

1408          KK   CN19E
1409          HC       2
              *
              *
              * *** ROUTE RN19E ******************************************************************
              * ROUTE RN19E IS 3344 FT WITH A SLOPE OF 0.0072
              * CROSS SECTION A SMALL NATURAL WASH
              *
              * *** ROUTE FLOW TO CN19D FROM CN19E ************************************
              * DDM   ***** Preserved *****

1410          KK   RN19E
1411          RS       1    FLOW       0
1412          RC    0.05    0.06    0.05    3344   .0072
1413          RX       0     350     450     480     482     510     610     910
1414          RY       7       6       5       1       0       5       6       7
              *
              *
              * DDM   ***** Preserved *****
1                                        HEC-1 INPUT                                          PAGE 52

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

1415          KK    N19D   BASIN
1416          KM   SUB-BASIN N19D
```

```
1417          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
1418          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
1419          KM     L = 1.41  Kb = .047  Adj. Slope =   69.0
1420          BA    .393
1421          LG    0.35    0.35    4.20    0.43      27
1422          UC   0.521   0.402
1423          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
1424          UA     100
              *
              *
              * *** COMBINE  CN19D ******************************************************
              * COMBINE BASIN N19D AND CN19E
              * DDM   ***** Preserved *****

1425          KK   CN19D
1426          HC       2
              *
              * *** ROUTE RN19D *********************************************************
              *
              * ROUTE RN19D IS 4986 FT WITH A SLOPE OF 0.0076
              * CROSS SECTION IS A MEDIUM NATURAL WASH
              *
              * *** ROUTE FLOW TO CN19C FROM CN19D ***************************************
              * DDM   ***** Preserved *****

1427          KK   RN19D
1428          RS       4    FLOW       0
1429          RC    0.05    0.06    0.05    4986  0.0076
1430          RX       0     100     300     360     380     420     620     720
1431          RY      10       8       6       2       0       6       8      10
              *
              * DDM   ***** Preserved *****

1432          KK    N19C   BASIN
1433          KM   SUB-BASIN N19C
1434          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
1435          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
1436          KM     L = 1.14  Kb = .043  Adj. Slope =  102.0
1437          BA    .756
1438          LG    0.31    0.31    4.55    0.37      23
1439          UC   0.387   0.168
1440          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1441          UA     100
              *
              *
              * *** COMBINE  CN19C ******************************************************
              * *** COMBINE BASIN N19C AND CN19D *****************************************
              * DDM   ***** Preserved *****
```



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

1442          KK   CN19C
1443          HC       2
              *
              * *** ROUTE RN19C *********************************************************
              *
              * ROUTE RN19C IS 4137 FT WITH A SLOPE OF 0.0097
              * CROSS SECTION IS A MEDIUM NATURAL WASH
              *
              * *** ROUTE FLOW TO CN19B FROM CN19C ***************************************
              * DDM   ***** Preserved *****

1444          KK   RN19C
1445          RS       2    FLOW       0
1446          RC    0.05    0.06    0.05    4137  0.0097
1447          RX       0     100     300     360     380     420     620     720
1448          RY      10       8       6       2       0       6       8      10
              *
              * DDM   ***** Preserved *****

1449          KK    N19B   BASIN
1450          KM   SUB-BASIN N19B
1451          KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
1452          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
1453          KM     L =  .86  Kb = .048  Adj. Slope =  159.0
1454          BA    .318
1455          LG    0.33    0.30    4.60    0.34      20
1456          UC   0.283   0.155
1457          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
```

```
1458          UA     100
              *
              * *** COMBINE  CN19B ***************************************************
              * *** COMBINE BASIN N19B AND CN19C ****************************************
              * DDM   ***** Preserved *****

1459          KK   CN19B
1460          HC       2
              *
              * *** ROUTE RN19B *******************************************************
              *
              * ROUTE RN19B IS 6110 FT WITH A SLOPE OF 0.0066
              * CROSS SECTION IS A MEDIUM NATURAL WASH
              *
              * *** ROUTE FLOW TO CN19A FROM CN19B  ************************************
              * DDM   ***** Preserved *****

1461          KK   RN19B
1462          KO       3
1463          RS       3    FLOW       0
1464          RC    0.05    0.06    0.05    6110  0.0066
1465          RX       0     100     300     360     380     420     620     720
1466          RY      10       8       6       2       0       6       8      10
              *
              *
              * DDM   ***** Preserved *****
1                                        HEC-1 INPUT                                    PAGE 54

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

1467          KK    N19A   BASIN
1468          KM   SUB-BASIN N19A
1469          KM   24-HOUR RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1470          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .976
1471          KM     L = 1.16  Kb = .026  Adj. Slope =  102.0
1472          KM    CLARK UNIT HYDROGRAPH FOR NATURAL WATERSHEDS WAS USED FOR THIS BASIN
1473          BA    .467
1474          LG    0.15    0.34    4.90    0.28      32
1475          UC   0.237   0.317
1476          UA       0       3       5       8      12      20      43      75      90      96
1477          UA     100
              *
              *
              * DDM   ***** Preserved *****

1478          KK    A21B   BASIN
1479          KM   SUB-BASIN A21B
1480          KM   24-HOUR RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1481          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .991
1482          KM     L = .40  Kb = .033  Adj. Slope =  315.0
1483          KM    CLARK UNIT HYDROGRAPH FOR NATURAL WATERSHEDS WAS USED FOR THIS BASIN
1484          BA    .022
1485          LG    0.15    0.35    4.50    0.35      34
1486          UC   0.237   0.317
1487          UA       0       3       5       8      12      20      43      75      90      96
1488          UA     100
              *
              *
              * *** ROUTE RA21B ******************************************************
              * ROUTE RA21B IS 1000 FT WITH APPROX. SLOPE OF 0.0200 (MEASURED FROM 1996 TOPO)
              * CROSS SECTION IS A MEDIUM NATURAL WASH
              *
              * *** ROUTE FLOW TO CN19A FROM BASIN A21B ********************************
              * DDM   ***** Preserved *****

1489          KK   RA21B
1490          KO       3
1491          RS       5    FLOW      -1
1492          RC    .050    .060    .050    1000   .0200
1493          RX       0     100     300     360     380     420     620     720
1494          RY      10       8       6       2       0       6       8      10
              *
              *
              * *** COMBINE  CN19A ****************************************************
              * COMBINE BASIN N19A, RN19B, AND RA21B
              * DDM   ***** Preserved *****

1495          KK   CN19A
1496          HC       3    3.04
              *
```

```
                * ***************************************************************************
                * STORAGE IS ENTERED HERE FOR THE DETENTION BASIN NORTH OF
                * ARROWHEAD RANCH LAKES (LAKE #1).  THE WIER CREST ELEVATION IS 1296.00 WHICH IS
                * ALSO THE 100-YEAR STARTING WATER SURFACE ELEVATION.
                * ***************************************************************************
                *
                * DDM    ***** Preserved *****
1
                                                HEC-1 INPUT                                                    PAGE 55

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

1497            KK   397RR
1498            KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #1) IN THUNDERBIRD PARK.
1499            KM   SOURCE:  NEW ANALYSIS FOR ARROWHEAD RANCH.
1500            RS       1    ELEV    1296
1501            SV       0    8.50   17.19   26.06   35.12   44.34   53.71   63.24   72.91
1502            SE    1296  1296.5    1297  1297.5    1298  1298.5    1299  1299.5    1300
1503            SQ       0     139     399     732    1146    1639    2202    2814    3516
                *
                *
                * DDM    ***** Preserved *****

1504            KK   398A    BASIN
1505            KM   RUNOFF GENERATED ON SUB-BASIN 398A
1506            KM   THIS BASIN IS ALSO BASIN N19 IN ENTELLUS REPORT.
1507            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1508            KM    L= 0.34 mi. S= 315 ft/mi  Kb= .029 Tc = 0.100 Hr. R = 0.045
1509            KM   24-HOUR RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1510            KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .991
1511            KM    CLARK UNIT HYDROGRAPH FOR NATURAL WATERSHEDS WAS USED FOR THIS BASIN
1512            BA    .102
1513            LG    0.15    0.35    4.00    0.45      61
1514            UC    .196    .094
1515            UA       0       3       5       8      12      20      43      75      90      96
1516            UA     100
                *
                *
                * DDM    ***** Preserved *****

1517            KK   398B    BASIN
1518            KM   RUNOFF GENERATED ON SUB-BASIN 398B
1519            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1520            KM    L= .93 mi. S= 30 ft/mi  Kb= .045 Tc = .496 Hr. R = .500
1521            KM   24-HOUR RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1522            KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .991
1523            KM    CLARK UNIT HYDROGRAPH FOR URBAN WATERSHEDS WAS USED FOR THIS BASIN
1524            BA    .136
1525            LG    0.17    0.17    4.65    0.39      63
1526            UC    .512    .518
1527            UA       0       5      16      30      65      77      84      90      94      97
1528            UA     100
                *
                *
                * *** COMBINE  C398B ***************************************************
                * COMBINE BASIN 398A, 398B, AND CN19A
                * DDM    ***** Preserved *****

1529            KK   C398B
1530            HC       3
                *
                *
                * DDM    ***** Preserved *****
1
                                                HEC-1 INPUT                                                    PAGE 56

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

1531            KK  398BRR
1532            KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #2) IN SUB-BASIN 398B.
1533            KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
1534            KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
1535            KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
1536            KM   SOURCE:  NEW ANALYSIS FOR ARROWHEAD RANCH.
1537            RS       1    ELEV    1294
1538            SV       0   14.13   28.79   43.96   59.40   74.84   90.27  105.71  121.14
1539            SE    1294  1294.5    1295  1295.5    1296  1296.5    1297  1297.5    1298
1540            SQ       0     224     653    1296    2017    3045    4090    5217    6375
                *
                *
                * *** DIVERSION D398B ***************************************************
```

```
* DIVERSION OF LAKE #2: MAIN EAST TO LAKE #3 & LAKE #4 (398BE),
* SPLIT WEST TO LAKE #5 (398BW).
* DDM   ***** Preserved *****

KK   D398B
DT   398BI
DI       1     240     360     480     600     720     840     960    1080    1200
DQ      .1      80     120     160     200     240     280     320     360     400
*
*
* *** DIVERSION D398BE ********************************************************
* DIVERSION OF LAKE #2: MAIN SOUTH EAST TO LAKE #3 (398BSE),
* SPLIT WEST TO LAKE #4 (398BSW).
* DDM   ***** Preserved *****

KK  D398BE
DT  398BSI
DI       1     240     360     480     600     720     840     960    1080    1200
DQ      .1     120     180     240     300     360     420     480     540     600
*
*
* DDM   ***** Preserved *****

KK    398D   BASIN
KM   RUNOFF GENERATED ON SUB-BASIN 398D
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L= .24 mi. S= 315 ft/mi  Kb= .029 Tc = .083 Hr. R = .031
KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .991
KM    CLARK UNIT HYDROGRAPH FOR NATURAL WATERSHEDS WAS USED FOR THIS BASIN
BA    .081
LG    0.15    0.35    3.95    0.47      65
UC    .146    .058
UA       0       3       5       8      12      20      43      75      90      96
UA     100
*
*
* DDM   ***** Preserved *****
```



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

KK    398E   BASIN
KM   RUNOFF GENERATED ON SUB-BASIN 398E
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L= .38 mi. S= 315 ft/mi  Kb= .027 Tc = .104 Hr. R = .034
KM   24-HOUR RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .991
KM    CLARK UNIT HYDROGRAPH FOR NATURAL WATERSHEDS WAS USED FOR THIS BASIN
BA    .112
LG      .2     .35     4.6     .33      49
UC    .200    .100
UA       0       3       5       8      12      20      43      75      90      96
UA     100
*
*
* DDM   ***** Preserved *****

KK    398F   BASIN
KM   RUNOFF GENERATED ON SUB-BASIN 398F
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L= 2.05 mi. S= 72 ft/mi  Kb= .044 Tc = .575 Hr. R = .880
KM   24-HOUR RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .991
KM    CLARK UNIT HYDROGRAPH FOR URBAN WATERSHEDS WAS USED FOR THIS BASIN
BA    .204
LG    0.18    0.17    4.35    0.48      77
UC    .592    .909
UA       0       5      16      30      65      77      84      90      94      97
UA     100
*
*
* *** COMBINE  C398F ***********************************************************
* COMBINE BASIN 398D, 398F, 398BSE AND C398E
* DDM   ***** Preserved *****

KK   C398F
HC       4    3.68
*
*
```

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1587          KK  398FRR
1588          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #3) IN SUB-BASIN 398F.
1589          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
1590          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
1591          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
1592          KM   SOURCE:  NEW ANALYSIS FOR ARROWHEAD RANCH.
1593          RS       1    ELEV    1292
1594          SV       0   17.52   38.16   59.58   81.39  103.19     125  146.80  168.60
1595          SE    1292  1292.5    1293  1293.5    1294  1294.5    1295  1295.5    1296
1596          SQ       0      47     138     275     429     648     863    1087    1328
              *
              *
              * *** DIVERSION RECOVER D398B ***********************************************
              * RECALL THE DIVERTED FLOW FROM LAKE #2 (398BI)
              * DDM   ***** Preserved *****
1                                        HEC-1 INPUT                                          PAGE 58

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


1597          KK  D398BW
1598          DR   398BI
              *
              *
              * DDM   ***** Preserved *****

1599          KK    398C   BASIN
1600          KM   RUNOFF GENERATED ON SUB-BASIN 398C
1601          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1602          KM    L= .87 mi. S= 9 ft/mi  Kb= .047 Tc = .821 Hr. R = 1.023
1603          KM   24-HOUR RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1604          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .991
1605          KM    CLARK UNIT HYDROGRAPH FOR URBAN WATERSHEDS WAS USED FOR THIS BASIN
1606          BA    .094
1607          LG    0.17    0.16    6.20    0.20      59
1608          UC    .846   1.058
1609          UA       0       5      16      30      65      77      84      90      94      97
1610          UA     100
              *
              *
              * *** COMBINE  C398C ***************************************************
              * COMBINE BASIN 398C AND RETREIVED HYDROGRAPH 398BW
              * DDM   ***** Preserved *****

1611          KK   C398C
1612          HC       2    3.27
              *
              *

1613          KK  398CRR
1614          KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #5) IN SUB-BASIN 398C.
1615          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
1616          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
1617          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
1618          KM   SOURCE:  NEW ANALYSIS FOR ARROWHEAD RANCH.
1619          RS       1    ELEV    1292
1620          SV       0    9.77   19.90   30.41   41.11   51.80   62.50   73.19   83.89
1621          SE    1292  1292.5    1293  1293.5    1294  1294.5    1295  1295.5    1296
1622          SQ       0      46     133     260     403     607     831    1087    1328
              *
              *
              * *** DIVERSION RECOVER D398BSW *********************************************
              * RECALL THE DIVERTED FLOW FROM LAKE #2 (398BSI)
              * DDM   ***** Preserved *****

1623          KK  398BSW
1624          DR  398BSI
              *
              *
              * DDM   ***** Preserved *****
1                                        HEC-1 INPUT                                          PAGE 59

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


1625          KK    398G   BASIN
1626          KM   ASSUME STARTING WATER SURFACE IN LAKE IS AT THE TOP OF WEIR CREST
1627          KM   ELEVATION PER CITY OF GLENDALE (PENTACORE SURVEY).
1628          KM   NOTE: NOT INCLUDE CIRCULATING BLEED-OFF SYSTEM BETWEEN LAKES.
1629          KM   RUNOFF GENERATED ON SUB-BASIN 398G
```

```
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L= 1.21 mi. S= 6 ft/mi  Kb= .043 Tc = 1.258 Hr. R = 1.318
KM   24-HOUR RAINFALL USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .990
KM    CLARK UNIT HYDROGRAPH FOR URBAN WATERSHEDS WAS USED FOR THIS BASIN
BA    .220
LG    0.18    0.18    3.60    0.72      57
UC   1.337   1.410
UA       0       5      16      30      65      77      84      90      94      97
UA     100
*
*
* *** COMBINE  C398G ***************************************************
* COMBINE C398C, C398E, BASIN 398G, AND DIVERTED HYDROGRAPH 398BSW
* DDM   ***** Preserved *****

KK   C398G
HC       4    4.09
*
*

KK  398GRR
KM   ROUTE FLOW THROUGH DETENTION BASIN (LAKE #4) IN SUB-BASIN 398G.
KM   SOURCE:  NEW ANALYSIS FOR ARROWHEAD RANCH.
RS       1    ELEV    1290
SV       0   20.87   42.58   65.13   88.11  111.08  134.05  157.03  202.97
SE    1290  1290.5    1291  1291.5    1292  1292.5    1293  1293.5    1294
SQ       0     120     346     634     993    1421    1908    2439    3047
*
*
*
ZZ
```

HEC-1 SCHEMATIC DIAGRAM

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 [illegible]  (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  40        N23A
                .
                .
  51            .-------> LN23AD
  50        LN23A
                .
                .
  55            .-------> N23AI
  54        DN23A
                .
                .
  58            .       A21C
                .          V
                .          V
  68            .     A21CRR
                .          V
                .          V
  78            .      RA21C
                .          .
                .          .
  83            .          .       A21D
                .          .          V
                .          .          V
  93            .          .      RA21D
                .          .          .
                .          .          .
  99            .          .          .        A21E
                .          .          .          .
                .          .          .          .
 109            .          .      CA21E............
                .          .          V
                .          .          V
 111            .          .     A21ERR
                .          .          .
                .          .          .
 [illegible]    .          .          .-------> A21EI
 121            .          .      DA21E
                .          .          V
                .          .          V
 125            .          .     RA21ES
                .          .          .
                .          .          .
 130            .          .          .        A21K
                .          .          .          .
                .          .          .          .
 140            .     CA21K........................
                .          V
                .          V
 142            .    A21KRR
                .          .
                .          .
 153            .          .       A21L
                .          .          .
                .          .          .
 163            .     CA21L............
                .          V
                .          V
 165            .    A21LRR
                .          V
                .          V
 175            .     RA21L
                .          .
                .          .
 180            .          .       A21M
                .          .          V
                .          .          V
 190            .          .     A21MRR
                .          .          V
                .          .          V
 201            .          .      RA21M
                .          .          .
                .          .          .
 208            .          .          .          .<-------  A21EI
 207            .          .          .     DA21EW
```

```
209                                  A21F
                                        V
                                        V
219                                  RA21F
                                        V
                                        V
225                                  RA21F
                                        .
229                                     .
                                        .                A21G
                                        .                  .
239                                     .                  .
                            CA21G.......................
                                V
                                V
241                         A21GRR
                                .
                                .
251                                  A21H
                                        .
                                        .
261                         CA21H............
                                V
                                V
263                         A21HRR
                                .
                                .
273                                  A21I
                                        V
                                        V
283                                  RA21I
                                        .
                                        .
289                                     .                A21J
                                        .                  .
299                                     .                  .
                            CA21J.......................
                                V
                                V
301                         A21JRR
                                V
                                V
311                         RA21J
                                .
                                .
317                                  A21N
                                        .
                                        .
327                 CA21N...................................
                        V
                        V
329                 A21NRR
                        .
                        .
339                             A21O
                                    .
                                    .
349                 CA21O............
                        V
                        V
351                 A21ORR
                        .
                        .
361                             A21U
                                    .
                                    .
372                                 .-------->   A21UR
371                             LA21U
                                    .
                                    .
375                 CA21U............
                        V
                        V
377                 A21URR
                        .
                        .
2                       .-------->  DA21US
1                   DA21U
                        .
```

```
395                 N21A36
                       .
401                    .        N21AP3
                       .           .
408          C21AP3.....................
                 V
                 V
410          L21AP3
                 .
417                 N21A25
                       V
                       V
423                 R21A25
                       .
428                    .        N21A24
                       .           .
434                    .           .        N21A26
                       .           .           .
440                    .           .           .        N21A27
                       .           .           .           .
446                 C21A27.................................
                       V
                       V
448                 L21A27
                       .
454                    .        N21A23
                       .           V
460                    .           V
                       .        R21A23
                       .           .
465                    .           .        N21A28
                       .           .           .
471                    .           .           .        N21A29
                       .           .           .           .
477                 C21A28.................................
                       V
                       V
479                 L2A281
                       V
                       V
485                 L2A282
                       .
491                    .        N21A32
                       .           .
497                 C21A32............
                       V
                       V
499                 L2A283
                       .
505                    .        N21A31
                       .           .
511                    .           .        N21A33
                       .           .           .
517                 C21A33.....................
                       .
519                    .        N21A22
                       .           .
526                    .           .
525                    .           .        .<-------   N23AI
                       .           .     DRN23A
                       .           .        V
527                    .           .        V
                       .           .     RN23AS
```

```
532                          C21A22............
                                   .
535                                .-------> 21A22I
534                          D21A22
                                   .
538                                .      N21A30
                                   .          .
544                                .          .      N21AP1
                                   .          .          .
550                     C21AP1.....................................
                             V                                     .
                             V                                     .
552                     L21AP1
                             .
559                          .      N21AP2
                             .          .
565                     C21AP2............
                             V
                             V
567                     L21AP2
                             .
574                          .      N21A37
                             .          .
580                C21APA........................
                             .
582                     N21A34
                             .
588                          .      N21A35
                             .          .
594                          .          .      N21AP5
                             .          .          V
600                          .          .          V
                             .          .      L21AP5
                             .          .          .
607                          .          .          .      N21AP4
                             .          .          .          .
613                C21APB.............................................
                        V                                            .
                        V                                            .
615                L21AP4
                             .
622                     N21A39
                             .
629                          .          .<-------  21A22I
628                          .      DR2122
                             .          V
                             .          V
630                          .      R21A22
                             .          .
635                C21A39........................
                        V
                        V
637                R21A39
                             .
643                     N21A40
                             .
649                C21A40............
                             .
651                     N21A41
                             .
```

```
657                 N21A42
                       .
663                    .        N21A43
                       .           .
9          C21A42.......................
                V
                V
671        L21A43
                .
678             A21P
                  V
                  V
688           A21PRR
                  V
                  V
700           RA21P
                  .
703                 A21V
                       .
714                    .-------->   A21VR
713                 LA21V
                       .
717                    .        A21Q
                       .           .
727           CA21Q.......................
                  V
                  V
729           A21QRR
                  .
740                 A21R
                       .
750           CA21R............
                  V
                  V
752           A21RRR
                  .
762                 A21S
                       .
772           CA21S............
                  V
                  V
774           A21SRR
                  .
784                 A21T
                       .
794           CA21T............
                  V
                  V
796           A21TRR
                  V
                  V
809           RA21T
                  .
812                 A21AE
                       .
823                    .-------->  A21AER
822                 LA21AE
                       .
826                    .        A21AF
                       .           .
7                      .           .-------->  A21AFR
6                      .      LA21AF
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840                                                A21X
                                                     .
851                                                  .-------> A21XR
850                                            LA21X
                                                     .
854                                                  .        A21W
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865                                                  .          .-------> A21WR
864                                                  .       LA21W
                                                     .          .
868                 CA21AE.............................................
                                                     .
870                           A21Y                   .
                                .                    .
881                             .-------> A21YR      .
880                         LA21Y                    .
                                .                    .
884                             .        A21Z        .
                                .          .         .
895                             .          .-------> A21ZR
894                             .       LA21Z        .
                                .          V         .
                                .          V         .
898                             .       RA21Z        .
                                .          .         .
903                             .          .      A21AB
                                .          .         .
914                             .          .         .-------> A21ABR
913                             .          .      LA21AB
                                .          .         .
7                           CA21AB.......................
                                V                    .
                                V                    .
919                         RA21AB                   .
                                .                    .
922                             .       A21AC        .
                                .          .         .
933                             .          .-------> A21ACR
932                             .      LA21AC        .
                                .          .         .
936                             .          .      A21AA
                                .          .         .
947                             .          .         .-------> A21AAR
946                             .          .      LA21AA
                                .          .         .
950                             .          .         .        A21AD
                                .          .         .          .
961                             .          .         .          .-------> A21ADR
960                             .          .         .       LA21AD
                                .          .         .          .
964                         CA21AD.....................................
                                V                    .
                                V                    .
966                         RA21AD                   .
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969                 A21AEC............                .
                        V
                        V
71                  RA21AE
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 974                    A21AG
                          .
 985                      .-------> A21AGR
 984                 LA21AG
                          .
 988            CA21AG...........
                     V
                     V
 990            RA21AG
                          .
 993                    A21AH
                          .
1004                      .-------> A21AHR
1003                 LA21AH
                          .
1007                      .      A21AI
                          .        .
1018                      .        .-------> A21AIR
1017                      .     LA21AI
                          .        .
1021                      .        .      A21AJ
                          .        .        .
1032                      .        .        .-------> A21AIR
1031                      .        .     LA21AI
                          .        .        .
1035                 CA21AJ.......................
                          .
1037                      .      A21AK
                          .        .
1048                      .        .-------> A21AKR
1047                      .     LA21AK
                          .        .
1052                      .        .        .<------- DA21US
1051                      .        .     DA21US
                          .        .        V
1053                      .        .        V
                          .        .     RA21US
                          .        .        .
1056                      .        .        .      N21A38
                          .        .        .          V
1062                      .        .        .          V
                          .        .        .      L21A38
1068                      .        .        .          V
                          .        .        .          V
                          .        .        .      R21A38
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1073            CN21B.............................................
                     V
                     V
1075            RN21B
                          .
1080                 N21A44
                          V
1086                      V
                     L21A44
                          V
1092                      V
                     R21A44
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1097                      .     N21A90
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 103        C21A43.................................
                V
                V
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1105          .      R21A43
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1110          .          .      N21A19
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              .          .          .      N21A91
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1122          .      C21A91.......................
              .          V
              .          V
1124          .      R21A91
              .          .
              .          .
1129          .          .      N21A4
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1136          .          .          .-------->   21A4I
1135          .          .      D21A4
              .          .          .
              .          .          .
1139          .          .          .      N21A2
              .          .          .          .
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1145          .          .          .          .     N21A3
              .          .          .          .         .
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1151          .          .      C21A3........................
              .          .          V
              .          .          V
1153          .          .      R21A3
              .          .          .
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1158          .          .          .      N21A1
              .          .          .          V
              .          .          .          V
1164          .          .          .      R21A1
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1169          .          .          .          .      N21A5
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1175          .          .      C21A5........................
              .          .          V
              .          .          V
1177          .          .      R21A5
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1183          .          .          .          .<-------   21A4I
1182          .          .          .     DR21A4
              .          .          .          V
              .          .          .          V
1184          .          .          .      R21A4
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1189          .          .          .          .      N21A6
              .          .          .          .         .
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1195          .          .          .      C21A6............
              .          .          .          V
              .          .          .          V
1197          .          .          .      R21A6
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1202          .          .          .          .      N21A7
              .          .          .          .          V
              .          .          .          .          V
1208          .          .          .          .      R21A7
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1213          .          .          .          .          .      N21A8
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1219          .          .      C21A8.......................................
              .          .          V
              .          .          V
              .          .      L21A8
              .          .          V
              .          .          V
1227          .          .      R21A8
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1232                    N21A9
                            V
                            V
1238                    R21A9
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1243                        .      N21A10
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1249                        .          .      N21A11
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1255                        .          .          .      N21A12
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1261                C21A11..............................................
                        V
                        V
1263                L21A11
                        V
                        V
1269                L21A14
                        V
                        V
1275                R21A11
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1280                    .      N21A14
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1286                C21A14............
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1288                    .      N21A13
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1294                        .          .      N21A15
                            .          .          .
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1300                C21A15......................
                        V
                        V
1302                L21A15
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1308                    .      N21A17
                            .          V
                            .          V
1314                    .      L21A17
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1320                C21A17............
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1322                    .      N21A16
                            .          V
                            .          V
1328                    .      L21A16
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1334                C21A16............
                        V
                        V
1336                R21A16
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1341                    .      N21A20
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1347                C21A20............
                        V
                        V
1349                L21A20
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1355                    .      N21A18
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1361                C21A18............
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                    V
                    V
1363          R21A18
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[illegible]8                N21A21
                              V
                              V
1374                        L21A21
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                              .
1380                          .          N21A92
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                              .            .
1386        CN21A.....................................
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1388          N19E
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1398                .        N19F
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1408          CN19E............
                    V
                    V
1410          RN19E
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                    .
1415                .        N19D
                    .          .
                    .          .
1425          CN19D............
                    V
                    V
1427          RN19D
                    .
                    .
1432                .        N19C
                    .          .
                    .          .
[illegible]2          CN19C............
                    V
                    V
1444          RN19C
                    .
                    .
1449                .        N19B
                    .          .
                    .          .
1459          CN19B............
                    V
                    V
1461          RN19B
                    .
                    .
1467                .        N19A
                    .          .
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1478                .          .        A21B
                    .          .          V
                    .          .          V
1489                .          .       RA21B
                    .          .          .
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1495          CN19A.......................
                    V
                    V
1497          397RR
                    .
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1504                .       398A
                    .          .
                    .          .
1517                .          .       398B
                    .          .          .
                    .          .          .
[illegible]29         C398B.......................
                    V
                    V
1531          398BRR
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1542                                  .-------> 398BI
1541                            D398B
                                      .
                                      .
1546                                  .-------> 398BSI
1545                            D398BE
                                      .
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1549                                  .        398D
                                      .          .
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1561                                  .          .        398E
                                      .          .          .
                                      .          .          .
1573                                  .          .          .        398F
                                      .          .          .          .
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1585                            C398F.....................................
                                    V
                                    V
1587                            398FRR
                                      .
                                      .
1598                                  .          .<-------   398BI
1597                                  .      D398BW
                                      .          .
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1599                                  .          .        398C
                                      .          .          .
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1611                                  .      C398C............
                                      .          V
                                      .          V
1613                                  .      398CRR
                                      .          .
                                      .          .
1624                                  .          .          .<-------  398BSI
1623                                  .          .      398BSW
                                      .          .          .
                                      .          .          .
1635                                  .          .          .        398G
                                      .          .          .          .
                                      .          .          .          .
1640                            C398G.....................................
                                    V
                                    V
1642                            398GRR
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(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

HEC-1 OUTPUT SUMMARY

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	N23A	690.	12.17	83.	25.		15.	0.49	
+	DIVERSION TO	LN23AD	308.	11.92	22.	7.		4.	0.49	
+	HYDROGRAPH AT	LN23A	690.	12.17	69.	19.		11.	0.49	
+	DIVERSION TO	N23AI	25.	12.17	2.	0.		0.	0.49	
+	HYDROGRAPH AT	DN23A	665.	12.17	67.	18.		10.	0.49	
+	HYDROGRAPH AT	A21C	101.	12.00	9.	3.		2.	0.05	
+	ROUTED TO	A21CRR	43.	12.25	9.	3.		2.	0.05	
+	ROUTED TO	RA21C	43.	12.25	9.	3.		2.	0.05	
+	HYDROGRAPH AT	A21D	47.	12.00	4.	1.		1.	0.02	
+	ROUTED TO	RA21D	42.	12.00	4.	1.		1.	0.02	
+	HYDROGRAPH AT	A21E	146.	12.00	13.	4.		2.	0.06	
+	2 COMBINED AT	CA21E	187.	12.00	17.	6.		3.	0.08	
+	ROUTED TO	A21ERR	136.	12.08	17.	6.		3.	0.08	
+	DIVERSION TO	A21EI	41.	12.08	5.	1.		1.	0.08	
+	HYDROGRAPH AT	DA21E	95.	12.08	12.	4.		2.	0.08	
+	ROUTED TO	RA21ES	89.	12.17	12.	4.		2.	0.08	
+	HYDROGRAPH AT	A21K	143.	12.00	12.	4.		2.	0.07	
+	3 COMBINED AT	CA21K	228.	12.08	33.	11.		6.	0.20	
+	ROUTED TO	A21KRR	197.	12.17	33.	11.		6.	0.20	
+	HYDROGRAPH AT	A21L	46.	12.08	5.	2.		1.	0.03	
+	2 COMBINED AT	CA21L	234.	12.17	38.	12.		7.	0.23	
+	ROUTED TO	A21LRR	185.	12.33	84.	77.		75.	0.23	
+	ROUTED TO	RA21L	181.	12.33	84.	77.		75.	0.23	
+	HYDROGRAPH AT	A21M	14.	12.17	3.	1.		1.	0.02	

	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
+	ROUTED TO	A21MRR	0.	0.08	0.	0.	0.	0.	0.02	
+	ROUTED TO	RA21M	0.	0.08	0.	0.	0.	0.	0.02	
+	HYDROGRAPH AT	DA21EW	41.	12.08	5.	1.	1.	0.08		
+	HYDROGRAPH AT	A21F	111.	12.00	11.	4.	2.	0.05		
+	ROUTED TO	RA21F	110.	12.00	11.	4.	2.	0.05		
+	ROUTED TO	RA21F	103.	12.00	11.	4.	2.	0.05		
+	HYDROGRAPH AT	A21G	96.	12.00	9.	3.	2.	0.04		
+	3 COMBINED AT	CA21G	230.	12.00	24.	8.	5.	0.16		
+	ROUTED TO	A21GRR	201.	12.08	24.	8.	5.	0.16		
+	HYDROGRAPH AT	A21H	18.	12.00	2.	1.	0.	0.01		
+	2 COMBINED AT	CA21H	214.	12.08	26.	8.	5.	0.17		
+	ROUTED TO	A21HRR	168.	12.25	26.	8.	5.	0.17		
+	HYDROGRAPH AT	A21I	88.	12.00	7.	2.	1.	0.04		
+	ROUTED TO	RA21I	85.	12.08	7.	2.	1.	0.04		
+	HYDROGRAPH AT	A21J	239.	12.00	22.	7.	4.	0.11		
+	3 COMBINED AT	CA21J	430.	12.08	55.	18.	10.	0.32		
+	ROUTED TO	A21JRR	395.	12.17	55.	18.	10.	0.32		
+	ROUTED TO	RA21J	395.	12.17	55.	18.	10.	0.32		
+	HYDROGRAPH AT	A21N	515.	12.00	44.	14.	8.	0.26		
+	4 COMBINED AT	CA21N	875.	12.08	182.	107.	93.	0.75		
+	ROUTED TO	A21NRR	557.	12.33	181.	107.	92.	0.75		
+	HYDROGRAPH AT	A21O	25.	12.00	3.	1.	1.	0.01		
+	2 COMBINED AT	CA21O	563.	12.33	184.	108.	92.	0.76		
+	ROUTED TO	A21ORR	556.	12.42	184.	108.	92.	0.76		
+	HYDROGRAPH AT	A21U	253.	12.08	26.	8.	5.	0.14		

	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
+	DIVERSION TO	A21UR	5.	10.42	3.	1.		1.	0.14	
+	HYDROGRAPH AT	LA21U	253.	12.08	25.	7.		4.	0.14	
+	2 COMBINED AT	CA21U	643.	12.25	208.	115.		96.	0.90	
+	ROUTED TO	A21URR	446.	12.75	208.	114.		94.	0.90	
+	DIVERSION TO	DA21US	15.	1.33	15.	15.		15.	0.90	
+	HYDROGRAPH AT	DA21U	431.	12.75	193.	99.		79.	0.90	
+	HYDROGRAPH AT	N21A36	14.	12.17	2.	1.		0.	0.02	
+	HYDROGRAPH AT	N21AP3	8.	12.17	2.	1.		0.	0.01	
+	3 COMBINED AT	C21AP3	439.	12.75	196.	100.		80.	0.92	
+	ROUTED TO	L21AP3	438.	12.83	196.	100.		79.	0.92	
+	HYDROGRAPH AT	N21A25	8.	12.00	1.	0.		0.	0.00	
+	ROUTED TO	R21A25	8.	12.08	1.	0.		0.	0.00	
+	HYDROGRAPH AT	N21A24	8.	12.17	2.	1.		0.	0.02	
+	HYDROGRAPH AT	N21A26	17.	12.25	3.	1.		1.	0.03	
+	HYDROGRAPH AT	N21A27	1.	12.17	0.	0.		0.	0.00	
+	4 COMBINED AT	C21A27	33.	12.17	6.	2.		1.	0.05	
+	ROUTED TO	L21A27	14.	12.92	3.	2.		1.	0.05	
+	HYDROGRAPH AT	N21A23	17.	12.17	3.	1.		1.	0.03	
+	ROUTED TO	R21A23	17.	12.42	3.	1.		1.	0.03	
+	HYDROGRAPH AT	N21A28	0.	12.92	0.	0.		0.	0.01	
+	HYDROGRAPH AT	N21A29	9.	12.25	2.	1.		0.	0.02	
+	4 COMBINED AT	C21A28	27.	12.42	9.	4.		2.	0.10	
+	ROUTED TO	L2A281	18.	13.08	6.	4.		3.	0.10	
+	ROUTED TO	L2A282	12.	13.33	6.	5.		4.	0.10	
+	HYDROGRAPH AT	N21A32	1.	12.17	0.	0.		0.	0.00	

	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
+	2 COMBINED AT	C21A32	12.	13.33	6.	5.	4.	0.11		
+	ROUTED TO	L2A283	11.	13.50	6.	5.	4.	0.11		
+	HYDROGRAPH AT	N21A31	16.	12.17	2.	1.	0.	0.02		
+	HYDROGRAPH AT	N21A33	24.	12.25	5.	2.	1.	0.04		
+	3 COMBINED AT	C21A33	43.	12.17	12.	7.	6.	0.16		
+	HYDROGRAPH AT	N21A22	6.	12.17	2.	1.	0.	0.01		
+	HYDROGRAPH AT	DRN23A	25.	12.17	2.	0.	0.	0.49		
+	ROUTED TO	RN23AS	8.	12.75	2.	0.	0.	0.49		
+	2 COMBINED AT	C21A22	14.	12.67	4.	1.	1.	0.01		
+	DIVERSION TO	21A22I	11.	12.67	2.	1.	0.	0.01		
+	HYDROGRAPH AT	D21A22	3.	14.25	2.	1.	0.	0.01		
+	HYDROGRAPH AT	N21A30	17.	12.17	3.	1.	1.	0.02		
+	HYDROGRAPH AT	N21AP1	7.	12.67	3.	1.	1.	0.02		
+	4 COMBINED AT	C21AP1	66.	12.17	20.	10.	7.	0.21		
+	ROUTED TO	L21AP1	35.	12.83	20.	10.	7.	0.21		
+	HYDROGRAPH AT	N21AP2	14.	12.17	2.	1.	0.	0.01		
+	2 COMBINED AT	C21AP2	39.	12.58	22.	10.	8.	0.22		
+	ROUTED TO	L21AP2	39.	12.58	22.	10.	8.	0.22		
+	HYDROGRAPH AT	N21A37	12.	12.17	2.	1.	0.	0.01		
+	3 COMBINED AT	C21APA	477.	12.83	219.	111.	87.	1.16		
+	HYDROGRAPH AT	N21A34	15.	12.17	2.	1.	0.	0.02		
+	HYDROGRAPH AT	N21A35	13.	12.08	2.	1.	0.	0.01		
+	HYDROGRAPH AT	N21AP5	9.	12.08	1.	0.	0.	0.01		
+	ROUTED TO	L21AP5	1.	13.17	1.	0.	0.	0.01		
+	HYDROGRAPH AT	N21AP4	28.	12.17	6.	2.	1.	0.03		

	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
+	5 COMBINED AT	C21APB	495.	12.75	228.	114.		89.	1.23	
+	ROUTED TO	L21AP4	464.	13.08	227.	114.		88.	1.23	
+	HYDROGRAPH AT	N21A39	6.	12.33	3.	1.		1.	0.01	
+	HYDROGRAPH AT	DR2122	11.	12.67	2.	1.		0.	0.01	
+	ROUTED TO	R21A22	11.	13.25	2.	1.		0.	0.01	
+	3 COMBINED AT	C21A39	478.	13.08	232.	116.		89.	1.24	
+	ROUTED TO	R21A39	478.	13.17	232.	116.		89.	1.24	
+	HYDROGRAPH AT	N21A40	31.	12.25	6.	2.		1.	0.05	
+	2 COMBINED AT	C21A40	486.	13.17	238.	117.		90.	1.29	
+	HYDROGRAPH AT	N21A41	19.	12.25	4.	1.		1.	0.03	
+	HYDROGRAPH AT	N21A42	14.	12.25	3.	1.		1.	0.02	
+	HYDROGRAPH AT	N21A43	3.	12.08	0.	0.		0.	0.00	
+	4 COMBINED AT	C21A42	495.	13.08	244.	119.		91.	1.34	
+	ROUTED TO	L21A43	504.	13.17	244.	119.		90.	1.34	
+	HYDROGRAPH AT	A21P	58.	12.08	8.	3.		1.	0.04	
+	ROUTED TO	A21PRR	16.	12.08	8.	3.		1.	0.04	
+	ROUTED TO	RA21P	16.	12.17	8.	3.		1.	0.04	
+	HYDROGRAPH AT	A21V	87.	12.00	7.	2.		1.	0.04	
+	DIVERSION TO	A21VR	87.	12.00	7.	2.		1.	0.04	
+	HYDROGRAPH AT	LA21V	0.	0.08	0.	0.		0.	0.04	
+	HYDROGRAPH AT	A21Q	52.	12.08	8.	3.		2.	0.04	
+	3 COMBINED AT	CA21Q	67.	12.08	16.	5.		3.	0.11	
+	ROUTED TO	A21QRR	62.	12.25	16.	5.		3.	0.11	
+	HYDROGRAPH AT	A21R	16.	12.00	2.	1.		0.	0.01	
+	2 COMBINED AT	CA21R	72.	12.17	18.	6.		3.	0.12	

	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
+	ROUTED TO	A21RRR	68.	12.25	18.	6.		3.	0.12	
+	HYDROGRAPH AT	A21S	27.	12.00	3.	1.		1.	0.01	
+	2 COMBINED AT	CA21S	82.	12.17	21.	7.		4.	0.14	
+	ROUTED TO	A21SRR	80.	12.25	21.	7.		4.	0.14	
+	HYDROGRAPH AT	A21T	77.	12.00	8.	3.		1.	0.04	
+	2 COMBINED AT	CA21T	130.	12.08	29.	9.		5.	0.18	
+	ROUTED TO	A21TRR	16.	12.00	16.	9.		5.	0.18	
+	ROUTED TO	RA21T	16.	12.08	16.	9.		5.	0.18	
+	HYDROGRAPH AT	A21AE	118.	12.00	10.	3.		2.	0.05	
+	DIVERSION TO	A21AER	101.	12.00	6.	2.		1.	0.05	
+	HYDROGRAPH AT	LA21AE	90.	12.08	4.	1.		1.	0.05	
+	HYDROGRAPH AT	A21AF	9.	12.00	1.	0.		0.	0.00	
+	DIVERSION TO	A21AFR	9.	12.00	1.	0.		0.	0.00	
+	HYDROGRAPH AT	LA21AF	2.	12.25	0.	0.		0.	0.00	
+	HYDROGRAPH AT	A21X	30.	12.08	3.	1.		0.	0.02	
+	DIVERSION TO	A21XR	30.	12.08	3.	1.		0.	0.02	
+	HYDROGRAPH AT	LA21X	0.	0.08	0.	0.		0.	0.02	
+	HYDROGRAPH AT	A21W	22.	12.08	2.	1.		0.	0.02	
+	DIVERSION TO	A21WR	22.	12.08	2.	1.		0.	0.02	
+	HYDROGRAPH AT	LA21W	0.	0.08	0.	0.		0.	0.02	
+	5 COMBINED AT	CA21AE	101.	12.08	20.	10.		6.	0.27	
+	HYDROGRAPH AT	A21Y	102.	12.00	11.	3.		2.	0.05	
+	DIVERSION TO	A21YR	102.	12.00	7.	2.		1.	0.05	
+	HYDROGRAPH AT	LA21Y	69.	12.17	5.	1.		1.	0.05	
	HYDROGRAPH AT	A21Z	132.	12.00	13.	4.		2.	0.06	

	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
+	DIVERSION TO	A21ZR	132.	12.00	9.	2.	1.	0.06		
+	HYDROGRAPH AT	LA21Z	76.	12.17	5.	1.	1.	0.06		
+	ROUTED TO	RA21Z	64.	12.25	5.	1.	1.	0.06		
+	HYDROGRAPH AT	A21AB	87.	12.00	10.	3.	2.	0.04		
+	DIVERSION TO	A21ABR	87.	12.00	7.	2.	1.	0.04		
+	HYDROGRAPH AT	LA21AB	49.	12.17	5.	1.	1.	0.04		
+	3 COMBINED AT	CA21AB	141.	12.25	14.	4.	2.	0.15		
+	ROUTED TO	RA21AB	133.	12.25	14.	4.	2.	0.15		
+	HYDROGRAPH AT	A21AC	58.	12.00	6.	2.	1.	0.02		
+	DIVERSION TO	A21ACR	58.	12.00	4.	1.	1.	0.02		
+	HYDROGRAPH AT	LA21AC	42.	12.08	3.	1.	0.	0.02		
+	HYDROGRAPH AT	A21AA	28.	12.00	3.	1.	0.	0.01		
+	DIVERSION TO	A21AAR	24.	11.92	1.	0.	0.	0.01		
+	HYDROGRAPH AT	LA21AA	23.	12.08	2.	0.	0.	0.01		
+	HYDROGRAPH AT	A21AD	102.	12.08	12.	4.	2.	0.05		
+	DIVERSION TO	A21ADR	101.	12.08	7.	2.	1.	0.05		
+	HYDROGRAPH AT	LA21AD	78.	12.17	6.	2.	1.	0.05		
+	4 COMBINED AT	CA21AD	216.	12.25	24.	7.	4.	0.24		
+	ROUTED TO	RA21AD	195.	12.25	24.	7.	4.	0.24		
+	2 COMBINED AT	A21AEC	230.	12.25	44.	17.	10.	0.51		
+	ROUTED TO	RA21AE	218.	12.33	43.	17.	10.	0.51		
+	HYDROGRAPH AT	A21AG	71.	12.00	6.	2.	1.	0.03		
+	DIVERSION TO	A21AGR	71.	12.00	4.	1.	1.	0.03		
+	HYDROGRAPH AT	LA21AG	34.	12.17	2.	1.	0.	0.03		
+	2 COMBINED AT	CA21AG	229.	12.25	46.	17.	10.	0.54		

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
+ ROUTED TO	RA21AG	225.	12.33	45.	17.	10.	0.54		
+ HYDROGRAPH AT	A21AH	56.	12.00	5.	1.	1.	0.03		
+ DIVERSION TO	A21AHR	56.	12.00	3.	1.	1.	0.03		
+ HYDROGRAPH AT	LA21AH	26.	12.17	2.	1.	0.	0.03		
+ HYDROGRAPH AT	A21AI	15.	12.00	1.	0.	0.	0.01		
+ DIVERSION TO	A21AIR	15.	12.00	1.	0.	0.	0.01		
+ HYDROGRAPH AT	LA21AI	7.	12.17	0.	0.	0.	0.01		
+ HYDROGRAPH AT	A21AJ	20.	12.00	2.	1.	0.	0.01		
+ DIVERSION TO	A21AIR	20.	12.00	2.	1.	0.	0.01		
+ HYDROGRAPH AT	LA21AI	2.	12.75	0.	0.	0.	0.01		
+ 3 COMBINED AT	CA21AJ	31.	12.17	3.	1.	0.	0.04		
+ HYDROGRAPH AT	A21AK	105.	12.00	11.	4.	2.	0.04		
+ DIVERSION TO	A21AKR	105.	12.00	8.	2.	1.	0.04		
+ HYDROGRAPH AT	LA21AK	50.	12.17	5.	1.	1.	0.04		
+ HYDROGRAPH AT	DA21US	15.	1.33	15.	15.	15.	0.90		
+ ROUTED TO	RA21US	15.	1.50	15.	15.	15.	0.90		
+ HYDROGRAPH AT	N21A38	15.	12.17	3.	1.	1.	0.02		
+ ROUTED TO	L21A38	12.	12.42	2.	1.	0.	0.02		
+ ROUTED TO	R21A38	11.	12.75	2.	1.	0.	0.02		
+ 5 COMBINED AT	CN21B	274.	12.25	69.	35.	26.	0.65		
+ ROUTED TO	RN21B	261.	12.33	68.	35.	26.	0.65		
+ HYDROGRAPH AT	N21A44	27.	12.17	5.	2.	1.	0.03		
+ ROUTED TO	L21A44	0.	0.08	0.	0.	0.	0.03		
+ ROUTED TO	R21A44	0.	0.08	0.	0.	0.	0.03		
+ HYDROGRAPH AT	N21A90	6.	12.42	3.	1.	1.	0.01		

	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
+	4 COMBINED AT	C21A43	620.	12.50	312.	154.	117.	2.03		
+	ROUTED TO	R21A43	615.	12.75	311.	154.	116.	2.03		
+	HYDROGRAPH AT	N21A19	6.	12.08	1.	0.	0.	0.01		
+	HYDROGRAPH AT	N21A91	4.	12.17	1.	1.	0.	0.00		
+	3 COMBINED AT	C21A91	619.	12.75	313.	155.	117.	2.04		
+	ROUTED TO	R21A91	618.	12.75	313.	155.	117.	2.04		
+	HYDROGRAPH AT	N21A4	8.	12.08	1.	0.	0.	0.01		
+	DIVERSION TO	21A4I	3.	12.08	0.	0.	0.	0.01		
+	HYDROGRAPH AT	D21A4	5.	12.08	1.	0.	0.	0.01		
+	HYDROGRAPH AT	N21A2	8.	12.17	1.	0.	0.	0.01		
+	HYDROGRAPH AT	N21A3	12.	12.17	2.	1.	0.	0.02		
+	3 COMBINED AT	C21A3	24.	12.17	4.	1.	1.	0.03		
+	ROUTED TO	R21A3	23.	12.25	4.	1.	1.	0.03		
+	HYDROGRAPH AT	N21A1	28.	12.08	4.	1.	1.	0.02		
+	ROUTED TO	R21A1	28.	12.25	4.	1.	1.	0.02		
+	HYDROGRAPH AT	N21A5	3.	12.33	1.	0.	0.	0.01		
+	3 COMBINED AT	C21A5	53.	12.25	8.	3.	1.	0.07		
+	ROUTED TO	R21A5	53.	12.33	8.	3.	1.	0.07		
+	HYDROGRAPH AT	DR21A4	3.	12.08	0.	0.	0.	0.01		
+	ROUTED TO	R21A4	3.	12.25	0.	0.	0.	0.01		
+	HYDROGRAPH AT	N21A6	19.	12.08	3.	1.	0.	0.02		
+	2 COMBINED AT	C21A6	22.	12.17	3.	1.	1.	0.02		
+	ROUTED TO	R21A6	22.	12.25	3.	1.	1.	0.02		
+	HYDROGRAPH AT	N21A7	13.	12.08	2.	1.	0.	0.01		
+	ROUTED TO	R21A7	11.	12.42	2.	1.	0.	0.01		

	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	N21A8	0.	0.08	0.	0.	0.	0.	0.01	
+	4 COMBINED AT	C21A8	81.	12.33	13.	4.	2.	0.11		
+	ROUTED TO	L21A8	3.	14.92	2.	2.	1.	0.11		
+	ROUTED TO	R21A8	3.	15.08	2.	2.	1.	0.11		
+	HYDROGRAPH AT	N21A9	22.	12.17	3.	1.	1.	0.03		
+	ROUTED TO	R21A9	22.	12.25	3.	1.	1.	0.03		
+	HYDROGRAPH AT	N21A10	40.	12.17	6.	2.	1.	0.05		
+	HYDROGRAPH AT	N21A11	6.	12.25	1.	0.	0.	0.01		
+	HYDROGRAPH AT	N21A12	8.	12.17	2.	1.	0.	0.01		
+	5 COMBINED AT	C21A11	72.	12.17	13.	5.	4.	0.21		
+	ROUTED TO	L21A11	26.	12.75	13.	5.	4.	0.21		
+	ROUTED TO	L21A14	26.	12.83	13.	5.	4.	0.21		
+	ROUTED TO	R21A11	26.	12.83	13.	5.	4.	0.21		
+	HYDROGRAPH AT	N21A14	18.	12.42	4.	1.	1.	0.06		
+	2 COMBINED AT	C21A14	41.	12.58	17.	6.	4.	0.27		
+	HYDROGRAPH AT	N21A13	19.	12.17	3.	1.	1.	0.02		
+	HYDROGRAPH AT	N21A15	11.	12.17	2.	1.	0.	0.01		
+	3 COMBINED AT	C21A15	59.	12.33	21.	8.	5.	0.30		
+	ROUTED TO	L21A15	38.	13.17	21.	8.	5.	0.30		
+	HYDROGRAPH AT	N21A17	4.	12.25	1.	0.	0.	0.01		
+	ROUTED TO	L21A17	3.	12.58	1.	0.	0.	0.01		
+	2 COMBINED AT	C21A17	40.	13.08	22.	8.	5.	0.32		
+	HYDROGRAPH AT	N21A16	15.	12.17	3.	1.	1.	0.02		
+	ROUTED TO	L21A16	14.	12.33	12.	12.	12.	0.02		
+	2 COMBINED AT	C21A16	52.	13.08	34.	20.	17.	0.34		

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
ROUTED TO	R21A16	52.	13.17	34.	20.	17.	0.34		
+ HYDROGRAPH AT	N21A20	1.	12.17	0.	0.	0.	0.00		
+ 2 COMBINED AT	C21A20	53.	13.17	34.	20.	17.	0.34		
+ ROUTED TO	L21A20	53.	13.17	34.	20.	17.	0.34		
+ HYDROGRAPH AT	N21A18	18.	12.17	3.	1.	1.	0.03		
+ 2 COMBINED AT	C21A18	57.	13.08	38.	21.	18.	0.37		
+ ROUTED TO	R21A18	57.	13.08	38.	21.	18.	0.37		
+ HYDROGRAPH AT	N21A21	20.	12.08	3.	1.	1.	0.02		
+ ROUTED TO	L21A21	9.	12.50	2.	1.	0.	0.02		
+ HYDROGRAPH AT	N21A92	4.	12.33	2.	1.	0.	0.01		
+ 4 COMBINED AT	CN21A	673.	12.75	351.	176.	134.	3.72		
+ HYDROGRAPH AT	N19E	539.	12.67	99.	29.	17.	0.70		
+ HYDROGRAPH AT	N19F	223.	12.67	43.	11.	6.	0.37		
+ 2 COMBINED AT	CN19E	755.	12.67	140.	39.	23.	1.08		
+ ROUTED TO	RN19E	630.	12.83	140.	39.	23.	1.08		
+ HYDROGRAPH AT	N19D	397.	12.33	60.	18.	11.	0.39		
+ 2 COMBINED AT	CN19D	792.	12.75	198.	57.	33.	1.47		
+ ROUTED TO	RN19D	753.	13.08	198.	57.	33.	1.47		
+ HYDROGRAPH AT	N19C	1159.	12.08	114.	34.	19.	0.76		
+ 2 COMBINED AT	CN19C	1184.	12.08	308.	89.	52.	2.23		
+ ROUTED TO	RN19C	932.	12.33	308.	89.	52.	2.23		
+ HYDROGRAPH AT	N19B	545.	12.08	48.	14.	8.	0.32		
+ 2 COMBINED AT	CN19B	1190.	12.25	353.	103.	60.	2.54		
+ ROUTED TO	RN19B	944.	12.58	353.	103.	60.	2.54		
HYDROGRAPH AT	N19A	634.	12.17	82.	25.	14.	0.47		

	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	A21B	30.	12.17	4.	1.		1.	0.02	
+	ROUTED TO	RA21B	30.	12.25	4.	1.		1.	0.02	
+	3 COMBINED AT	CN19A	1171.	12.50	434.	128.		74.	3.04	
+	ROUTED TO	397RR	1010.	12.83	431.	128.		74.	3.04	
+	HYDROGRAPH AT	398A	232.	12.08	23.	8.		4.	0.10	
+	HYDROGRAPH AT	398B	145.	12.25	32.	11.		6.	0.14	
+	3 COMBINED AT	C398B	1100.	12.75	479.	145.		84.	3.28	
+	ROUTED TO	398BRR	974.	13.08	474.	145.		84.	3.28	
+	DIVERSION TO	398BI	325.	13.08	158.	48.		28.	3.28	
+	HYDROGRAPH AT	D398B	649.	13.08	316.	97.		56.	3.28	
+	DIVERSION TO	398BSI	325.	13.08	158.	48.		28.	3.28	
+	HYDROGRAPH AT	D398BE	325.	13.08	158.	49.		28.	3.28	
+	HYDROGRAPH AT	398D	200.	12.00	19.	6.		4.	0.08	
+	HYDROGRAPH AT	398E	249.	12.08	23.	7.		4.	0.11	
+	HYDROGRAPH AT	398F	158.	12.33	51.	18.		10.	0.20	
+	4 COMBINED AT	C398F	586.	12.08	243.	79.		46.	3.68	
+	ROUTED TO	398FRR	267.	14.50	197.	76.		46.	3.68	
+	HYDROGRAPH AT	D398BW	325.	13.08	158.	48.		28.	3.28	
+	HYDROGRAPH AT	398C	63.	12.50	22.	7.		4.	0.09	
+	2 COMBINED AT	C398C	369.	13.08	178.	55.		32.	3.27	
+	ROUTED TO	398CRR	259.	14.33	163.	55.		32.	3.27	
+	HYDROGRAPH AT	398BSW	325.	13.08	158.	48.		28.	3.28	
+	HYDROGRAPH AT	398G	99.	12.75	45.	15.		9.	0.22	
+	4 COMBINED AT	C398G	838.	13.92	555.	192.		114.	4.09	
+	ROUTED TO	398GRR	730.	14.83	518.	191.		114.	4.09	

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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

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