



## Drainage Reports

# ZONING DRAINAGE REPORT

## Happy Valley Road -18

Prepared for:

***Camelot Homes***

Submitted to:

***City of Scottsdale***

7447 E. Indian School Road  
Scottsdale, Arizona 85251

Prepared by:

***Kimley-Horn***

7740 N. 16<sup>th</sup> Street  
Suite 300  
Phoenix, Arizona 85020

# ZONING DRAINAGE REPORT

HAPPY VALLEY ROAD - 18



*Zachary Schmidt*

JANUARY 2020

Prepared By:

**Kimley»»Horn**

13-ZN-2019  
1/28/2020

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# INTRODUCTION

## PURPOSE

This Zoning Drainage Report for SWC of Happy Valley & Alma School Road (Site) has been prepared to meet the drainage requirements outlined in Chapter 4 of the City of Scottsdale Design Standards and Policies Manual (DS&PM). The Site is currently zoned as R-190 and will be rezoned as R-43.

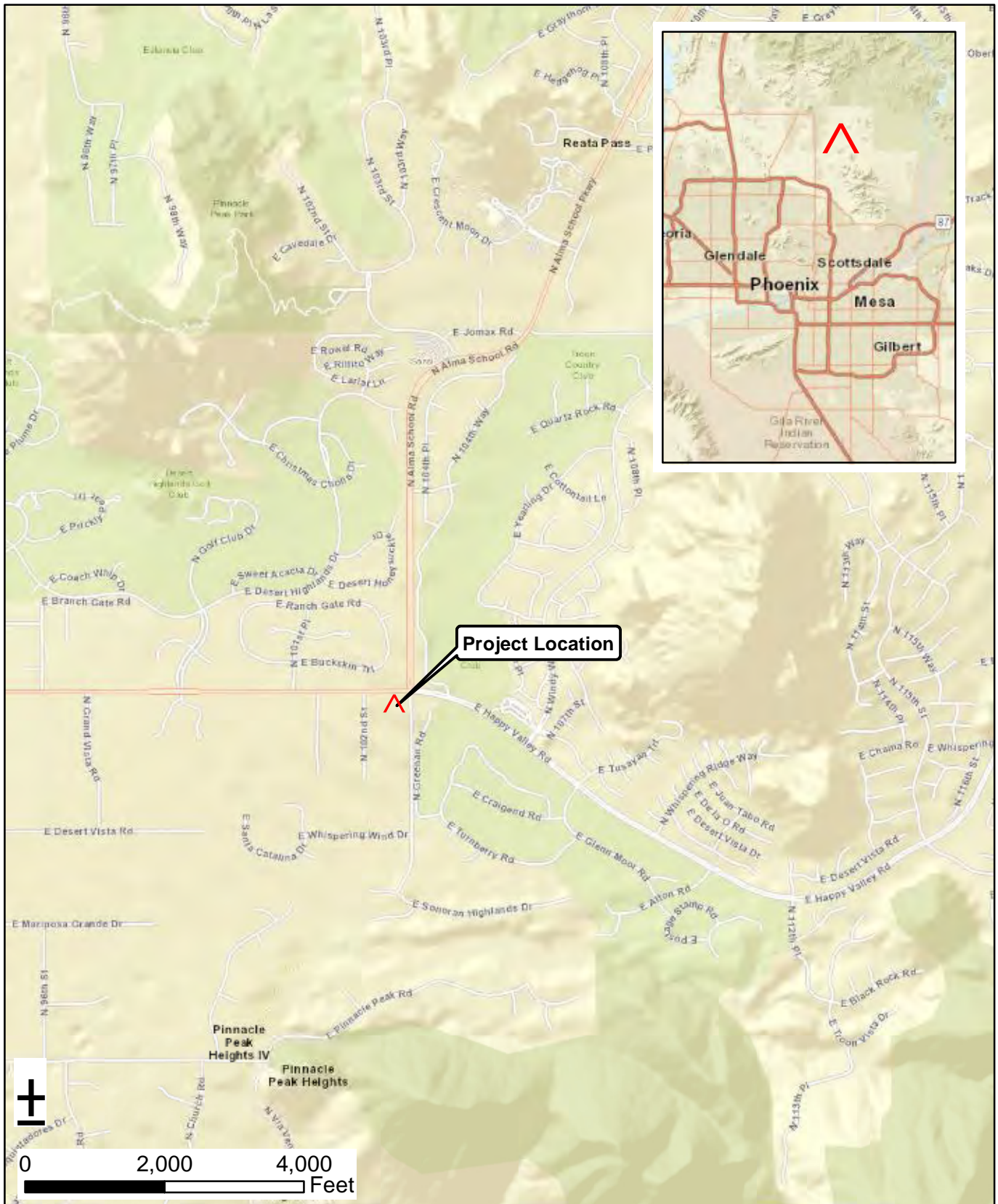
The main purposes of this report are the following:


- Illustrate compliance with the *DS&PM*.
- Establish drainage parameters and criteria for planning and zoning.
- Provide a preliminary hydrologic analysis for the development of the Site.

## PROJECT LOCATION AND DESCRIPTION


The Site is bounded on the east by Alma School Road, north by Happy Valley Road, west by a driveway to an existing residential development, and south by an existing development and Whispering Wind Dr. It lies within a portion of Section 8, Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian. The Site is located within the City of Scottsdale (City) and falls under the City's Environmentally Sensitive Lands Overlay (ESLO). The Site consists of Twenty one (21) lots in the twenty nine-acre (29-acre) site. It is currently zoned R-190. See **Figure 1A** and **Figure 1B** for the Location and Aerial Maps.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and incorporated areas, Panel Number 04013C1330L, effective date October 16, 2013, indicates that the site is Zone X. Shaded Zone X flood zones are classified as "Areas of moderate flood hazard, usually between the limits of the 100-year and 500-year floods." The FIRM Panel is included as **Figure 2**.



|  |   |                              |
|--|---|------------------------------|
|  <p>Expect More. Experience Better.</p> | <p><b>SWC of Happy Valley Road<br/>and Alma School Road</b></p> | <p><b>Scottsdale, AZ</b></p> |
|  | <p><b>Figure 1A. Location Map</b></p>                           |                              |



|  |  |                |
|--|--|----------------|
| <br>Expect More. Experience Better. | SWC of Happy Valley Road<br>and Alma School Road | Scottsdale, AZ |
|  | <b>Figure 1B. Aerial Photo Map</b>               |                |



# National Flood Hazard Layer FIRMette



33°42'57.30"N



## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- |                             |  |   |
|-----------------------------|--|---|
| SPECIAL FLOOD HAZARD AREAS  |  | Without Base Flood Elevation (BFE)<br>Zone A, V, A99  |
|                             |  | With BFE or Depth Zone AE, AO, AH, VE, AR   |
|                             |  | Regulatory Floodway   |
| OTHER AREAS OF FLOOD HAZARD |  | 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X |
|                             |  | Future Conditions 1% Annual Chance Flood Hazard Zone X  |
|                             |  | Area with Reduced Flood Risk due to Levee. See Notes. Zone X  |
|                             |  | Area with Flood Risk due to Levee Zone D  |
| OTHER AREAS                 |  | NO SCREEN Area of Minimal Flood Hazard Zone X   |
|                             |  | Effective LOMRs   |
|                             |  | Area of Undetermined Flood Hazard Zone D  |
| GENERAL STRUCTURES          |  | Channel, Culvert, or Storm Sewer  |
|                             |  | Levee, Dike, or Floodwall   |
| OTHER FEATURES              |  | 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation   |
|                             |  | 17.5 Coastal Transect   |
|                             |  | Base Flood Elevation Line (BFE)   |
|                             |  | Limit of Study  |
|                             |  | Jurisdiction Boundary   |
|                             |  | Coastal Transect Baseline   |
| MAP PANELS                  |  | Digital Data Available  |
|                             |  | No Digital Data Available   |
|                             |  | Unmapped  |
- The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/10/2019 at 2:29:35 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and unmapped and unmodeled regulatory purposes.

USGS The National Map: Orthoimagery. Data refreshed April, 2019.

0 250 500 1,000 1,500 2,000 Feet 1:6,000

33°42'27.37"N

13-ZN-2019  
1/28/2020

## DESCRIPTION OF EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

### EXISTING OFFSITE DRAINAGE CONDITIONS

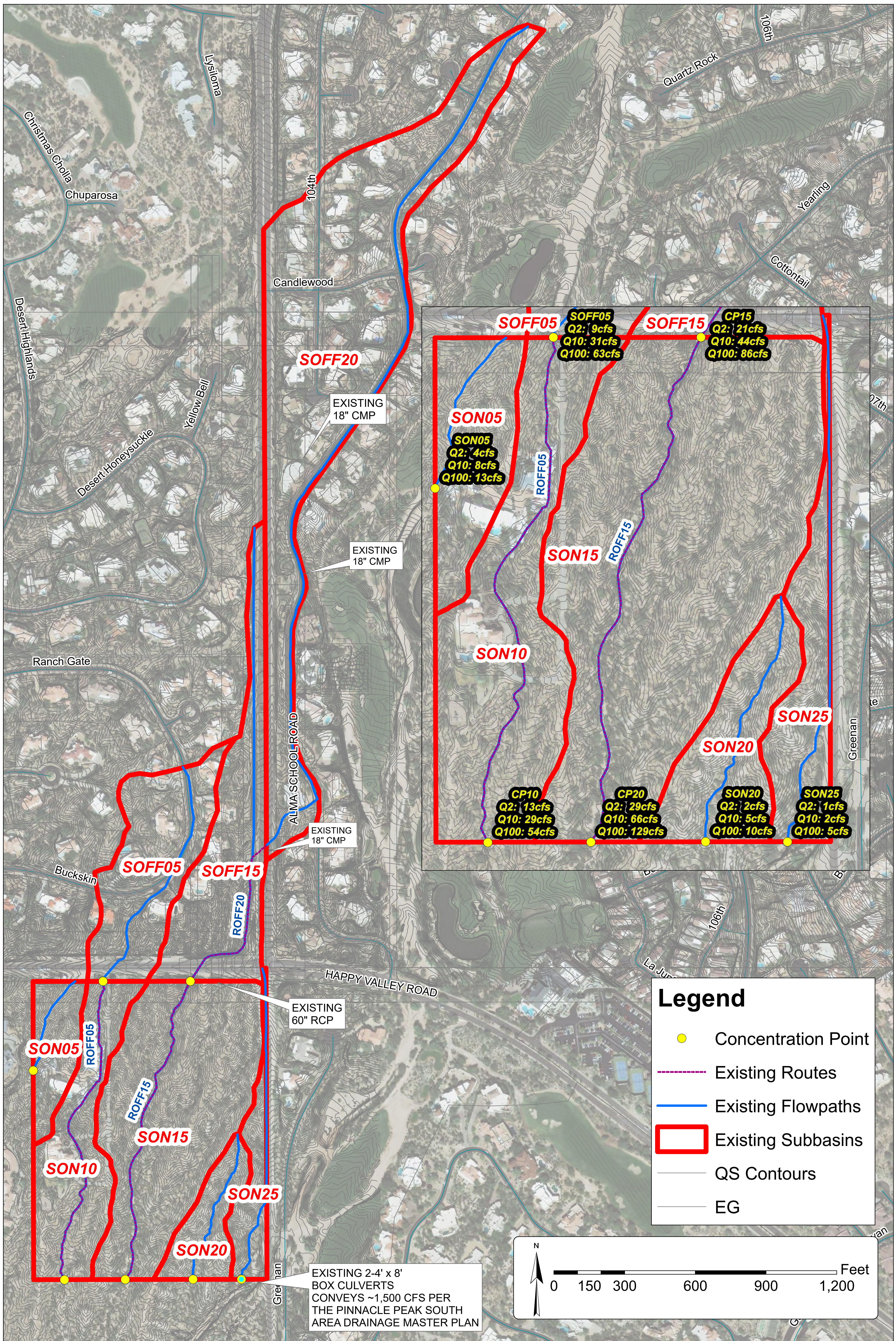
The Site is located within the Pinnacle Peak South Area Drainage Master Study (PPSADMS). Upstream of the Site there are three 18-in culverts that cross Alma School Road from east to west. These culverts convey flow from a subdivision northeast on the Site through an existing 60-in Reinforced Concrete Pipe (RCP). Runoff generated directly north of the Site enter through minor washes that flow through the length of the property. Remaining runoff from subdivisions located to the east, drain towards a larger wash that runs parallel to the Site. The amount of flow in that wash was estimated to be approximated 1,500 cfs based on the PPSADMS study. An existing two (2) barrel 8-ft x 4-ft box culvert located at the southeast corner of the site will convey this flow and will not affect the site. Refer to **Figure 3** for the Existing Conditions Map.

### EXISTING ONSITE DRAINAGE CONDITIONS

The Site is currently undeveloped. All the Site drains from north to south in minor washes. Subbasins were delineated using City of Scottsdale quarter section one-foot contour maps. No significant washes cross the Site. There is one existing development in the southwest portion of the site. No improvements will be done to this parcel, and it will maintain historical drainage patterns. Refer to **Figure 3** for the Existing Conditions Map.

### CONTEXT RELATIVE TO ADJACENT PROJECTS AND IMPROVEMENTS

An existing two barrel 8-ft by 4-ft box culvert conveys flows in the wash located east of the Site under Alma School Rd. The property will be developed so that if Alma School Road is widened, additional work can be done to the culvert crossing and it will not affect the Site.



|  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|
| PROJECT NO.<br>291104088<br>DRAWING NAME<br>EXISTING CONDITIONS<br>3-ENGINEERING | CITY OF SCOTTSDALE<br>HVR & ALMA SCHOOL<br>EXISTING CONDITIONS<br>FIGURE 3 | SCALE(H): 1"= 600'<br>SCALE(V): NONE                 |  | © 2019 KIMLEY-HORN AND ASSOCIATES, INC.<br>Engineering, Planning and Environmental Consultants<br>7740 North 16th Street, Suite 300<br>Phoenix, Arizona 85020 (602) 944-5500 |  |  |  |  |
|  |  | DESIGNED BY: ACH<br>DRAWN BY: ACH<br>CHECKED BY: ZRS |  |  |  |  |  |  |
|  |  | DATE: 01/2020  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

# PROPOSED DRAINAGE PLAN

## PROPOSED ONSITE DRAINAGE PLAN

Proposed onsite sub-basin boundaries were delineated from the proposed overall grading concept. The onsite lots are directed to drain towards the streets and in some cases drain offsite to the east and west. The runoff is conveyed south through the streets and proposed storm drain system, towards a Natural Area Open Space (NAOS) towards two (2) onsite detention basin. The culverts and streets will be designed as a part of final design.

There are two (2) onsite detention basins. Basin A is located at the southwest corner of the site and has a twelve (12) inch orifice located six (6) inches above the bottom of the basin. Basin B is located in the center of the development and has a six (6) inch orifice plate. Flow is then metered out towards another NAOS that routes the flow south and offsite. The detention basins are designed with an overflow weir six (6) inches below the top of basin. The orifice and overflow weirs are being used to control post-development peak discharges. Runoff from east of the site runs parallel to Alma School Road and exits the site to the south. Subbasin SON05 does not discharge towards either of the proposed detention basins designed for first flush. In order to be able to treat the runoff generated from this subbasin, a stormceptor will be installed at the outfall. Refer to **Figure 4** for the proposed hydrology map.

**Table 1. Basin Stage Storage**

| Basin A       |                    |              | Basin B       |                    |              |
|---------------|--------------------|--------------|---------------|--------------------|--------------|
| Stage<br>[ft] | Storage<br>[ac-ft] | Area<br>[ac] | Stage<br>[ft] | Storage<br>[ac-ft] | Area<br>[ac] |
| 2320.00       | -                  | 0.1          | 2337.00       | -                  | 0.1          |
| 2321.00       | 3.00               | 0.2          | 2338.00       | 0.47               | 0.2          |
| 2322.00       | 5.00               | 0.2          | 2339.00       | 1.06               | 0.2          |
| 2323.00       | 6.00               | 0.3          | 2340.00       | 1.42               | 0.3          |
| 2323.10       | 7.00               | 0.3          | 2340.10       | 4.99               | 0.3          |
| 2323.20       | 16.00              | 0.3          | 2340.20       | 14.34              | 0.3          |
| 2323.30       | 30.00              | 0.3          | 2340.30       | 26.73              | 0.3          |
| 2323.40       | 47.00              | 0.3          | 2340.40       | 41.72              | 0.3          |
| 2323.50       | 67.00              | 0.3          | 2340.50       | 59.03              | 0.3          |

## PROPOSED ONSITE HYDROLOGY

The development of the Site minimizes increases in post-development runoff to pre-development conditions where runoff exits the Site for three design storms (2-, 10- and 100-year). The entirety of the

pre-developed site consists of braided washes that all exit at the southern portion of the site. The site layout used for the Site takes into consideration these existing washes, as well as existing properties that are near and within the Site. There is a small increase between pre- and post-development conditions for the 2-, 10-, and 100-year storm at one combination point. These increases are considered negligible. Refer to **Table 1** for a summary of pre- and post-development discharges. The onsite detention basins are used to attenuate peak discharges from onsite runoff. Refer to **Figure 4** for the Proposed Hydrology Map. Refer to **Appendix B** for detailed hydrologic calculations and results.

**Table 2. Pre- Versus Post-Development Runoff**

| HEC-1 Name |        | Q <sub>2</sub> [cfs] |      | Q <sub>10</sub> [cfs] |      | Q <sub>100</sub> [cfs] |      |
|------------|--------|----------------------|------|-----------------------|------|------------------------|------|
| Pre        | Post   | Pre                  | Post | Pre                   | Post | Pre                    | Post |
| CP15       | CP15   | 21                   | 16   | 44                    | 35   | 86                     | 71   |
| SOFF05     | SOFF05 | 7                    | 11   | 18                    | 18   | 31                     | 31   |
| SON05      | SON60  | 9                    | 1    | 8                     | 2    | 13                     | 3    |
| CP20       | CP45   | 29                   | 32   | 66                    | 64   | 129                    | 128  |
| CP10       | CP50   | 13                   | 4    | 29                    | 8    | 54                     | 28   |
| SON20      | SON55  | 2                    | 3    | 5                     | 4    | 10                     | 7    |

## PROPOSED ONSITE HYDRAULICS

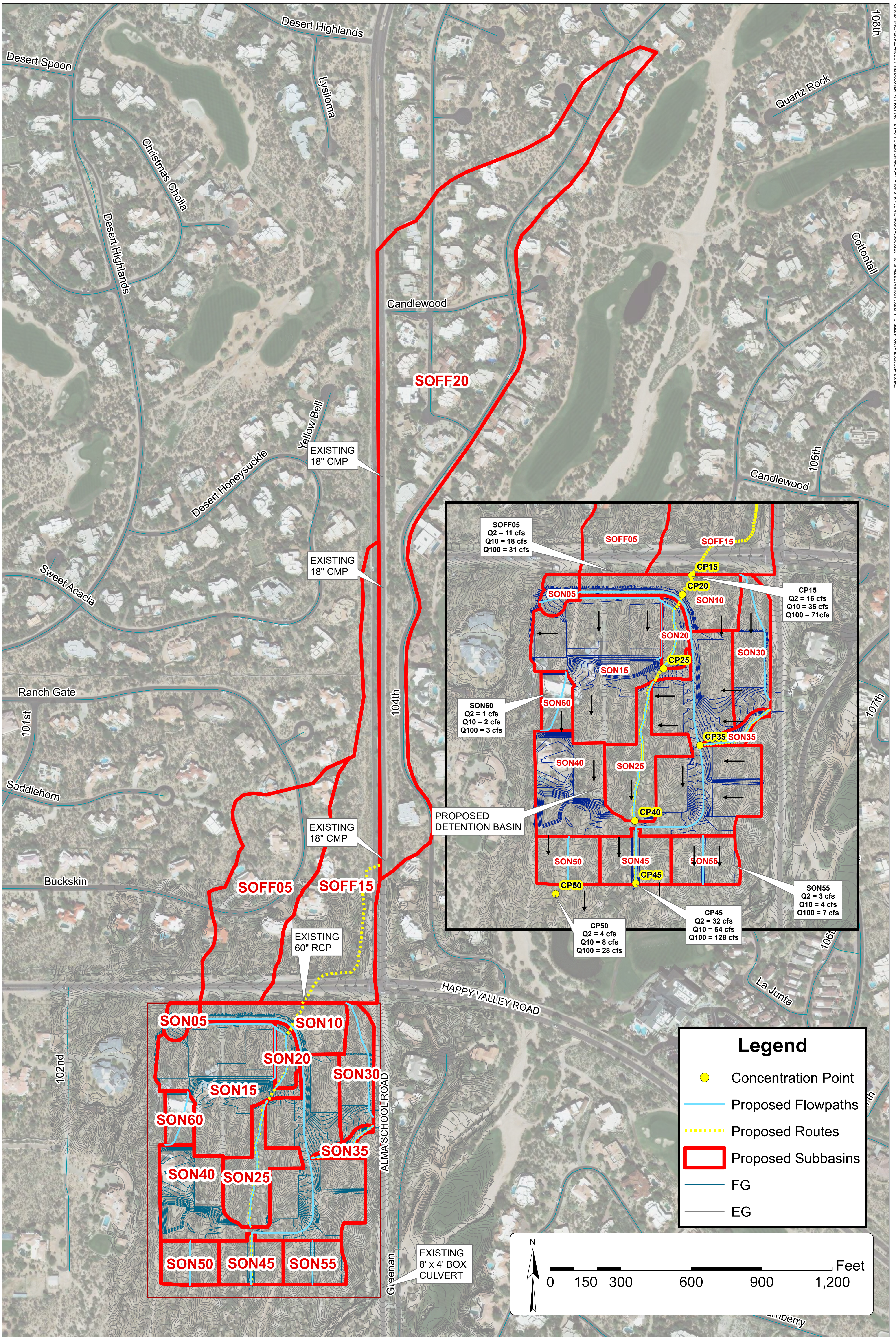
Onsite runoff will be conveyed in local streets and culverts to the detention basins. Per the DS&PM, all interior streets will be designed to convey the peak discharge from the 10-year storm event at or below the top of curb elevation. Onsite culverts sized for the 10-year storm will be included in following submittals. Additionally, the streets will convey the 100-year runoff within the proposed tracts and maintain a maximum flow depth of eight inches above the gutter flow line. Catch basins will capture pavement runoff and outfall to the proposed detention basin. Catch basins, curb cuts, and storm drains will be designed per the DS&PM and Flood Control District of Maricopa County (FCDMC) Drainage Policies and Standards as part of the final design.

## PROPOSED OFFSITE DRAINAGE PLAN

Offsite flow will be routed through the Site via culverts and onsite channels. This drainage pattern is similar to the existing condition. Hydraulic analysis for the culverts will be completed with final design.

## PROPOSED PROJECT PHASING

The project will be constructed in one phase.



|                          |                                       |
|--------------------------|---------------------------------------|
| PROJECT NO.<br>291104088 | DRAWING NAME<br>3-PROPOSED CONDITIONS |
|--------------------------|---------------------------------------|

CITY OF SCOTTSDALE  
HVR & ALMA SCHOOL  
PROPOSED CONDITIONS  
FIGURE 4

SCALE(H): 1"= 600'  
SCALE(V): NONE  
DESIGNED BY: ACH  
DRAWN BY: ACH  
CHECKED BY: ZRS  
DATE: 01/2020

**Kimley & Horn**

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|  |  |  |  |  |
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## SPECIAL CONDITIONS

### ADEQ REQUIREMENTS

A stormwater management plan will be prepared to meet Arizona Department of Environmental Quality (ADEQ) requirements. The stormwater management plan is prepared under the Arizona Pollutant Discharge Elimination System (AZPDES) program. The stormwater management plan is a part of a separate document and is not included with this report.

# DATA ANALYSIS METHODS

## HYDROLOGY

The U.S. Army Corps of Engineers HEC-1 hydrologic computer program was used to determine the 2-, 10, and 100-year peak discharges for offsite and onsite subbasins. Offsite subbasins were delineated using city one-foot contours, onsite subbasins were delineated using obtained topography. The hydrologic model prepared for this report uses rainfall depths from National Oceanic and Atmospheric Administration Atlas 14 (NOAA14). The six-hour storm duration was used for this project due to the size of the contributing watershed. Refer to **Appendix A**. The Drainage Design Management System for Windows (DDMSW) program was used to develop the hydrologic parameters for the onsite drainage areas and offsite drainage areas north of the Site. The default NMIN value was changed in DDMSW from 5 to 2 based on the FCDMC Drainage Design Manual – Hydrology Manual. The lower value was used for the shorter time of concentrations. The “Non-default value or value out of range” note in the proposed conditions parameters in **Appendix B** is because of the varying subbasin sizes and flowpaths. The selected NMIN parameter will not meet the time of concentration requirements specified in the FCDMC Drainage Design Manual – Hydrology due to the varying subbasin sizes. The HEC-1 models were run with varying NMIN parameters to confirm the hydrograph shape and peaks were valid. Green and Ampt rainfall loss parameters were estimated using DDMSW, DS&PM, and FCDMC Drainage Design – Hydrology. No changes were made to the default hydrologic parameters.

Green and Ampt rainfall loss parameters for the onsite basins were estimated using DDMSW, the City parameters, and the FCDMC Drainage Design Manual – Hydrology. The Clark Unit hydrograph was used. The existing onsite land use is undeveloped desert. No changes were made to the existing offsite land use types. **Table 2** is a summary of the land use parameters used for the onsite hydrologic model. The values shown were taken from the FCDMC Drainage Policies and Standards and confirmed that the default values applied to the Site. The percent cover for the NDR Land Use Code was determined based on a visual inspection via aerial photographs and Site visit. Proposed land use maps are included in **Appendix B**

**Table 3. Land Use Parameters**

| Land Use Code | Land Use Category   | IA [in] | R <sub>time</sub> [%] | Cover [%] | D <sub>theta</sub> [cfs] | K <sub>b</sub> [cfs] |
|---------------|---|---------|-----------------------|-----------|--------------------------|----------------------|
| 110           | Rural Residential (<= 1/5 du per acre) Rural-190                      | 0.30    | 5                     | 30        | Normal                   | Min                  |
| 120           | Estate Residential (1/5 du per acre) Rural-70, Rural-43               | 0.30    | 5                     | 30        | Normal                   | Min                  |
| 140           | Medium Lot Residential – Single Family (2-4 du per acre) R1-18, R1-10 | 0.25    | 20                    | 50        | Normal                   | Min                  |
| 2002          | Pavement and Rooftops   | 0.05    | 0                     | 95        | Dry                      | Min                  |
| NDR           | Open Space  | 0.35    | 0                     | 25        | Dry                      | Low                  |

Six soil types were identified for the onsite and offsite subbasins using the web soil survey from the National Resource Conservation Service (NRCS). Maps showing the soil type is shown in **Appendix A** and **Appendix B**.



The normal depth method was used for routes through the existing washes. Culverts were not routed in the model to remove instabilities and is more conservative as there is no attenuation taking place in the pipes. Eight point cross sections are provided. The proposed model includes routes through the detention basins. Refer to **Appendix A** and **Appendix B**.

## HYDRAULICS

There will be four culverts installed throughout the site to convey flow across roads towards the southern portion of the site. Proposed culverts and storm drain for onsite flow will be sized for the 10-year storm in final design.

## PROPOSED ONSITE STORMWATER STORAGE

The outlet for the detention basins are elevated six (6) inches above the bottom of the basin. The volume below the outlet will treat the first flush runoff. Because the site is located in ELSO it qualified for a partial stormwater storage waiver. Post-development peak discharges are less than or equal to pre-development peak discharges. The storage waiver is included in **Appendix C**.

## CONCLUSIONS

- Hydrologic models were prepared for the onsite and offsite area for the pre- and post-development conditions. The Development will not increase post-development peak discharges exiting the site from the pre-development conditions. Detention basins are used to attenuate onsite runoff. The basins will treat the first flush.

## REFERENCES

- Arizona Department of Water Resources, *State Standard for Watercourse System Sediment Balance*, September 1996.
- Bentley Systems, Inc., *FlowMaster*, V8i, 2009.
- City of Scottsdale, *Design Standards and Policies Manual*, January 2010.
- Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona – Hydrology*, revised 2013.
- Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona – Hydraulics*, revised 2013.
- Flood Control District of Maricopa County, *Drainage Policies and Standards for Maricopa County, Arizona*, revised 2016.
- TY Lin International, *Pinnacle Peak South Area Drainage Master Study*, July 2013

## **Appendix A – Existing Conditions Hydrology**

*Existing Conditions Soils*

*Existing Conditions Land Use*

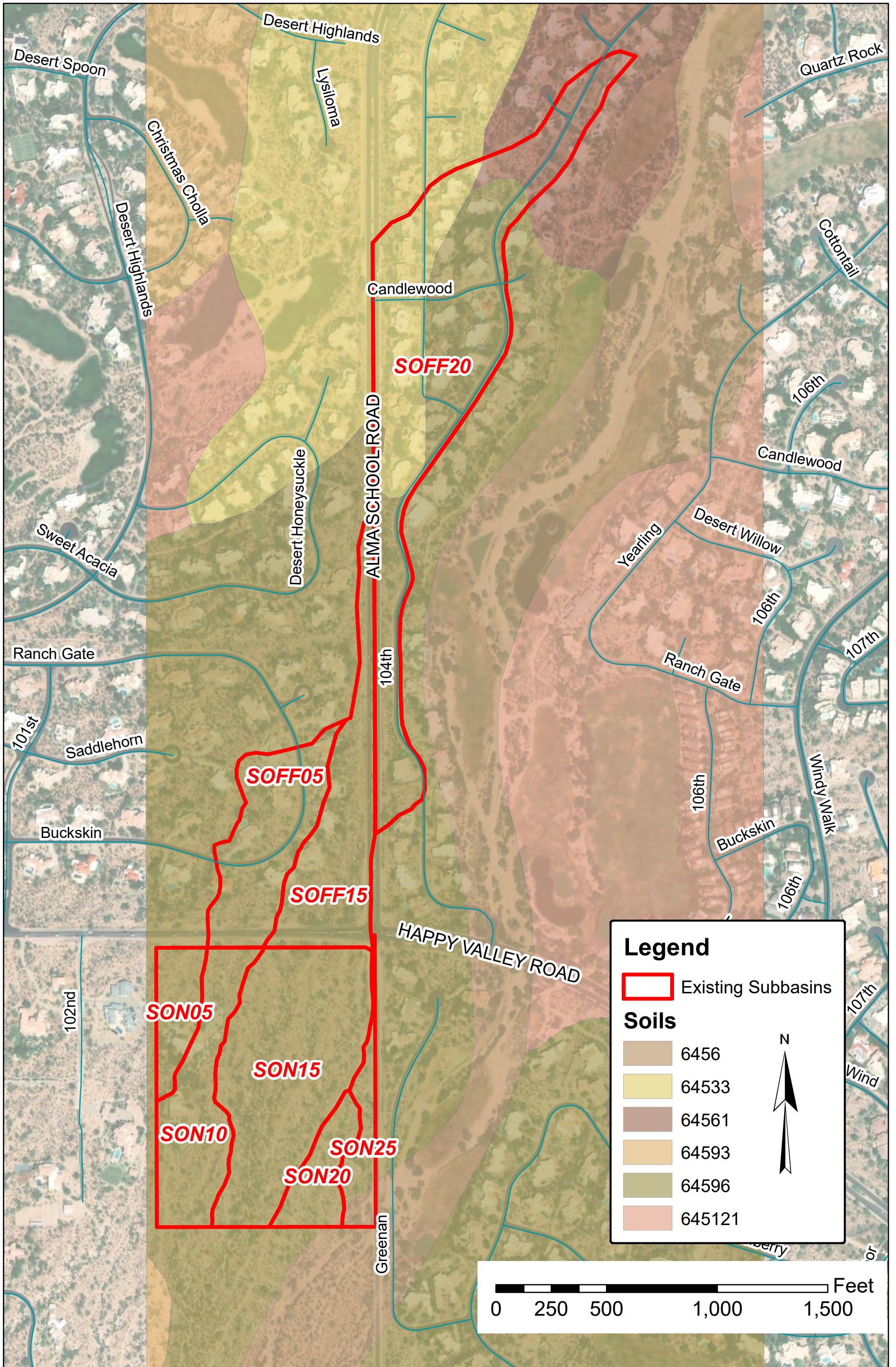
*Subbasin Hydrologic Parameters*

*Routing Reaches*

*HEC-1 Results*

Flood Control District of Maricopa County  
 Drainage Design Management System  
**RAINFALL DATA**  
 Project Reference: HVR/ALMA SCHOOL-EX

| ID             | Method | Duration | 2 Yr  | 5 Yr  | 10 Yr | 25 Yr | 50 Yr | 100 Yr |
|----------------|--------|----------|-------|-------|-------|-------|-------|--------|
| <b>DEFAULT</b> | NOAA14 | 5 MIN    | 0.303 | 0.408 | 0.487 | 0.591 | 0.669 | 0.748  |
|                | NOAA14 | 10 MIN   | 0.461 | 0.620 | 0.741 | 0.900 | 1.019 | 1.139  |
|                | NOAA14 | 15 MIN   | 0.571 | 0.769 | 0.919 | 1.115 | 1.263 | 1.412  |
|                | NOAA14 | 30 MIN   | 0.769 | 1.036 | 1.237 | 1.502 | 1.701 | 1.902  |
|                | NOAA14 | 1 HOUR   | 0.952 | 1.282 | 1.531 | 1.859 | 2.105 | 2.353  |
|                | NOAA14 | 2 HOUR   | 1.087 | 1.442 | 1.713 | 2.079 | 2.355 | 2.639  |
|                | NOAA14 | 3 HOUR   | 1.158 | 1.507 | 1.786 | 2.172 | 2.478 | 2.794  |
|                | NOAA14 | 6 HOUR   | 1.368 | 1.738 | 2.033 | 2.437 | 2.752 | 3.078  |
|                | NOAA14 | 12 HOUR  | 1.630 | 2.049 | 2.381 | 2.831 | 3.176 | 3.532  |
|                | NOAA14 | 24 HOUR  | 1.986 | 2.585 | 3.068 | 3.752 | 4.302 | 4.884  |



|                         |                          |
|-------------------------|--------------------------|
| PROJECT NO.<br>28110425 | DRAWING NAME<br>EX SOILS |
|-------------------------|--------------------------|

**CITY OF SCOTTSDALE  
HVR & ALMA SCHOOL  
EXISTING SOILS**

SCALE(H): 1" = 500'  
SCALE(V): N/A  
DESIGNED BY: ACH  
DRAWN BY: ACH  
CHECKED BY: ZRS  
DATE: 1/2020



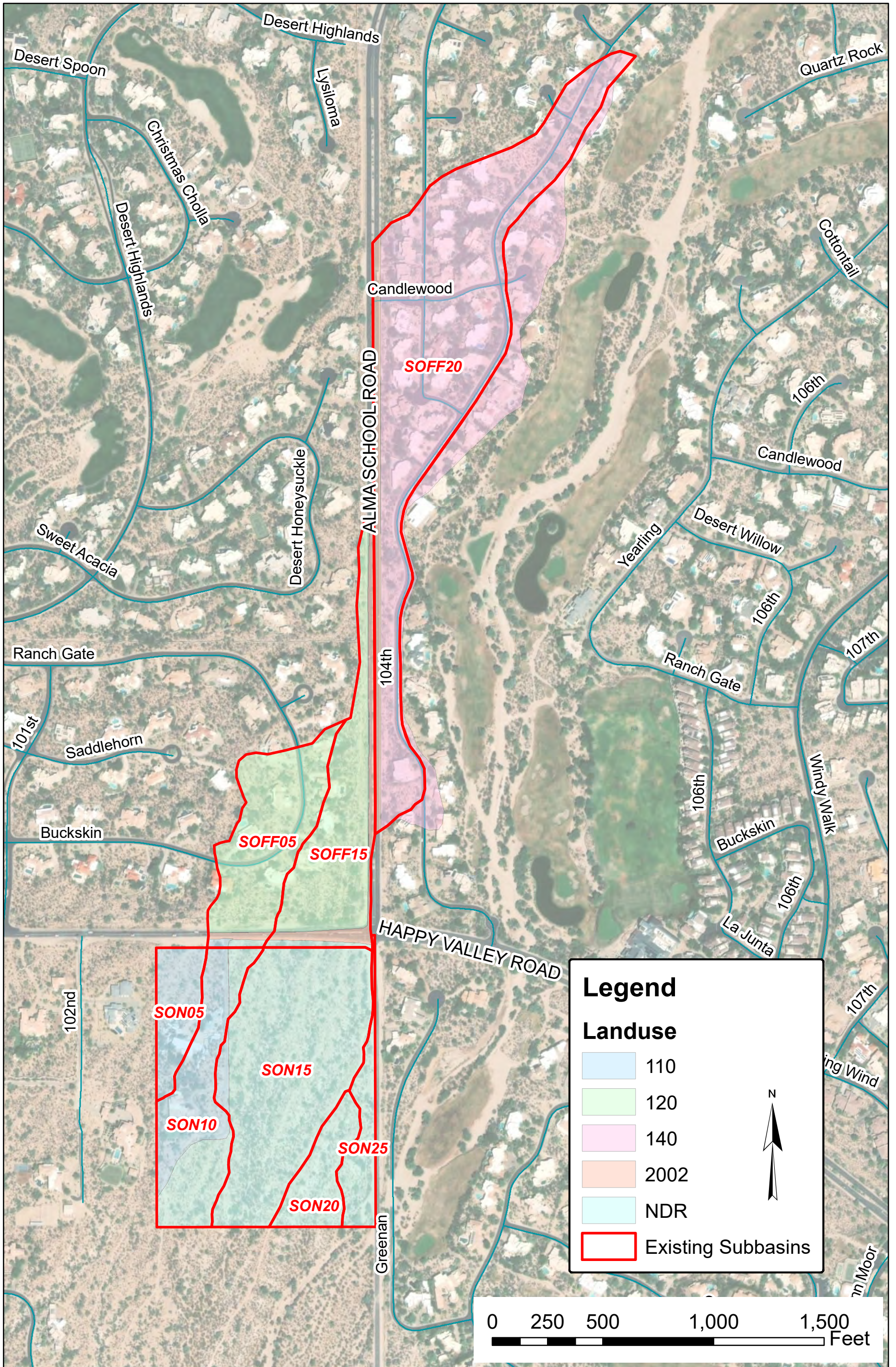
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Flood Control District of Maricopa County  
 Drainage Design Management System  
 SOILS

| Area ID                   | Book Number | Map Unit | Soil ID | Area (sq mi) | Area (%) | XKSAT | Rock Percent (%) | Effective Rock (%) | Comments |
|---------------------------|-------------|----------|---------|--------------|----------|-------|------------------|--------------------|----------|
| <b>Major Basin ID: 01</b> |             |          |         |              |          |       |                  |                    |          |
| SOFF05                    | 645         | 96       | 64596   | 0.011        | 100.00   | 0.070 | -                | 100                |          |
| SOFF15                    | 645         | 96       | 64596   | 0.014        | 100.00   | 0.070 | -                | 100                |          |
| SOFF20                    | 645         | 33       | 64533   | 0.012        | 31.80    | 0.230 | -                | 100                |          |
|                           | 645         | 61       | 64561   | 0.005        | 13.80    | 0.150 | -                | 100                |          |
|                           | 645         | 96       | 64596   | 0.021        | 54.40    | 0.070 | -                | 100                |          |
| SON05                     | 645         | 96       | 64596   | 0.004        | 100.00   | 0.070 | -                | 100                |          |
| SON10                     | 645         | 96       | 64596   | 0.011        | 100.00   | 0.070 | -                | 100                |          |
| SON15                     | 645         | 96       | 64596   | 0.022        | 100.00   | 0.070 | -                | 100                |          |
| SON20                     | 645         | 6        | 6456    | 0.000        | 2.40     | 0.620 | -                | 100                |          |
|                           | 645         | 96       | 64596   | 0.004        | 97.60    | 0.070 | -                | 100                |          |
| SON25                     | 645         | 6        | 6456    | 0.001        | 22.20    | 0.620 | -                | 100                |          |
|                           | 645         | 96       | 64596   | 0.003        | 77.80    | 0.070 | -                | 100                |          |

\* Non default value



|              |                  |
|--------------|------------------|
| PROJECT NO.  | 28110425         |
| DRAWING NAME | EXISTING LANDUSE |

**CITY OF SCOTTSDALE  
HVR & ALMA SCHOOL  
EXISTING LANDUSE**

SCALE(H): 1" = 5000'  
SCALE(V): N/A  
DESIGNED BY: ACH  
DRAWN BY: ACH  
CHECKED BY: ZRS  
DATE: 1/2020



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Flood Control District of Maricopa County  
 Drainage Design Management System  
**LAND USE**  
 Project Reference: HVR/ALMA SCHOOL-EX

| Sub Basin                 | Land Use Code | Area (sq mi)  | Area (%)     | Initial Loss (IA) | Percent Impervious (RTIMP) | Vegetation Cover (%) | DTHETA | Kb    | Description  |
|---------------------------|---------------|---------------|--------------|-------------------|----------------------------|----------------------|--------|-------|--|
| <b>Major Basin ID: 01</b> |               |               |              |                   |                            |                      |        |       |  |
| SOFF05                    | 110           | 0.0001        | 0.9          | 0.30              | 5                          | 30.0                 | NORMAL | 0.035 | Rural Residential (<= 1/5 du per acre)                               |
|                           | 120           | 0.0107        | 94.7         | 0.30              | 5                          | 30.0                 | NORMAL | 0.035 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           | 2002          | 0.0003        | 2.7          | 0.05              | 95                         | 0.0                  | DRY    | 0.035 | Pavement and Rooftops  |
|                           | NDR           | 0.0002        | 1.8          | 0.35              | 0                          | 25.0                 | DRY    | 0.068 | Undeveloped Desert Rangeland, Little topographic relief, slopes < 5% |
|                           |               | <b>0.0113</b> | <b>100.1</b> |                   |                            |                      |        |       |  |
| SOFF15                    | 120           | 0.0105        | 77.2         | 0.30              | 5                          | 30.0                 | NORMAL | 0.034 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           | 2002          | 0.0026        | 19.1         | 0.05              | 95                         | 0.0                  | DRY    | 0.034 | Pavement and Rooftops  |
|                           | NDR           | 0.0005        | 3.7          | 0.35              | 0                          | 25.0                 | DRY    | 0.067 | Undeveloped Desert Rangeland, Little topographic relief, slopes < 5% |
|                           |               | <b>0.0136</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SOFF20                    | 140           | 0.0357        | 93.0         | 0.25              | 20                         | 50.0                 | NORMAL | 0.031 | Medium Lot Residential - Single Family (2-4 du per acre)             |
|                           | 2002          | 0.0027        | 7.0          | 0.05              | 95                         | 0.0                  | DRY    | 0.031 | Pavement and Rooftops  |
|                           |               | <b>0.0384</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON05                     | 110           | 0.0040        | 100.0        | 0.30              | 5                          | 30.0                 | NORMAL | 0.037 | Rural Residential (<= 1/5 du per acre)                               |
|                           |               | <b>0.0040</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON10                     | 110           | 0.0063        | 58.9         | 0.30              | 5                          | 30.0                 | NORMAL | 0.035 | Rural Residential (<= 1/5 du per acre)                               |
|                           | NDR           | 0.0044        | 41.1         | 0.35              | 0                          | 25.0                 | DRY    | 0.068 | Undeveloped Desert Rangeland, Little topographic relief, slopes < 5% |
|                           |               | <b>0.0107</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON15                     | 110           | 0.0006        | 2.7          | 0.30              | 5                          | 30.0                 | NORMAL | 0.033 | Rural Residential (<= 1/5 du per acre)                               |
|                           | NDR           | 0.0218        | 97.3         | 0.35              | 0                          | 25.0                 | DRY    | 0.064 | Undeveloped Desert Rangeland, Little topographic relief, slopes < 5% |
|                           |               | <b>0.0224</b> | <b>100.0</b> |                   |                            |                      |        |       |  |

\* Non default value

Flood Control District of Maricopa County  
 Drainage Design Management System  
**LAND USE**  
 Project Reference: HVR/ALMA SCHOOL-EX

| Sub Basin                 | Land Use Code | Area (sq mi)  | Area (%)     | Initial Loss (IA) | Percent Impervious (RTIMP) | Vegetation Cover (%) | DTHETA | Kb    | Description  |
|---------------------------|---------------|---------------|--------------|-------------------|----------------------------|----------------------|--------|-------|--|
| <b>Major Basin ID: 01</b> |               |               |              |                   |                            |                      |        |       |  |
| SON20                     | NDR           | 0.0042        | 100.0        | 0.35              | 0                          | 25.0                 | DRY    | 0.074 | Undeveloped Desert Rangeland, Little topographic relief, slopes < 5% |
|                           |               | <b>0.0042</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON25                     | NDR           | 0.0036        | 100.0        | 0.35              | 0                          | 25.0                 | DRY    | 0.074 | Undeveloped Desert Rangeland, Little topographic relief, slopes < 5% |
|                           |               | <b>0.0036</b> | <b>100.0</b> |                   |                            |                      |        |       |  |

\* Non default value

Flood Control District of Maricopa County  
 Drainage Design Management System  
 SUB BASINS

| Area ID                   | Sub Basin Parameters  |             |               |           |           |       | Rainfall Losses |        |           |               |           | Return Period Parameters |       |       |        |        |        |        |
|---------------------------|---|-------------|---------------|-----------|-----------|-------|-----------------|--------|-----------|---------------|-----------|--------------------------|-------|-------|--------|--------|--------|--------|
|                           | Area (sq mi)  | Length (mi) | Slope (ft/mi) | Adj Slope | Time-Area | Kb    | IA (in)         | DTHETA | PSIF (in) | XKSAT (in/hr) | RTIMP (%) | 2 Yr                     | 5 Yr  | 10 Yr | 25 Yr  | 50 Yr  | 100 Yr |        |
| <b>Major Basin ID: 01</b> |   |             |               |           |           |       |                 |        |           |               |           |                          |       |       |        |        |        |        |
| SOFF05                    | 0.011   | 0.20        | 170.0         | 170.0     | Urban     | 0.035 | 0.29            | 0.16   | 7.94      | 0.085         | 7         | <b>Tc (Hrs)</b>          | 0.210 | 0.179 | 0.163  | 0.147  | 0.139  | 0.132  |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 1.40  | 1.64  | 1.80   | 2.00   | 2.11   | 2.22   |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.236 | 0.198 | 0.178  | 0.159  | 0.149  | 0.141  |
| SOFF15                    | 0.014   | 0.39        | 132.3         | 132.3     | Urban     | 0.035 | 0.25            | 0.18   | 7.94      | 0.081         | 22        | <b>Tc (Hrs)</b>          | 0.302 | 0.262 | 0.241  | 0.219  | 0.207  | 0.197  |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 1.89  | 2.18  | 2.37   | 2.61   | 2.76   | 2.90   |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.525 | 0.448 | 0.408  | 0.368  | 0.346  | 0.327  |
| SOFF20                    | 0.038   | 0.75        | 139.6         | 139.6     | Urban     | 0.031 | 0.24            | 0.18   | 6.76      | 0.161         | 25        | <b>Tc (Hrs)</b>          | 0.401 | 0.350 | 0.319  | 0.289  | 0.272  | 0.257  |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 2.74  | 3.14  | 3.45   | 3.81   | 4.04   | 4.28   |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.688 | 0.590 | 0.534  | 0.477  | 0.446  | 0.419  |
| SON05                     | 0.004   | 0.08        | 216.9         | 215.6     | Urban     | 0.037 | 0.30            | 0.15   | 7.94      | 0.085         | 5         | <b>Tc (Hrs)</b>          | 0.128 | 0.108 | 0.099* | 0.089* | 0.084* | 0.080* |
|                           | 10-, 25-, 50-, and 100-year Tc values listed as "non default or out of range" because of the varying subbasin sizes and flowpaths. The selected NMIN parameter will not meet the time of concentration requirements for the varying subbasin sizes. |             |               |           |           |       |                 |        |           |               |           |                          |       |       |        |        |        |        |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.92  | 1.09  | 1.19   | 1.32   | 1.40   | 1.47   |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.116 | 0.097 | 0.087  | 0.078  | 0.073  | 0.069  |
| SON10                     | 0.011   | 0.26        | 183.2         | 183.2     | Urban     | 0.049 | 0.32            | 0.21   | 7.94      | 0.084         | 3         | <b>Tc (Hrs)</b>          | 0.294 | 0.247 | 0.223  | 0.200  | 0.187  | 0.177  |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 1.30  | 1.54  | 1.71   | 1.91   | 2.04   | 2.15   |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.423 | 0.349 | 0.311  | 0.276  | 0.257  | 0.241  |
| SON15                     | 0.022   | 0.26        | 209.3         | 208.8     | Urban     | 0.063 | 0.35            | 0.30   | 7.94      | 0.082         |           | <b>Tc (Hrs)</b>          | 0.342 | 0.285 | 0.255  | 0.226  | 0.210  | 0.197  |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 1.12  | 1.34  | 1.50   | 1.69   | 1.82   | 1.94   |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.337 | 0.275 | 0.243  | 0.213  | 0.196  | 0.183  |
| SON20                     | 0.004   | 0.13        | 257.8         | 244.4     | Urban     | 0.074 | 0.35            | 0.30   | 7.94      | 0.087         |           | <b>Tc (Hrs)</b>          | 0.252 | 0.210 | 0.188  | 0.166  | 0.155  | 0.145  |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.76  | 0.91  | 1.01   | 1.15   | 1.23   | 1.31   |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.365 | 0.298 | 0.263  | 0.230  | 0.212  | 0.198  |
| SON25                     | 0.004   | 0.26        | 221.8         | 219.7     | Urban     | 0.074 | 0.35            | 0.35   | 6.76      | 0.133         |           | <b>Tc (Hrs)</b>          | 0.399 | 0.326 | 0.291  | 0.255  | 0.235  | 0.219  |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.96  | 1.17  | 1.31   | 1.50   | 1.62   | 1.74   |
|                           |   |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 1.056 | 0.844 | 0.745  | 0.642  | 0.587  | 0.544  |

\* Non default value or value out of range

Flood Control District of Maricopa County  
 Drainage Design Management System  
 HEC-1 ROUTING DATA  
 Project Reference: HVR/ALMA SCHOOL-EX

| Route ID | LOB N | Chan N | ROB N | Length (ft) | Slope (ft/ft) | Max Elev (ft) | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
|----------|-------|--------|-------|-------------|---------------|---------------|----|----|----|----|----|----|----|----|
|----------|-------|--------|-------|-------------|---------------|---------------|----|----|----|----|----|----|----|----|

**NORMAL DEPTH**

**Major Basin 01**

|        |                      |                      |                       |                       |                       |                        |             |          |          |          |          |          |          |          |
|--------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|------------------------|-------------|----------|----------|----------|----------|----------|----------|----------|
| ROFF05 | 0.035                | 0.035                | 0.035                 | 1,381.50              | 0.0356                | 2,387.00               | X: -        | 9.60     | 16.60    | 30.20    | 43.20    | 56.90    | 65.90    | 68.80    |
|        | Return Period        |                      |                       |                       |                       |                        | Y: 2,360.00 | 2,358.77 | 2,357.82 | 2,356.09 | 2,356.83 | 2,357.29 | 2,357.77 | 2,358.00 |
|        | <a href="#">2 Yr</a> | <a href="#">5 Yr</a> | <a href="#">10 Yr</a> | <a href="#">25 Yr</a> | <a href="#">50 Yr</a> | <a href="#">100 Yr</a> |             |          |          |          |          |          |          |          |
| NSTPS  | 0                    | 0                    | 0                     | 0                     | 0                     | 0                      |             |          |          |          |          |          |          |          |
| ROFF15 | 0.035                | 0.035                | 0.035                 | 1,369.70              | 0.0340                | 2,361.00               | X: -        | 4.70     | 19.30    | 25.80    | 28.90    | 33.30    | 45.70    | 62.30    |
|        | Return Period        |                      |                       |                       |                       |                        | Y: 2,349.86 | 2,349.23 | 2,348.23 | 2,345.50 | 2,345.59 | 2,348.70 | 2,349.27 | 2,351.02 |
|        | <a href="#">2 Yr</a> | <a href="#">5 Yr</a> | <a href="#">10 Yr</a> | <a href="#">25 Yr</a> | <a href="#">50 Yr</a> | <a href="#">100 Yr</a> |             |          |          |          |          |          |          |          |
| NSTPS  | 0                    | 0                    | 0                     | 0                     | 0                     | 0                      |             |          |          |          |          |          |          |          |
| ROFF20 | 0.035                | 0.035                | 0.035                 | 755.20                | 0.0250                | -                      | X: -        | 21.40    | 25.70    | 28.90    | 34.70    | 41.40    | 50.00    | 55.70    |
|        | Return Period        |                      |                       |                       |                       |                        | Y: 2,375.54 | 2,373.33 | 2,373.18 | 2,371.85 | 2,373.26 | 2,373.61 | 2,373.42 | 2,373.25 |
|        | <a href="#">2 Yr</a> | <a href="#">5 Yr</a> | <a href="#">10 Yr</a> | <a href="#">25 Yr</a> | <a href="#">50 Yr</a> | <a href="#">100 Yr</a> |             |          |          |          |          |          |          |          |
| NSTPS  | 0                    | 0                    | 0                     | 0                     | 0                     | 0                      |             |          |          |          |          |          |          |          |

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 30MAY19 TIME 17:50:54
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*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****
    
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

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LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID Flood Control District of Maricopa County
2 ID HVR/ALMA SCHOOL-EX - HVR AND ALMA SCHOOL-EX
3 ID 2 YEAR
4 ID 6 Hour Storm
5 ID Unit Hydrograph: Clark
6 ID Storm: Multiple
7 ID 05/30/2019
*DIAGRAM
8 IT 2 1JAN99 0 2000
9 IO 5
10 IN 15
*
11 JD 1.368 0.0001
12 PC 0.000 0.008 0.016 0.025 0.033 0.041 0.050 0.058 0.066 0.074
13 PC 0.087 0.099 0.118 0.138 0.216 0.377 0.834 0.911 0.931 0.950
14 PC 0.962 0.972 0.983 0.991 1.000
15 JD 1.360 0.5000
16 PC 0.000 0.008 0.016 0.025 0.033 0.041 0.050 0.058 0.066 0.074
17 PC 0.087 0.099 0.118 0.138 0.216 0.377 0.834 0.911 0.931 0.950
18 PC 0.962 0.972 0.983 0.991 1.000
*
19 KK SOFF20 BASIN
20 BA 0.038
21 LG 0.24 0.18 6.76 0.16 25
22 UC 0.401 0.688
23 UA 0 5.0 16.0 30.0 65.0 77.0 84.0 90.0 94.0 97.0
24 UA 100
*
25 KK ROFF20 ROUTE
26 RS 1 FLOW
27 RC 0.035 0.035 0.035 755 0.0250 0.00
28 RX 0.00 21.40 25.70 28.90 34.70 41.40 50.00 55.70
29 RY 2375.5 2373.33 2373.18 2371.85 2373.26 2373.61 2373.42 2373.25
*
30 KK SOFF15 BASIN
31 BA 0.014
32 LG 0.25 0.18 7.94 0.08 22
33 UC 0.302 0.525
34 UA 0 5.0 16.0 30.0 65.0 77.0 84.0 90.0 94.0 97.0
35 UA 100
*
36 KK CP15 COMBINE
37 HC 2
*
38 KK ROFF15 ROUTE
39 RS 1 FLOW
40 RC 0.035 0.035 0.035 1370 0.0340 2361.00
41 RX 0.00 4.70 19.30 25.80 28.90 33.30 45.70 62.30
42 RY 2349.9 2349.23 2348.23 2345.50 2345.59 2348.70 2349.27 2351.02
*
    
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1 HEC-1 INPUT PAGE 2

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

|    |    |        |         |         |         |         |         |         |         |      |      |
|----|----|--------|---------|---------|---------|---------|---------|---------|---------|------|------|
| 43 | KK | SON15  | BASIN   |         |         |         |         |         |         |      |      |
| 44 | BA | 0.022  |         |         |         |         |         |         |         |      |      |
| 45 | LG | 0.35   | 0.30    | 7.94    | 0.08    | 0       |         |         |         |      |      |
| 46 | UC | 0.342  | 0.337   |         |         |         |         |         |         |      |      |
| 47 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 48 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 49 | KK | CP20   | COMBINE |         |         |         |         |         |         |      |      |
| 50 | HC | 2      |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 51 | KK | SOFF05 | BASIN   |         |         |         |         |         |         |      |      |
| 52 | BA | 0.011  |         |         |         |         |         |         |         |      |      |
| 53 | LG | 0.29   | 0.16    | 7.94    | 0.09    | 7       |         |         |         |      |      |
| 54 | UC | 0.210  | 0.236   |         |         |         |         |         |         |      |      |
| 55 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 56 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 57 | KK | ROFF05 | ROUTE   |         |         |         |         |         |         |      |      |
| 58 | RS | 1      | FLOW    |         |         |         |         |         |         |      |      |
| 59 | RC | 0.035  | 0.035   | 0.035   | 1382    | 0.0356  | 2387.00 |         |         |      |      |
| 60 | RX | 0.00   | 9.60    | 16.60   | 30.20   | 43.20   | 56.90   | 65.90   | 68.80   |      |      |
| 61 | RY | 2360.0 | 2358.77 | 2357.82 | 2356.09 | 2356.83 | 2357.29 | 2357.77 | 2358.00 |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 62 | KK | SON10  | BASIN   |         |         |         |         |         |         |      |      |
| 63 | BA | 0.011  |         |         |         |         |         |         |         |      |      |
| 64 | LG | 0.32   | 0.21    | 7.94    | 0.08    | 3       |         |         |         |      |      |
| 65 | UC | 0.294  | 0.423   |         |         |         |         |         |         |      |      |
| 66 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 67 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 68 | KK | CP10   | COMBINE |         |         |         |         |         |         |      |      |
| 69 | HC | 0      |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 70 | KK | SON05  | BASIN   |         |         |         |         |         |         |      |      |
| 71 | BA | 0.004  |         |         |         |         |         |         |         |      |      |
| 72 | LG | 0.30   | 0.15    | 7.94    | 0.09    | 5       |         |         |         |      |      |
| 73 | UC | 0.128  | 0.116   |         |         |         |         |         |         |      |      |
| 74 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 75 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 76 | KK | SON20  | BASIN   |         |         |         |         |         |         |      |      |
| 77 | BA | 0.004  |         |         |         |         |         |         |         |      |      |
| 78 | LG | 0.35   | 0.30    | 7.94    | 0.09    | 0       |         |         |         |      |      |
| 79 | UC | 0.252  | 0.365   |         |         |         |         |         |         |      |      |
| 80 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 81 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |

1 HEC-1 INPUT

PAGE 3

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

|    |    |       |       |      |      |      |      |      |      |      |      |
|----|----|-------|-------|------|------|------|------|------|------|------|------|
| 82 | KK | SON25 | BASIN |      |      |      |      |      |      |      |      |
| 83 | BA | 0.004 |       |      |      |      |      |      |      |      |      |
| 84 | LG | 0.35  | 0.35  | 6.76 | 0.13 | 0    |      |      |      |      |      |
| 85 | UC | 0.399 | 1.056 |      |      |      |      |      |      |      |      |
| 86 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 87 | UA | 100   |       |      |      |      |      |      |      |      |      |
|    | *  |       |       |      |      |      |      |      |      |      |      |
| 88 | ZZ |       |       |      |      |      |      |      |      |      |      |

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW  
 NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

19 SOFF20  
 V  
 V  
 25 ROFF20  
 .  
 .  
 30 . SOFF15  
 .  
 .  
 36 CP15.....  
 V  
 V  
 38 ROFF15  
 .  
 .  
 43 . SON15  
 .  
 .  
 49 CP20.....  
 .

```

51 . . . . . SOFF05
    . . . . . V
    . . . . . V
57 . . . . . ROFF05
    . . . . .
    . . . . .
62 . . . . . SON10
    . . . . .
    . . . . .
68 . . . . . CP10.....
    . . . . .
    . . . . .
70 . . . . . SON05
    . . . . .
    . . . . .
76 . . . . . SON20
    . . . . .
    . . . . .
82 . . . . . SON25
    . . . . .
    
```

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

```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 30MAY19 TIME 17:50:54
*
*****
    
```

```

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

Flood Control District of Maricopa County  
 HVR/ALMA SCHOOL-EX - HVR AND ALMA SCHOOL-EX  
 2 YEAR  
 6 Hour Storm  
 Unit Hydrograph: Clark  
 Storm: Multiple  
 05/30/2019

```

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

```

IT        HYDROGRAPH TIME DATA
          NMIN       2  MINUTES IN COMPUTATION INTERVAL
          IDATE      1JAN99  STARTING DATE
          ITIME      0000  STARTING TIME
          NQ         2000  NUMBER OF HYDROGRAPH ORDINATES
          NDDATE     3JAN99  ENDING DATE
          NDTIME     1838  ENDING TIME
          ICENT      19  CENTURY MARK
    
```

```

          COMPUTATION INTERVAL .03 HOURS
          TOTAL TIME BASE      66.63 HOURS
    
```

```

ENGLISH UNITS
          DRAINAGE AREA      SQUARE MILES
          PRECIPITATION DEPTH INCHES
          LENGTH, ELEVATION  FEET
          FLOW                CUBIC FEET PER SECOND
          STORAGE VOLUME     ACRE-FEET
          SURFACE AREA        ACRES
          TEMPERATURE        DEGREES FAHRENHEIT
    
```

```

11 JD      INDEX STORM NO. 1
          STRM        1.37  PRECIPITATION DEPTH
          TRDA        .00  TRANSPOSITION DRAINAGE AREA
    
```

```

12 PI      PRECIPITATION PATTERN
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .01 .01 .01 .01 .01 .01 .01 .01 .01 .01
          .02 .02 .04 .06 .06 .06 .06 .06 .06 .06
          .01 .01 .01 .01 .01 .01 .01 .01 .01 .01
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    
```

```

15 JD      INDEX STORM NO. 2
          STRM        1.36  PRECIPITATION DEPTH
    
```





```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 30MAY19 TIME 17:51:07
*
*****
    
```

```

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

```

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

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

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

1 HEC-1 INPUT PAGE 1

| LINE | ID       | 1   | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9     | 10    |
|------|----------|---|---------|---------|---------|---------|---------|---------|---------|-------|-------|
| 1    | ID       | Flood Control District of Maricopa County   |         |         |         |         |         |         |         |       |       |
| 2    | ID       | HVR/ALMA SCHOOL-EX - HVR AND ALMA SCHOOL-EX |         |         |         |         |         |         |         |       |       |
| 3    | ID       | 10 YEAR                                     |         |         |         |         |         |         |         |       |       |
| 4    | ID       | 6 Hour Storm                                |         |         |         |         |         |         |         |       |       |
| 5    | ID       | Unit Hydrograph: Clark                      |         |         |         |         |         |         |         |       |       |
| 6    | ID       | Storm: Multiple                             |         |         |         |         |         |         |         |       |       |
| 7    | ID       | 05/30/2019                                  |         |         |         |         |         |         |         |       |       |
|      | *DIAGRAM |   |         |         |         |         |         |         |         |       |       |
| 8    | IT       | 2   | 1JAN99  | 0       | 2000    |         |         |         |         |       |       |
| 9    | IO       | 5   |         |         |         |         |         |         |         |       |       |
| 10   | IN       | 15  |         |         |         |         |         |         |         |       |       |
|      | *        |   |         |         |         |         |         |         |         |       |       |
| 11   | JD       | 2.033                                       | 0.0001  |         |         |         |         |         |         |       |       |
| 12   | PC       | 0.000                                       | 0.008   | 0.016   | 0.025   | 0.033   | 0.041   | 0.050   | 0.058   | 0.066 | 0.074 |
| 13   | PC       | 0.087                                       | 0.099   | 0.118   | 0.138   | 0.216   | 0.377   | 0.834   | 0.911   | 0.931 | 0.950 |
| 14   | PC       | 0.962                                       | 0.972   | 0.983   | 0.991   | 1.000   |         |         |         |       |       |
| 15   | JD       | 2.021                                       | 0.5000  |         |         |         |         |         |         |       |       |
| 16   | PC       | 0.000                                       | 0.008   | 0.016   | 0.025   | 0.033   | 0.041   | 0.050   | 0.058   | 0.066 | 0.074 |
| 17   | PC       | 0.087                                       | 0.099   | 0.118   | 0.138   | 0.216   | 0.377   | 0.834   | 0.911   | 0.931 | 0.950 |
| 18   | PC       | 0.962                                       | 0.972   | 0.983   | 0.991   | 1.000   |         |         |         |       |       |
|      | *        |   |         |         |         |         |         |         |         |       |       |
| 19   | KK       | SOFF20                                      | BASIN   |         |         |         |         |         |         |       |       |
| 20   | BA       | 0.038                                       |         |         |         |         |         |         |         |       |       |
| 21   | LG       | 0.24  | 0.18    | 6.76    | 0.16    | 25      |         |         |         |       |       |
| 22   | UC       | 0.319                                       | 0.534   |         |         |         |         |         |         |       |       |
| 23   | UA       | 0   | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0  | 97.0  |
| 24   | UA       | 100   |         |         |         |         |         |         |         |       |       |
|      | *        |   |         |         |         |         |         |         |         |       |       |
| 25   | KK       | ROFF20                                      | ROUTE   |         |         |         |         |         |         |       |       |
| 26   | RS       | 1   | FLOW    |         |         |         |         |         |         |       |       |
| 27   | RC       | 0.035                                       | 0.035   | 0.035   | 755     | 0.0250  | 0.00    |         |         |       |       |
| 28   | RX       | 0.00  | 21.40   | 25.70   | 28.90   | 34.70   | 41.40   | 50.00   | 55.70   |       |       |
| 29   | RY       | 2375.5                                      | 2373.33 | 2373.18 | 2371.85 | 2373.26 | 2373.61 | 2373.42 | 2373.25 |       |       |
|      | *        |   |         |         |         |         |         |         |         |       |       |
| 30   | KK       | SOFF15                                      | BASIN   |         |         |         |         |         |         |       |       |
| 31   | BA       | 0.014                                       |         |         |         |         |         |         |         |       |       |
| 32   | LG       | 0.25  | 0.18    | 7.94    | 0.08    | 22      |         |         |         |       |       |
| 33   | UC       | 0.241                                       | 0.408   |         |         |         |         |         |         |       |       |
| 34   | UA       | 0   | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0  | 97.0  |
| 35   | UA       | 100   |         |         |         |         |         |         |         |       |       |
|      | *        |   |         |         |         |         |         |         |         |       |       |
| 36   | KK       | CP15  | COMBINE |         |         |         |         |         |         |       |       |
| 37   | HC       | 2   |         |         |         |         |         |         |         |       |       |
|      | *        |   |         |         |         |         |         |         |         |       |       |
| 38   | KK       | ROFF15                                      | ROUTE   |         |         |         |         |         |         |       |       |
| 39   | RS       | 1   | FLOW    |         |         |         |         |         |         |       |       |
| 40   | RC       | 0.035                                       | 0.035   | 0.035   | 1370    | 0.0340  | 2361.00 |         |         |       |       |
| 41   | RX       | 0.00  | 4.70    | 19.30   | 25.80   | 28.90   | 33.30   | 45.70   | 62.30   |       |       |
| 42   | RY       | 2349.9                                      | 2349.23 | 2348.23 | 2345.50 | 2345.59 | 2348.70 | 2349.27 | 2351.02 |       |       |
|      | *        |   |         |         |         |         |         |         |         |       |       |

1 HEC-1 INPUT PAGE 2

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

|    |    |        |         |         |         |         |         |         |         |      |      |
|----|----|--------|---------|---------|---------|---------|---------|---------|---------|------|------|
| 43 | KK | SON15  | BASIN   |         |         |         |         |         |         |      |      |
| 44 | BA | 0.022  |         |         |         |         |         |         |         |      |      |
| 45 | LG | 0.35   | 0.30    | 7.94    | 0.08    | 0       |         |         |         |      |      |
| 46 | UC | 0.255  | 0.243   |         |         |         |         |         |         |      |      |
| 47 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 48 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 49 | KK | CP20   | COMBINE |         |         |         |         |         |         |      |      |
| 50 | HC | 2      |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 51 | KK | SOFF05 | BASIN   |         |         |         |         |         |         |      |      |
| 52 | BA | 0.011  |         |         |         |         |         |         |         |      |      |
| 53 | LG | 0.29   | 0.16    | 7.94    | 0.09    | 7       |         |         |         |      |      |
| 54 | UC | 0.163  | 0.178   |         |         |         |         |         |         |      |      |
| 55 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 56 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 57 | KK | ROFF05 | ROUTE   |         |         |         |         |         |         |      |      |
| 58 | RS | 1      | FLOW    |         |         |         |         |         |         |      |      |
| 59 | RC | 0.035  | 0.035   | 0.035   | 1382    | 0.0356  | 2387.00 |         |         |      |      |
| 60 | RX | 0.00   | 9.60    | 16.60   | 30.20   | 43.20   | 56.90   | 65.90   | 68.80   |      |      |
| 61 | RY | 2360.0 | 2358.77 | 2357.82 | 2356.09 | 2356.83 | 2357.29 | 2357.77 | 2358.00 |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 62 | KK | SON10  | BASIN   |         |         |         |         |         |         |      |      |
| 63 | BA | 0.011  |         |         |         |         |         |         |         |      |      |
| 64 | LG | 0.32   | 0.21    | 7.94    | 0.08    | 3       |         |         |         |      |      |
| 65 | UC | 0.223  | 0.311   |         |         |         |         |         |         |      |      |
| 66 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 67 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 68 | KK | CP10   | COMBINE |         |         |         |         |         |         |      |      |
| 69 | HC | 0      |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 70 | KK | SON05  | BASIN   |         |         |         |         |         |         |      |      |
| 71 | BA | 0.004  |         |         |         |         |         |         |         |      |      |
| 72 | LG | 0.30   | 0.15    | 7.94    | 0.09    | 5       |         |         |         |      |      |
| 73 | UC | 0.099  | 0.087   |         |         |         |         |         |         |      |      |
| 74 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 75 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 76 | KK | SON20  | BASIN   |         |         |         |         |         |         |      |      |
| 77 | BA | 0.004  |         |         |         |         |         |         |         |      |      |
| 78 | LG | 0.35   | 0.30    | 7.94    | 0.09    | 0       |         |         |         |      |      |
| 79 | UC | 0.188  | 0.263   |         |         |         |         |         |         |      |      |
| 80 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 81 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |

1 HEC-1 INPUT

PAGE 3

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

|    |    |       |       |      |      |      |      |      |      |      |      |
|----|----|-------|-------|------|------|------|------|------|------|------|------|
| 82 | KK | SON25 | BASIN |      |      |      |      |      |      |      |      |
| 83 | BA | 0.004 |       |      |      |      |      |      |      |      |      |
| 84 | LG | 0.35  | 0.35  | 6.76 | 0.13 | 0    |      |      |      |      |      |
| 85 | UC | 0.291 | 0.745 |      |      |      |      |      |      |      |      |
| 86 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 87 | UA | 100   |       |      |      |      |      |      |      |      |      |
|    | *  |       |       |      |      |      |      |      |      |      |      |
| 88 | ZZ |       |       |      |      |      |      |      |      |      |      |

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW  
 NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

19 SOFF20  
 V  
 V  
 25 ROFF20  
 .  
 .  
 30 . SOFF15  
 .  
 .  
 36 CP15.....  
 V  
 V  
 38 ROFF15  
 .  
 .  
 43 . SON15  
 .  
 .  
 49 CP20.....  
 .

```

51 . . SOFF05
    . . V
    . . V
57 . . ROFF05
    . . .
    . . .
62 . . . SON10
    . . .
    . . .
68 . . CP10.....
    . . .
    . . .
70 . . . SON05
    . . .
    . . .
76 . . . SON20
    . . .
    . . .
82 . . . SON25
    . . .
    
```

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

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 30MAY19 TIME 17:51:07 *
*
*****
    
```

```

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

Flood Control District of Maricopa County  
 HVR/ALMA SCHOOL-EX - HVR AND ALMA SCHOOL-EX  
 10 YEAR  
 6 Hour Storm  
 Unit Hydrograph: Clark  
 Storm: Multiple  
 05/30/2019

```

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

```

IT HYDROGRAPH TIME DATA
    NMIN 2 MINUTES IN COMPUTATION INTERVAL
    IDATE 1JAN99 STARTING DATE
    ITIME 0000 STARTING TIME
    NQ 2000 NUMBER OF HYDROGRAPH ORDINATES
    NDDATE 3JAN99 ENDING DATE
    NDTIME 1838 ENDING TIME
    ICENT 19 CENTURY MARK

    COMPUTATION INTERVAL .03 HOURS
    TOTAL TIME BASE 66.63 HOURS
    
```

ENGLISH UNITS  
 DRAINAGE AREA SQUARE MILES  
 PRECIPITATION DEPTH INCHES  
 LENGTH, ELEVATION FEET  
 FLOW CUBIC FEET PER SECOND  
 STORAGE VOLUME ACRE-FEET  
 SURFACE AREA ACRES  
 TEMPERATURE DEGREES FAHRENHEIT

```

11 JD INDEX STORM NO. 1
    STRM 2.03 PRECIPITATION DEPTH
    TRDA .00 TRANSPOSITION DRAINAGE AREA
    
```

```

12 PI PRECIPITATION PATTERN
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
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    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
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    .02 .02 .04 .06 .06 .06 .06 .06 .06 .06
    .01 .01 .01 .01 .01 .01 .01 .01 .01 .01
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    
```

```

15 JD INDEX STORM NO. 2
    STRM 2.02 PRECIPITATION DEPTH
    
```



```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
* RUN DATE 30MAY19 TIME 17:51:17
*
*****
    
```

```

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

```

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

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

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

1 HEC-1 INPUT PAGE 1

| LINE | ID | 1   | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9     | 10    |
|------|----|---|---------|---------|---------|---------|---------|---------|---------|-------|-------|
| 1    | ID | Flood Control District of Maricopa County   |         |         |         |         |         |         |         |       |       |
| 2    | ID | HVR/ALMA SCHOOL-EX - HVR AND ALMA SCHOOL-EX |         |         |         |         |         |         |         |       |       |
| 3    | ID | 100 YEAR                                    |         |         |         |         |         |         |         |       |       |
| 4    | ID | 6 Hour Storm                                |         |         |         |         |         |         |         |       |       |
| 5    | ID | Unit Hydrograph: Clark                      |         |         |         |         |         |         |         |       |       |
| 6    | ID | Storm: Multiple                             |         |         |         |         |         |         |         |       |       |
| 7    | ID | 05/30/2019                                  |         |         |         |         |         |         |         |       |       |
| 8    | IT | 2   | 1JAN99  | 0       | 2000    |         |         |         |         |       |       |
| 9    | IO | 5   |         |         |         |         |         |         |         |       |       |
| 10   | IN | 15  |         |         |         |         |         |         |         |       |       |
| 11   | JD | 3.078                                       | 0.0001  |         |         |         |         |         |         |       |       |
| 12   | PC | 0.000                                       | 0.008   | 0.016   | 0.025   | 0.033   | 0.041   | 0.050   | 0.058   | 0.066 | 0.074 |
| 13   | PC | 0.087                                       | 0.099   | 0.118   | 0.138   | 0.216   | 0.377   | 0.834   | 0.911   | 0.931 | 0.950 |
| 14   | PC | 0.962                                       | 0.972   | 0.983   | 0.991   | 1.000   |         |         |         |       |       |
| 15   | JD | 3.060                                       | 0.5000  |         |         |         |         |         |         |       |       |
| 16   | PC | 0.000                                       | 0.008   | 0.016   | 0.025   | 0.033   | 0.041   | 0.050   | 0.058   | 0.066 | 0.074 |
| 17   | PC | 0.087                                       | 0.099   | 0.118   | 0.138   | 0.216   | 0.377   | 0.834   | 0.911   | 0.931 | 0.950 |
| 18   | PC | 0.962                                       | 0.972   | 0.983   | 0.991   | 1.000   |         |         |         |       |       |
| 19   | KK | SOFF20                                      | BASIN   |         |         |         |         |         |         |       |       |
| 20   | BA | 0.038                                       |         |         |         |         |         |         |         |       |       |
| 21   | LG | 0.24  | 0.18    | 6.76    | 0.16    | 25      |         |         |         |       |       |
| 22   | UC | 0.257                                       | 0.419   |         |         |         |         |         |         |       |       |
| 23   | UA | 0   | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0  | 97.0  |
| 24   | UA | 100   |         |         |         |         |         |         |         |       |       |
| 25   | KK | ROFF20                                      | ROUTE   |         |         |         |         |         |         |       |       |
| 26   | RS | 1   | FLOW    |         |         |         |         |         |         |       |       |
| 27   | RC | 0.035                                       | 0.035   | 0.035   | 755     | 0.0250  | 0.00    |         |         |       |       |
| 28   | RX | 0.00  | 21.40   | 25.70   | 28.90   | 34.70   | 41.40   | 50.00   | 55.70   |       |       |
| 29   | RY | 2375.5                                      | 2373.33 | 2373.18 | 2371.85 | 2373.26 | 2373.61 | 2373.42 | 2373.25 |       |       |
| 30   | KK | SOFF15                                      | BASIN   |         |         |         |         |         |         |       |       |
| 31   | BA | 0.014                                       |         |         |         |         |         |         |         |       |       |
| 32   | LG | 0.25  | 0.18    | 7.94    | 0.08    | 22      |         |         |         |       |       |
| 33   | UC | 0.197                                       | 0.327   |         |         |         |         |         |         |       |       |
| 34   | UA | 0   | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0  | 97.0  |
| 35   | UA | 100   |         |         |         |         |         |         |         |       |       |
| 36   | KK | CP15  | COMBINE |         |         |         |         |         |         |       |       |
| 37   | HC | 2   |         |         |         |         |         |         |         |       |       |
| 38   | KK | ROFF15                                      | ROUTE   |         |         |         |         |         |         |       |       |
| 39   | RS | 1   | FLOW    |         |         |         |         |         |         |       |       |
| 40   | RC | 0.035                                       | 0.035   | 0.035   | 1370    | 0.0340  | 2361.00 |         |         |       |       |
| 41   | RX | 0.00  | 4.70    | 19.30   | 25.80   | 28.90   | 33.30   | 45.70   | 62.30   |       |       |
| 42   | RY | 2349.9                                      | 2349.23 | 2348.23 | 2345.50 | 2345.59 | 2348.70 | 2349.27 | 2351.02 |       |       |

1 HEC-1 INPUT PAGE 2

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

|    |    |        |         |         |         |         |         |         |         |      |      |
|----|----|--------|---------|---------|---------|---------|---------|---------|---------|------|------|
| 43 | KK | SON15  | BASIN   |         |         |         |         |         |         |      |      |
| 44 | BA | 0.022  |         |         |         |         |         |         |         |      |      |
| 45 | LG | 0.35   | 0.30    | 7.94    | 0.08    | 0       |         |         |         |      |      |
| 46 | UC | 0.197  | 0.183   |         |         |         |         |         |         |      |      |
| 47 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 48 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 49 | KK | CP20   | COMBINE |         |         |         |         |         |         |      |      |
| 50 | HC | 2      |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 51 | KK | SOFF05 | BASIN   |         |         |         |         |         |         |      |      |
| 52 | BA | 0.011  |         |         |         |         |         |         |         |      |      |
| 53 | LG | 0.29   | 0.16    | 7.94    | 0.09    | 7       |         |         |         |      |      |
| 54 | UC | 0.132  | 0.141   |         |         |         |         |         |         |      |      |
| 55 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 56 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 57 | KK | ROFF05 | ROUTE   |         |         |         |         |         |         |      |      |
| 58 | RS | 1      | FLOW    |         |         |         |         |         |         |      |      |
| 59 | RC | 0.035  | 0.035   | 0.035   | 1382    | 0.0356  | 2387.00 |         |         |      |      |
| 60 | RX | 0.00   | 9.60    | 16.60   | 30.20   | 43.20   | 56.90   | 65.90   | 68.80   |      |      |
| 61 | RY | 2360.0 | 2358.77 | 2357.82 | 2356.09 | 2356.83 | 2357.29 | 2357.77 | 2358.00 |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 62 | KK | SON10  | BASIN   |         |         |         |         |         |         |      |      |
| 63 | BA | 0.011  |         |         |         |         |         |         |         |      |      |
| 64 | LG | 0.32   | 0.21    | 7.94    | 0.08    | 3       |         |         |         |      |      |
| 65 | UC | 0.177  | 0.241   |         |         |         |         |         |         |      |      |
| 66 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 67 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 68 | KK | CP10   | COMBINE |         |         |         |         |         |         |      |      |
| 69 | HC | 0      |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 70 | KK | SON05  | BASIN   |         |         |         |         |         |         |      |      |
| 71 | BA | 0.004  |         |         |         |         |         |         |         |      |      |
| 72 | LG | 0.30   | 0.15    | 7.94    | 0.09    | 5       |         |         |         |      |      |
| 73 | UC | 0.080  | 0.069   |         |         |         |         |         |         |      |      |
| 74 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 75 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |
| 76 | KK | SON20  | BASIN   |         |         |         |         |         |         |      |      |
| 77 | BA | 0.004  |         |         |         |         |         |         |         |      |      |
| 78 | LG | 0.35   | 0.30    | 7.94    | 0.09    | 0       |         |         |         |      |      |
| 79 | UC | 0.145  | 0.198   |         |         |         |         |         |         |      |      |
| 80 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 81 | UA | 100    |         |         |         |         |         |         |         |      |      |
|    | *  |        |         |         |         |         |         |         |         |      |      |

1 HEC-1 INPUT

PAGE 3

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

|    |    |       |       |      |      |      |      |      |      |      |      |
|----|----|-------|-------|------|------|------|------|------|------|------|------|
| 82 | KK | SON25 | BASIN |      |      |      |      |      |      |      |      |
| 83 | BA | 0.004 |       |      |      |      |      |      |      |      |      |
| 84 | LG | 0.35  | 0.35  | 6.76 | 0.13 | 0    |      |      |      |      |      |
| 85 | UC | 0.219 | 0.544 |      |      |      |      |      |      |      |      |
| 86 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 87 | UA | 100   |       |      |      |      |      |      |      |      |      |
|    | *  |       |       |      |      |      |      |      |      |      |      |
| 88 | ZZ |       |       |      |      |      |      |      |      |      |      |

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW  
 NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

19 SOFF20  
 V  
 V  
 25 ROFF20  
 .  
 .  
 30 . SOFF15  
 .  
 .  
 36 CP15.....  
 V  
 V  
 38 ROFF15  
 .  
 .  
 43 . SON15  
 .  
 .  
 49 CP20.....  
 .

```

51 . . . SOFF05
    . . . V
    . . . V
57 . . . ROFF05
    . . . .
    . . . .
62 . . . . SON10
    . . . .
    . . . .
68 . . . CP10.....
    . . . .
    . . . .
70 . . . . SON05
    . . . .
    . . . .
76 . . . . SON20
    . . . .
    . . . .
82 . . . . SON25
    . . . .
    
```

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

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 30MAY19 TIME 17:51:17 *
*
*****
    
```

```

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

Flood Control District of Maricopa County  
 HVR/ALMA SCHOOL-EX - HVR AND ALMA SCHOOL-EX  
 100 YEAR  
 6 Hour Storm  
 Unit Hydrograph: Clark  
 Storm: Multiple  
 05/30/2019

```

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

```

IT HYDROGRAPH TIME DATA
    NMIN 2 MINUTES IN COMPUTATION INTERVAL
    IDATE 1JAN99 STARTING DATE
    ITIME 0000 STARTING TIME
    NQ 2000 NUMBER OF HYDROGRAPH ORDINATES
    NDDATE 3JAN99 ENDING DATE
    NDTIME 1838 ENDING TIME
    ICENT 19 CENTURY MARK

    COMPUTATION INTERVAL .03 HOURS
    TOTAL TIME BASE 66.63 HOURS
    
```

ENGLISH UNITS  
 DRAINAGE AREA SQUARE MILES  
 PRECIPITATION DEPTH INCHES  
 LENGTH, ELEVATION FEET  
 FLOW CUBIC FEET PER SECOND  
 STORAGE VOLUME ACRE-FEET  
 SURFACE AREA ACRES  
 TEMPERATURE DEGREES FAHRENHEIT

```

11 JD INDEX STORM NO. 1
    STRM 3.08 PRECIPITATION DEPTH
    TRDA .00 TRANSPOSITION DRAINAGE AREA
    
```

```

12 PI PRECIPITATION PATTERN
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
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    .02 .02 .04 .06 .06 .06 .06 .06 .06 .06
    .01 .01 .01 .01 .01 .01 .01 .01 .01 .01
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
    
```

```

15 JD INDEX STORM NO. 2
    STRM 3.06 PRECIPITATION DEPTH
    
```

TRDA .50 TRANSPOSITION DRAINAGE AREA

| 16 PI | PRECIPITATION PATTERN |     |     |     |     |     |     |     |     |     |
|-------|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
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|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .01                   | .01 | .01 | .01 | .01 | .02 | .02 | .02 | .02 | .02 |
|       | .02                   | .02 | .04 | .06 | .06 | .06 | .06 | .06 | .06 | .06 |
|       | .01                   | .01 | .01 | .01 | .01 | .01 | .01 | .01 | .01 | .01 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
|       | .00                   | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

1

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

| + | OPERATION     | STATION | PEAK FLOW | TIME OF PEAK | AVERAGE FLOW FOR MAXIMUM PERIOD |         |         | BASIN AREA | MAXIMUM STAGE | TIME OF MAX STAGE |
|---|---------------|---------|-----------|--------------|---------------------------------|---------|---------|------------|---------------|-------------------|
|   |               |         |           |              | 6-HOUR                          | 24-HOUR | 72-HOUR |            |               |                   |
| + | HYDROGRAPH AT |         |           |              |                                 |         |         |            |               |                   |
| + |               | SOFF20  | 63.       | 4.10         | 9.                              | 2.      | 1.      | .04        |               |                   |
| + | ROUTED TO     |         |           |              |                                 |         |         |            |               |                   |
| + |               | ROFF20  | 60.       | 4.17         | 9.                              | 2.      | 1.      | .04        |               |                   |
| + | HYDROGRAPH AT |         |           |              |                                 |         |         |            |               |                   |
| + |               | SOFF15  | 28.       | 4.07         | 3.                              | 1.      | 0.      | .01        |               |                   |
| + | 2 COMBINED AT |         |           |              |                                 |         |         |            |               |                   |
| + |               | CP15    | 86.       | 4.13         | 12.                             | 3.      | 1.      | .05        |               |                   |
| + | ROUTED TO     |         |           |              |                                 |         |         |            |               |                   |
| + |               | ROFF15  | 84.       | 4.17         | 12.                             | 3.      | 1.      | .05        |               |                   |
| + | HYDROGRAPH AT |         |           |              |                                 |         |         |            |               |                   |
| + |               | SON15   | 53.       | 4.07         | 4.                              | 1.      | 0.      | .02        |               |                   |
| + | 2 COMBINED AT |         |           |              |                                 |         |         |            |               |                   |
| + |               | CP20    | 129.      | 4.10         | 16.                             | 4.      | 1.      | .07        |               |                   |
| + | HYDROGRAPH AT |         |           |              |                                 |         |         |            |               |                   |
| + |               | SOFF05  | 31.       | 4.03         | 2.                              | 1.      | 0.      | .01        |               |                   |
| + | ROUTED TO     |         |           |              |                                 |         |         |            |               |                   |
| + |               | ROFF05  | 29.       | 4.07         | 2.                              | 1.      | 0.      | .01        |               |                   |
| + | HYDROGRAPH AT |         |           |              |                                 |         |         |            |               |                   |
| + |               | SON10   | 25.       | 4.07         | 2.                              | 1.      | 0.      | .01        |               |                   |
| + | 2 COMBINED AT |         |           |              |                                 |         |         |            |               |                   |
| + |               | CP10    | 54.       | 4.07         | 5.                              | 1.      | 0.      | .02        |               |                   |
| + | HYDROGRAPH AT |         |           |              |                                 |         |         |            |               |                   |
| + |               | SON05   | 13.       | 4.00         | 1.                              | 0.      | 0.      | .00        |               |                   |
| + | HYDROGRAPH AT |         |           |              |                                 |         |         |            |               |                   |
| + |               | SON20   | 10.       | 4.03         | 1.                              | 0.      | 0.      | .00        |               |                   |
| + | HYDROGRAPH AT |         |           |              |                                 |         |         |            |               |                   |
| + |               | SON25   | 5.        | 4.10         | 1.                              | 0.      | 0.      | .00        |               |                   |

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



## **Appendix B – Proposed Conditions Hydrology**

*Proposed Conditions Soils*

*Proposed Conditions Land Use*

*Subbasin Hydrologic Parameters*

*Routing Reaches*

*Storage Facilities*

*HEC-1 Results*

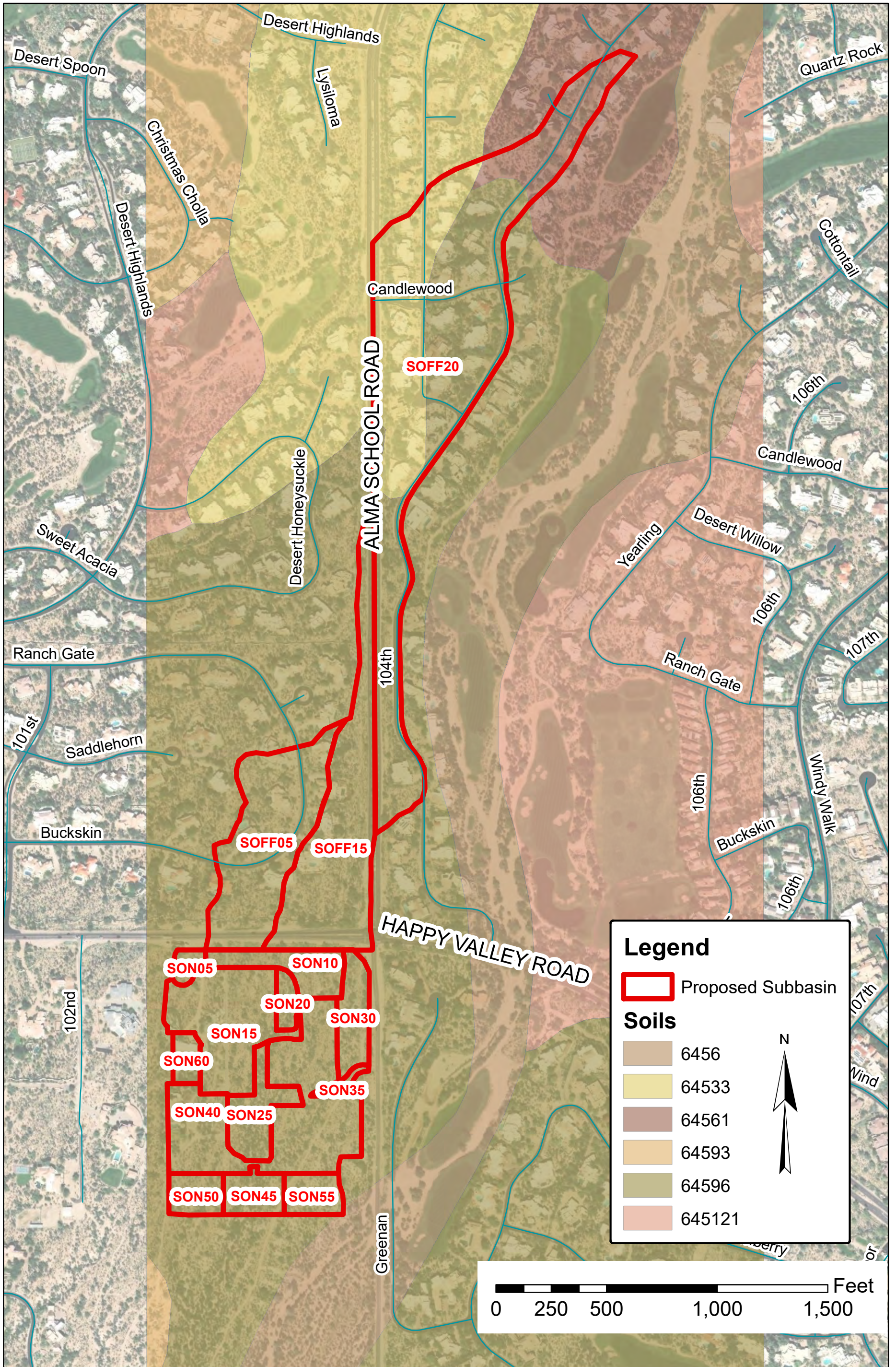
Flood Control District of Maricopa County  
 Drainage Design Management System  
**RAINFALL DATA**  
 Project Reference: HVR & ALMA SCHOOL-PR

| ID             | Method | Duration | 2 Yr  | 5 Yr  | 10 Yr | 25 Yr | 50 Yr | 100 Yr |
|----------------|--------|----------|-------|-------|-------|-------|-------|--------|
| <b>DEFAULT</b> | NOAA14 | 5 MIN    | 0.303 | 0.408 | 0.487 | 0.591 | 0.669 | 0.748  |
|                | NOAA14 | 10 MIN   | 0.461 | 0.620 | 0.741 | 0.900 | 1.019 | 1.139  |
|                | NOAA14 | 15 MIN   | 0.571 | 0.769 | 0.919 | 1.115 | 1.263 | 1.412  |
|                | NOAA14 | 30 MIN   | 0.769 | 1.036 | 1.237 | 1.502 | 1.701 | 1.902  |
|                | NOAA14 | 1 HOUR   | 0.952 | 1.282 | 1.531 | 1.859 | 2.105 | 2.353  |
|                | NOAA14 | 2 HOUR   | 1.087 | 1.442 | 1.713 | 2.079 | 2.355 | 2.639  |
|                | NOAA14 | 3 HOUR   | 1.158 | 1.507 | 1.786 | 2.172 | 2.478 | 2.794  |
|                | NOAA14 | 6 HOUR   | 1.368 | 1.738 | 2.033 | 2.437 | 2.752 | 3.078  |
|                | NOAA14 | 12 HOUR  | 1.630 | 2.049 | 2.381 | 2.831 | 3.176 | 3.532  |
|                | NOAA14 | 24 HOUR  | 1.986 | 2.585 | 3.068 | 3.752 | 4.302 | 4.884  |

Flood Control District of Maricopa County  
 Drainage Design Management System  
 SOILS

| Area ID                   | Book Number | Map Unit | Soil ID | Area (sq mi) | Area (%) | XKSAT | Rock Percent (%) | Effective Rock (%) | Comments |
|---------------------------|-------------|----------|---------|--------------|----------|-------|------------------|--------------------|----------|
| <b>Major Basin ID: 01</b> |             |          |         |              |          |       |                  |                    |          |
| SOFF05                    | 645         | 96       | 64596   | 0.012        | 100.00   | 0.070 | -                | 100                |          |
| SOFF15                    | 645         | 96       | 64596   | 0.014        | 100.00   | 0.070 | -                | 100                |          |
| SOFF20                    | 645         | 33       | 64533   | 0.012        | 31.80    | 0.230 | -                | 100                |          |
|                           | 645         | 61       | 64561   | 0.005        | 13.80    | 0.150 | -                | 100                |          |
|                           | 645         | 96       | 64596   | 0.021        | 54.40    | 0.070 | -                | 100                |          |
| SON05                     | 645         | 96       | 64596   | 0.001        | 100.00   | 0.070 | -                | 100                |          |
| SON10                     | 645         | 96       | 64596   | 0.003        | 100.00   | 0.070 | -                | 100                |          |
| SON15                     | 645         | 96       | 64596   | 0.008        | 100.00   | 0.070 | -                | 100                |          |
| SON20                     | 645         | 96       | 64596   | 0.001        | 100.00   | 0.070 | -                | 100                |          |
| SON25                     | 645         | 96       | 64596   | 0.003        | 100.00   | 0.070 | -                | 100                |          |
| SON30                     | 645         | 96       | 64596   | 0.003        | 100.00   | 0.070 | -                | 100                |          |
| SON35                     | 645         | 96       | 64596   | 0.001        | 100.00   | 0.070 | -                | 100                |          |
| SON40                     | 645         | 96       | 64596   | 0.013        | 100.00   | 0.070 | -                | 100                |          |
| SON45                     | 645         | 96       | 64596   | 0.002        | 100.00   | 0.070 | -                | 100                |          |
| SON50                     | 645         | 96       | 64596   | 0.002        | 100.00   | 0.070 | -                | 100                |          |
| SON55                     | 645         | 96       | 64596   | 0.002        | 100.00   | 0.070 | -                | 100                |          |
| SON60                     | 645         | 96       | 64596   | 0.001        | 100.00   | 0.070 | -                | 100                |          |

\* Non default value



|              |          |
|--------------|----------|
| PROJECT NO.  | 28110425 |
| DRAWING NAME | PK SOILS |

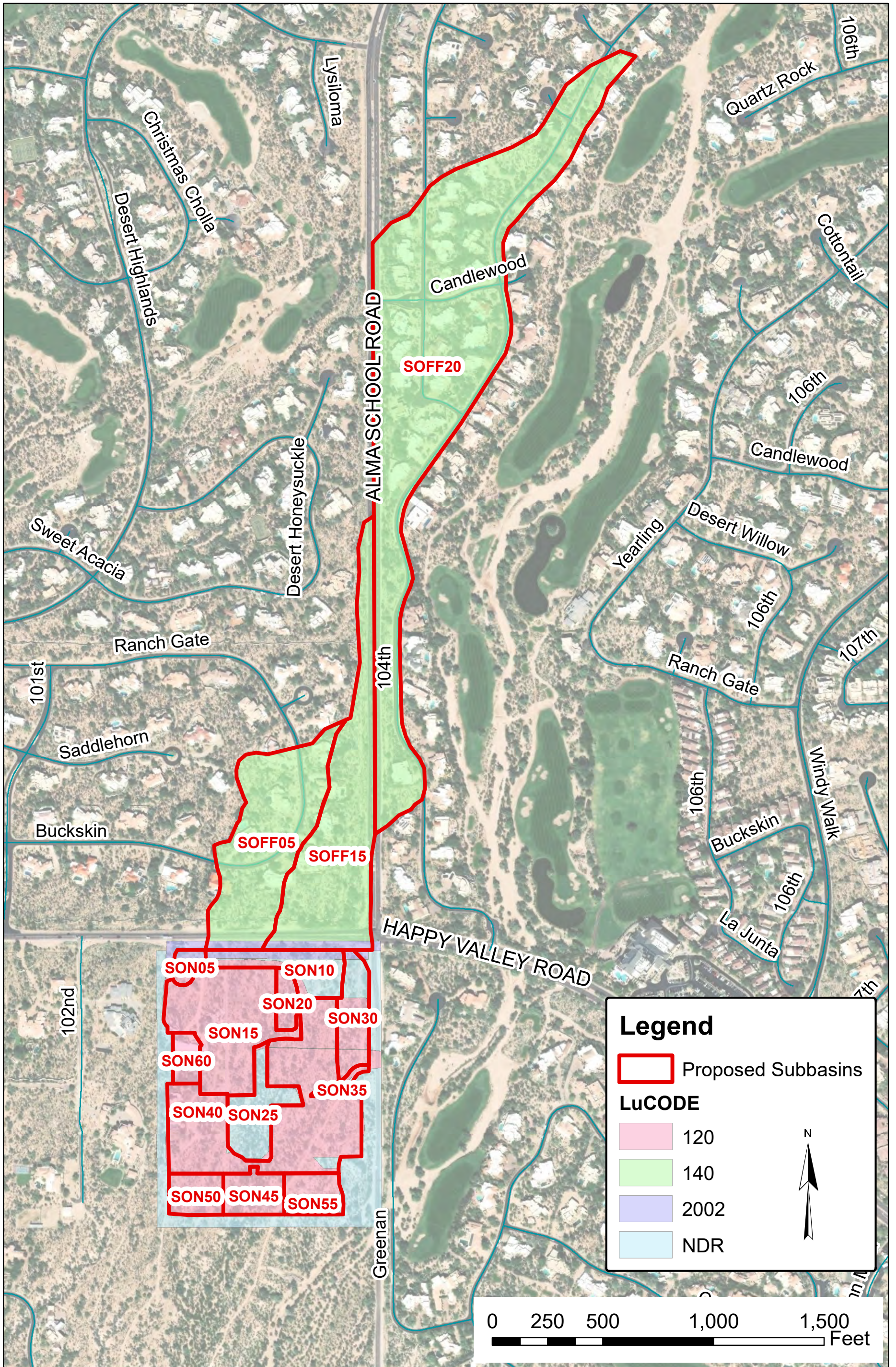
**CITY OF SCOTTSDALE  
HVR & ALMA SCHOOL  
PROPOSED SOILS**

SCALE(H): 1" = 500'  
SCALE(V): N/A  
DESIGNED BY: ACH  
DRAWN BY: ACH  
CHECKED BY: ZRS  
DATE: 1/2020



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Engineering, Planning and Environmental Consultants  
7740 North 16th Street, Suite 300  
Phoenix, Arizona 85020 (602) 944-5500

| NO. | REVISION | BY | DATE | APPR. |
|-----|----------|----|------|-------|
|     |          |    |      |       |
|     |          |    |      |       |
|     |          |    |      |       |



|              |            |
|--------------|------------|
| PROJECT NO.  | 28110425   |
| DRAWING NAME | PR LANDUSE |

**CITY OF SCOTTSDALE  
HVR & ALMA SCHOOL  
PROPOSED LANDUSE**

SCALE(H): 1" = 500'  
SCALE(V): N/A  
DESIGNED BY: ACH  
DRAWN BY: ACH  
CHECKED BY: ZRS  
DATE: 1/2020



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|     |          |    |      |       |

Flood Control District of Maricopa County  
 Drainage Design Management System  
**LAND USE**  
 Project Reference: HVR & ALMA SCHOOL-PR

| Sub Basin                 | Land Use Code | Area (sq mi)  | Area (%)     | Initial Loss (IA) | Percent Impervious (RTIMP) | Vegetation Cover (%) | DTHETA | Kb    | Description  |
|---------------------------|---------------|---------------|--------------|-------------------|----------------------------|----------------------|--------|-------|--|
| <b>Major Basin ID: 01</b> |               |               |              |                   |                            |                      |        |       |  |
| SOFF05                    | 140           | 0.0111        | 96.5         | 0.25              | 20                         | 50.0                 | NORMAL | 0.034 | Medium Lot Residential - Single Family (2-4 du per acre)             |
|                           | 2002          | 0.0004        | 3.5          | 0.05              | 95                         | 0.0                  | DRY    | 0.034 | Pavement and Rooftops  |
|                           |               | <b>0.0115</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SOFF15                    | 140           | 0.0130        | 94.2         | 0.25              | 20                         | 50.0                 | NORMAL | 0.034 | Medium Lot Residential - Single Family (2-4 du per acre)             |
|                           | 2002          | 0.0008        | 5.8          | 0.05              | 95                         | 0.0                  | DRY    | 0.034 | Pavement and Rooftops  |
|                           |               | <b>0.0138</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SOFF20                    | 140           | 0.0384        | 100.0        | 0.25              | 20                         | 50.0                 | NORMAL | 0.031 | Medium Lot Residential - Single Family (2-4 du per acre)             |
|                           |               | <b>0.0384</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON05                     | 120           | 0.0005        | 71.4         | 0.30              | 5                          | 30.0                 | NORMAL | 0.041 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           | 2002          | 0.0002        | 28.6         | 0.05              | 95                         | 0.0                  | DRY    | 0.041 | Pavement and Rooftops  |
|                           |               | <b>0.0007</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON10                     | 120           | 0.0007        | 25.0         | 0.30              | 5                          | 30.0                 | NORMAL | 0.038 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           | 2002          | 0.0008        | 28.6         | 0.05              | 95                         | 0.0                  | DRY    | 0.038 | Pavement and Rooftops  |
|                           | NDR           | 0.0013        | 46.4         | 0.35              | 0                          | 25.0                 | DRY    | 0.076 | Undeveloped Desert Rangeland, Little topographic relief, slopes < 5% |
|                           |               | <b>0.0028</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON15                     | 120           | 0.0078        | 100.0        | 0.30              | 5                          | 30.0                 | NORMAL | 0.036 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           |               | <b>0.0078</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON20                     | 120           | 0.0009        | 100.0        | 0.30              | 5                          | 30.0                 | NORMAL | 0.041 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           |               | <b>0.0009</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON25                     | 120           | 0.0003        | 10.0         | 0.30              | 5                          | 30.0                 | NORMAL | 0.038 | Estate Residential (1/5 du per acre to 1 du per acre)                |

\* Non default value

Flood Control District of Maricopa County  
 Drainage Design Management System  
**LAND USE**  
 Project Reference: HVR & ALMA SCHOOL-PR

| Sub Basin                 | Land Use Code | Area (sq mi)  | Area (%)     | Initial Loss (IA) | Percent Impervious (RTIMP) | Vegetation Cover (%) | DTHETA | Kb    | Description  |
|---------------------------|---------------|---------------|--------------|-------------------|----------------------------|----------------------|--------|-------|--|
| <b>Major Basin ID: 01</b> |               |               |              |                   |                            |                      |        |       |  |
| SON25                     | NDR           | 0.0027        | 90.0         | 0.35              | 0                          | 25.0                 | DRY    | 0.076 | Undeveloped Desert Rangeland, Little topographic relief, slopes < 5% |
|                           |               | <b>0.0030</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON30                     | 120           | 0.0017        | 68.0         | 0.30              | 5                          | 30.0                 | NORMAL | 0.038 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           | NDR           | 0.0008        | 32.0         | 0.35              | 0                          | 25.0                 | DRY    | 0.076 | Undeveloped Desert Rangeland, Little topographic relief, slopes < 5% |
|                           |               | <b>0.0025</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON35                     | 120           | 0.0003        | 75.0         | 0.30              | 5                          | 30.0                 | NORMAL | 0.041 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           | NDR           | 0.0001        | 25.0         | 0.35              | 0                          | 25.0                 | DRY    | 0.083 | Undeveloped Desert Rangeland, Little topographic relief, slopes < 5% |
|                           |               | <b>0.0004</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON40                     | 120           | 0.0123        | 98.4         | 0.30              | 5                          | 30.0                 | NORMAL | 0.034 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           | NDR           | 0.0002        | 1.6          | 0.35              | 0                          | 25.0                 | DRY    | 0.068 | Undeveloped Desert Rangeland, Little topographic relief, slopes < 5% |
|                           |               | <b>0.0125</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON45                     | 120           | 0.0019        | 100.0        | 0.30              | 5                          | 30.0                 | NORMAL | 0.039 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           |               | <b>0.0019</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON50                     | 120           | 0.0017        | 100.0        | 0.30              | 5                          | 30.0                 | NORMAL | 0.039 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           |               | <b>0.0017</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON55                     | 120           | 0.0017        | 100.0        | 0.30              | 5                          | 30.0                 | NORMAL | 0.039 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           |               | <b>0.0017</b> | <b>100.0</b> |                   |                            |                      |        |       |  |
| SON60                     | 120           | 0.0010        | 100.0        | 0.30              | 5                          | 30.0                 | NORMAL | 0.041 | Estate Residential (1/5 du per acre to 1 du per acre)                |
|                           |               | <b>0.0010</b> | <b>100.0</b> |                   |                            |                      |        |       |  |

\* Non default value

Flood Control District of Maricopa County  
 Drainage Design Management System  
 SUB BASINS

| Area ID   | Sub Basin Parameters |             |               |           |           |       | Rainfall Losses |        |           |               |           | Return Period Parameters |        |        |        |        |        |        |
|---|----------------------|-------------|---------------|-----------|-----------|-------|-----------------|--------|-----------|---------------|-----------|--------------------------|--------|--------|--------|--------|--------|--------|
|   | Area (sq mi)         | Length (mi) | Slope (ft/mi) | Adj Slope | Time-Area | Kb    | IA (in)         | DTHETA | PSIF (in) | XKSAT (in/hr) | RTIMP (%) | 2 Yr                     | 5 Yr   | 10 Yr  | 25 Yr  | 50 Yr  | 100 Yr |        |
| <b>Major Basin ID: 01</b>   |                      |             |               |           |           |       |                 |        |           |               |           |                          |        |        |        |        |        |        |
| SON05   | 0.001                | 0.03        | 9.7           | 9.7       | Urban     | 0.041 | 0.23            | 0.19   | 7.94      | 0.079         | 31        | <b>Tc (Hrs)</b>          | 0.199  | 0.174  | 0.161  | 0.147  | 0.139  | 0.133  |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.22   | 0.25   | 0.27   | 0.30   | 0.32   | 0.33   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.191  | 0.165  | 0.151  | 0.137  | 0.129  | 0.122  |
| SON10   | 0.003                | 0.10        | 29.0          | 29.0      | Urban     | 0.056 | 0.25            | 0.26   | 7.94      | 0.077         | 28        | <b>Tc (Hrs)</b>          | 0.314  | 0.273  | 0.251  | 0.228  | 0.215  | 0.205  |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.47   | 0.54   | 0.58   | 0.64   | 0.68   | 0.72   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.445  | 0.381  | 0.346  | 0.312  | 0.292  | 0.276  |
| SOFF05  | 0.012                | 0.20        | 168.3         | 168.3     | Urban     | 0.034 | 0.24            | 0.16   | 7.94      | 0.100         | 23        | <b>Tc (Hrs)</b>          | 0.199  | 0.172  | 0.158  | 0.144  | 0.136  | 0.129  |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 1.47   | 1.71   | 1.86   | 2.04   | 2.16   | 2.27   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.211  | 0.180  | 0.164  | 0.148  | 0.139  | 0.131  |
| SON45   | 0.002                | 0.04        | 195.1         | 195.1     | Urban     | 0.039 | 0.30            | 0.15   | 7.94      | 0.085         | 5         | <b>Tc (Hrs)</b>          | 0.096* | 0.081* | 0.074* | 0.067* | 0.063* | 0.060* |
| 2-, 5-, 10-, 25-, 50-, and 100-year Tc values listed as "non default or out of range" because of the varying subbasin sizes and flowpaths. The selected NMIN parameter will not meet the time of concentration requirements for the varying subbasin sizes. |                      |             |               |           |           |       |                 |        |           |               |           |                          |        |        |        |        |        |        |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.61   | 0.72   | 0.79   | 0.88   | 0.93   | 0.98   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.072  | 0.060  | 0.054  | 0.048  | 0.045  | 0.043  |
| SOFF15  | 0.014                | 0.40        | 131.6         | 131.6     | Urban     | 0.034 | 0.24            | 0.16   | 7.94      | 0.099         | 24        | <b>Tc (Hrs)</b>          | 0.302  | 0.262  | 0.241  | 0.220  | 0.207  | 0.197  |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 1.94   | 2.24   | 2.43   | 2.67   | 2.83   | 2.98   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.537  | 0.458  | 0.417  | 0.376  | 0.354  | 0.334  |
| SON15   | 0.008                | 0.11        | 121.0         | 121.0     | Urban     | 0.036 | 0.30            | 0.15   | 7.94      | 0.085         | 5         | <b>Tc (Hrs)</b>          | 0.176  | 0.150  | 0.136  | 0.123  | 0.116  | 0.110  |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.92   | 1.08   | 1.19   | 1.31   | 1.39   | 1.47   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.145  | 0.121  | 0.109  | 0.097  | 0.091  | 0.086  |
| SON50   | 0.002                | 0.04        | 211.4         | 210.7     | Urban     | 0.039 | 0.30            | 0.15   | 7.94      | 0.085         | 5         | <b>Tc (Hrs)</b>          | 0.093* | 0.079* | 0.072* | 0.065* | 0.061* | 0.058* |
| 2-, 5-, 10-, 25-, 50-, and 100-year Tc values listed as "non default or out of range" because of the varying subbasin sizes and flowpaths. The selected NMIN parameter will not meet the time of concentration requirements for the varying subbasin sizes. |                      |             |               |           |           |       |                 |        |           |               |           |                          |        |        |        |        |        |        |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.63   | 0.74   | 0.81   | 0.90   | 0.96   | 1.01   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.070  | 0.058  | 0.053  | 0.047  | 0.044  | 0.042  |
| SOFF20  | 0.038                | 0.75        | 43.9          | 43.9      | Urban     | 0.031 | 0.25            | 0.17   | 6.76      | 0.164         | 20        | <b>Tc (Hrs)</b>          | 0.585* | 0.507* | 0.461* | 0.416  | 0.391  | 0.369  |
| 2-, 5-, 10-, 25-, 50-, and 100-year Tc values listed as "non default or out of range" because of the varying subbasin sizes and flowpaths. The selected NMIN parameter will not meet the time of concentration requirements for the varying subbasin sizes. |                      |             |               |           |           |       |                 |        |           |               |           |                          |        |        |        |        |        |        |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 1.88   | 2.17   | 2.39   | 2.64   | 2.81   | 2.98   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 1.045  | 0.891  | 0.802  | 0.716  | 0.668  | 0.627  |
| SON20   | 0.001                | 0.06        | 203.5         | 203.3     | Urban     | 0.041 | 0.30            | 0.15   | 7.94      | 0.085         | 5         | <b>Tc (Hrs)</b>          | 0.119  | 0.101  | 0.092* | 0.083* | 0.078* | 0.074* |
| 10-, 25-, 50-, and 100-year Tc values listed as "non default or out of range" because of the varying subbasin sizes and flowpaths. The selected NMIN parameter will not meet the time of concentration requirements for the varying subbasin sizes.         |                      |             |               |           |           |       |                 |        |           |               |           |                          |        |        |        |        |        |        |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.74   | 0.87   | 0.96   | 1.06   | 1.13   | 1.19   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.188  | 0.157  | 0.141  | 0.126  | 0.118  | 0.111  |

\* Non default value or value out of range



Flood Control District of Maricopa County  
 Drainage Design Management System  
 SUB BASINS

| Area ID   | Sub Basin Parameters |             |               |           |           |       | Rainfall Losses |        |           |               |           | Return Period Parameters |        |        |        |        |        |         |
|---|----------------------|-------------|---------------|-----------|-----------|-------|-----------------|--------|-----------|---------------|-----------|--------------------------|--------|--------|--------|--------|--------|---------|
|   | Area (sq mi)         | Length (mi) | Slope (ft/mi) | Adj Slope | Time-Area | Kb    | IA (in)         | DTHETA | PSIF (in) | XKSAT (in/hr) | RTIMP (%) | 2 Yr                     | 5 Yr   | 10 Yr  | 25 Yr  | 50 Yr  | 100 Yr |         |
| <b>Major Basin ID: 01</b>   |                      |             |               |           |           |       |                 |        |           |               |           |                          |        |        |        |        |        |         |
| SON55   | 0.002                | 0.04        | 240.0         | 233.4     | Urban     | 0.039 | 0.30            | 0.15   | 7.94      | 0.085         | 5         | <b>Tc (Hrs)</b>          | 0.090* | 0.077* | 0.070* | 0.063* | 0.060* | 0.056 * |
| 2-, 5-, 10-, 25-, 50-, and 100-year Tc values listed as "non default or out of range" because of the varying subbasin sizes and flowpaths. The selected NMIN parameter will not meet the time of concentration requirements for the varying subbasin sizes. |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.65   | 0.76   | 0.84   | 0.93   | 0.98   | 1.05    |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.068  | 0.056  | 0.051  | 0.045  | 0.042  | 0.040   |
| SON25   | 0.003                | 0.11        | 167.6         | 167.6     | Urban     | 0.072 | 0.35            | 0.29   | 7.94      | 0.082         | 1         | <b>Tc (Hrs)</b>          | 0.253  | 0.211  | 0.189  | 0.168  | 0.156  | 0.147   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.64   | 0.76   | 0.85   | 0.96   | 1.03   | 1.10    |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.377  | 0.309  | 0.273  | 0.239  | 0.221  | 0.207   |
| SON60   | 0.001                | 0.05        | 104.0         | 104.0     | Urban     | 0.041 | 0.30            | 0.15   | 7.94      | 0.085         | 5         | <b>Tc (Hrs)</b>          | 0.133  | 0.113  | 0.103  | 0.093* | 0.088* | 0.083 * |
| 2-, 5-, 10-, 25-, 50-, and 100-year Tc values listed as "non default or out of range" because of the varying subbasin sizes and flowpaths. The selected NMIN parameter will not meet the time of concentration requirements for the varying subbasin sizes. |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.55   | 0.65   | 0.71   | 0.79   | 0.83   | 0.88    |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.184  | 0.154  | 0.139  | 0.124  | 0.116  | 0.109   |
| SON30   | 0.003                | 0.10        | 199.0         | 199.0     | Urban     | 0.050 | 0.32            | 0.20   | 7.94      | 0.084         | 3         | <b>Tc (Hrs)</b>          | 0.179  | 0.150  | 0.136  | 0.122  | 0.114  | 0.108   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.82   | 0.98   | 1.08   | 1.20   | 1.29   | 1.36    |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.238  | 0.196  | 0.175  | 0.155  | 0.145  | 0.136   |
| SON35   | 0.001                | 0.06        | 61.0          | 61.0      | Urban     | 0.058 | 0.32            | 0.21   | 7.94      | 0.084         | 3         | <b>Tc (Hrs)</b>          | 0.217  | 0.182  | 0.164  | 0.147  | 0.138  | 0.130   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 0.41   | 0.48   | 0.54   | 0.60   | 0.64   | 0.68    |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.366  | 0.302  | 0.269  | 0.239  | 0.222  | 0.208   |
| SON40   | 0.012                | 0.19        | 157.8         | 157.8     | Urban     | 0.035 | 0.30            | 0.15   | 7.94      | 0.085         | 5         | <b>Tc (Hrs)</b>          | 0.210  | 0.179  | 0.163  | 0.147  | 0.139  | 0.131   |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>Vel (f/s)</b>         | 1.33   | 1.56   | 1.71   | 1.90   | 2.00   | 2.13    |
|   |                      |             |               |           |           |       |                 |        |           |               |           | <b>R (Hrs)</b>           | 0.216  | 0.180  | 0.162  | 0.145  | 0.136  | 0.128   |

\* Non default value or value out of range

Flood Control District of Maricopa County  
 Drainage Design Management System  
 HEC-1 ROUTING DATA  
 Project Reference: HVR & ALMA SCHOOL-PR

| Route ID              | LOB N                | Chan N               | ROB N                 | Length (ft)           | Slope (ft/ft)         | Max Elev (ft)          | 1.          | 2.       | 3.       | 4.       | 5.       | 6.       | 7.       | 8.       |  |
|-----------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|------------------------|-------------|----------|----------|----------|----------|----------|----------|----------|--|
| <b>NORMAL DEPTH</b>   |                      |                      |                       |                       |                       |                        |             |          |          |          |          |          |          |          |  |
| <b>Major Basin 01</b> |                      |                      |                       |                       |                       |                        |             |          |          |          |          |          |          |          |  |
| ROFF15                | 0.035                | 0.035                | 0.035                 | 86.10                 | 0.0320                | 2,362.00               | X: -        | 3.60     | 19.60    | 38.80    | 44.80    | 48.00    | 55.10    | 86.00    |  |
|                       | Return Period        |                      |                       |                       |                       |                        | Y: 2,362.00 | 2,361.80 | 2,359.82 | 2,359.05 | 2,357.41 | 2,357.32 | 2,360.24 | 2,363.00 |  |
|                       | <a href="#">2 Yr</a> | <a href="#">5 Yr</a> | <a href="#">10 Yr</a> | <a href="#">25 Yr</a> | <a href="#">50 Yr</a> | <a href="#">100 Yr</a> |             |          |          |          |          |          |          |          |  |
| NSTPS                 | 0                    | 0                    | 0                     | 0                     | 0                     | 0                      |             |          |          |          |          |          |          |          |  |
| ROFF20                | 0.035                | 0.035                | 0.035                 | 41.40                 | 0.9699                | 2,373.61               | X: -        | 3.90     | 21.40    | 25.80    | 28.90    | 34.70    | 39.00    | 41.40    |  |
|                       | Return Period        |                      |                       |                       |                       |                        | Y: 2,375.54 | 2,374.98 | 2,373.33 | 2,373.18 | 2,371.85 | 2,373.26 | 2,373.41 | 2,373.61 |  |
|                       | <a href="#">2 Yr</a> | <a href="#">5 Yr</a> | <a href="#">10 Yr</a> | <a href="#">25 Yr</a> | <a href="#">50 Yr</a> | <a href="#">100 Yr</a> |             |          |          |          |          |          |          |          |  |
| NSTPS                 | 0                    | 0                    | 0                     | 0                     | 0                     | 0                      |             |          |          |          |          |          |          |          |  |
| RSON20                | 0.035                | 0.035                | 0.035                 | 52.00                 | 0.0422                | 2,352.43               | X: -        | 16.40    | 22.50    | 26.70    | 27.90    | 32.60    | 51.20    | 52.40    |  |
|                       | Return Period        |                      |                       |                       |                       |                        | Y: 2,353.77 | 2,351.69 | 2,351.59 | 2,348.34 | 2,348.39 | 2,351.27 | 2,352.25 | 2,352.43 |  |
|                       | <a href="#">2 Yr</a> | <a href="#">5 Yr</a> | <a href="#">10 Yr</a> | <a href="#">25 Yr</a> | <a href="#">50 Yr</a> | <a href="#">100 Yr</a> |             |          |          |          |          |          |          |          |  |
| NSTPS                 | 0                    | 0                    | 0                     | 0                     | 0                     | 0                      |             |          |          |          |          |          |          |          |  |
| RSON25                | 0.035                | 0.035                | 0.035                 | 50.70                 | 0.0249                | 2,334.54               | X: -        | 10.60    | 21.50    | 24.40    | 27.90    | 31.40    | 40.40    | 50.70    |  |
|                       | Return Period        |                      |                       |                       |                       |                        | Y: 2,335.30 | 2,334.78 | 2,334.43 | 2,332.76 | 2,332.98 | 2,333.97 | 2,334.54 | 2,334.37 |  |
|                       | <a href="#">2 Yr</a> | <a href="#">5 Yr</a> | <a href="#">10 Yr</a> | <a href="#">25 Yr</a> | <a href="#">50 Yr</a> | <a href="#">100 Yr</a> |             |          |          |          |          |          |          |          |  |
| NSTPS                 | 0                    | 0                    | 0                     | 0                     | 0                     | 0                      |             |          |          |          |          |          |          |          |  |
| RSON30                | 0.035                | 0.035                | 0.020                 | 21.70                 | 0.0117                | 2,359.95               | X: -        | 3.60     | 9.10     | 13.00    | 13.30    | 14.40    | 19.70    | 21.70    |  |
|                       | Return Period        |                      |                       |                       |                       |                        | Y: 2,359.92 | 2,359.95 | 2,359.31 | 2,358.86 | 1,358.89 | 2,359.16 | 2,360.49 | 2,360.49 |  |
|                       | <a href="#">2 Yr</a> | <a href="#">5 Yr</a> | <a href="#">10 Yr</a> | <a href="#">25 Yr</a> | <a href="#">50 Yr</a> | <a href="#">100 Yr</a> |             |          |          |          |          |          |          |          |  |
| NSTPS                 | 0                    | 0                    | 0                     | 0                     | 0                     | 0                      |             |          |          |          |          |          |          |          |  |
| RSON35                | 0.035                | 0.035                | 0.035                 | 51.20                 | 0.0570                | 2,350.88               | X: 7.20     | 14.80    | 16.60    | 21.20    | 32.40    | 46.10    | 49.40    | 51.20    |  |
|                       | Return Period        |                      |                       |                       |                       |                        | Y: 2,350.41 | 2,349.76 | 2,349.78 | 2,349.45 | 2,348.17 | 2,349.63 | 2,350.43 | 2,350.88 |  |
|                       | <a href="#">2 Yr</a> | <a href="#">5 Yr</a> | <a href="#">10 Yr</a> | <a href="#">25 Yr</a> | <a href="#">50 Yr</a> | <a href="#">100 Yr</a> |             |          |          |          |          |          |          |          |  |
| NSTPS                 | 0                    | 0                    | 0                     | 0                     | 0                     | 0                      |             |          |          |          |          |          |          |          |  |

Flood Control District of Maricopa County  
 Drainage Design Management System  
 HEC-1 ROUTING DATA  
 Project Reference: HVR & ALMA SCHOOL-PR

| Route ID | LOB N                | Chan N               | ROB N                 | Length (ft)           | Slope (ft/ft)         | Max Elev (ft)          |    | 1.       | 2.       | 3.       | 4.       | 5.       | 6.       | 7.       | 8.       |  |
|----------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|------------------------|----|----------|----------|----------|----------|----------|----------|----------|----------|--|
| RSON40   | 0.020                | 0.020                | 0.020                 | 70.70                 | 0.0174                | 2,325.00               | X: | -        | 17.40    | 19.80    | 32.80    | 45.80    | 48.00    | 58.50    | 70.70    |  |
|          | Return Period        |                      |                       |                       |                       |                        | Y: | 2,326.00 | 2,326.00 | 2,325.00 | 2,322.89 | 2,324.00 | 2,325.00 | 2,325.00 | 2,325.00 |  |
|          | <a href="#">2 Yr</a> | <a href="#">5 Yr</a> | <a href="#">10 Yr</a> | <a href="#">25 Yr</a> | <a href="#">50 Yr</a> | <a href="#">100 Yr</a> |    |          |          |          |          |          |          |          |          |  |
| NSTPS    | 0                    | 0                    | 0                     | 0                     | 0                     | 0                      |    |          |          |          |          |          |          |          |          |  |

Flood Control District of Maricopa County  
 Drainage Design Management System  
 HEC-1 STORAGE FACILITIES

| Storage Basin ID: <b>BASINA</b>      |      |                             | <u>1</u>    | <u>2</u>    | <u>3</u>     | <u>4</u>     | <u>5</u>     | <u>6</u>      | <u>7</u>  | <u>8</u>  | <u>9</u>  | <u>10</u> |
|--------------------------------------|------|-----------------------------|-------------|-------------|--------------|--------------|--------------|---------------|-----------|-----------|-----------|-----------|
| <b>Spillway Characteristics (SS)</b> |      |                             |             |             |              |              |              |               |           |           |           |           |
| Spillway Crest Elevation:            | -NA- | <b>Volume (ac-ft)</b>       | 0           | -           | -            | -            | -            | -             | -         | -         | -         | -         |
| Spillway Length:                     | -NA- | <b>Discharge (cfs)</b>      | 0           | 3           | 5            | 6            | 7            | 16            | 30        | 47        | 67        | -         |
| Discharge Coefficient:               | -NA- | <b>Elevation (ft)</b>       | 2,320.0     | 2,321.0     | 2,322.0      | 2,323.0      | 2,323.1      | 2,323.2       | 2,323.3   | 2,323.4   | 2,323.5   | -         |
| Weir Coefficient:                    | -NA- |                             |             |             |              |              |              |               |           |           |           |           |
| <b>Low-Level Outlet (SL)</b>         |      |                             | <u>11</u>   | <u>12</u>   | <u>13</u>    | <u>14</u>    | <u>15</u>    | <u>16</u>     | <u>17</u> | <u>18</u> | <u>19</u> | <u>20</u> |
| Centerline Elevation:                | -NA- | <b>Volume (ac-ft)</b>       | -           | -           | -            | -            | -            | -             | -         | -         | -         | -         |
| Cross-Section Area:                  | -NA- | <b>Discharge (cfs)</b>      | -           | -           | -            | -            | -            | -             | -         | -         | -         | -         |
| Discharge Coefficient:               | -NA- | <b>Elevation (ft)</b>       | -           | -           | -            | -            | -            | -             | -         | -         | -         | -         |
| Orifice Equation Exponent:           | -NA- |                             |             |             |              |              |              |               |           |           |           |           |
| <b>Top of Dam Overflow (ST)</b>      |      |                             | <u>2 Yr</u> | <u>5 Yr</u> | <u>10 Yr</u> | <u>25 Yr</u> | <u>50 Yr</u> | <u>100 Yr</u> |           |           |           |           |
| Elevation Top of Dam:                | -NA- | <b>Peak Volume (ac-ft)</b>  | 0.00        | 0.00        | 0.00         | 0.00         | 0.00         | 0.00          |           |           |           |           |
| Length of Dam:                       | -NA- | <b>Peak Stage (ft)</b>      | 2,321.00    | 0.00        | 2,322.00     | 0.00         | 0.00         | 2,323.27      |           |           |           |           |
| Discharge Coefficient:               | -NA- | <b>Peak Discharge (cfs)</b> | 3           | 0           | 5            | 0            | 0            | 26            |           |           |           |           |
| Weir Coefficient:                    | -NA- |                             |             |             |              |              |              |               |           |           |           |           |

| Storage Basin ID: <b>BASINB</b>      |      |                             | <u>1</u>    | <u>2</u>    | <u>3</u>     | <u>4</u>     | <u>5</u>     | <u>6</u>      | <u>7</u>  | <u>8</u>  | <u>9</u>  | <u>10</u> |
|--------------------------------------|------|-----------------------------|-------------|-------------|--------------|--------------|--------------|---------------|-----------|-----------|-----------|-----------|
| <b>Spillway Characteristics (SS)</b> |      |                             |             |             |              |              |              |               |           |           |           |           |
| Spillway Crest Elevation:            | -NA- | <b>Volume (ac-ft)</b>       | 0           | -           | -            | -            | -            | -             | -         | -         | -         | -         |
| Spillway Length:                     | -NA- | <b>Discharge (cfs)</b>      | 0           | 1           | 2            | 3            | 5            | 14            | 27        | 41        | 59        | -         |
| Discharge Coefficient:               | -NA- | <b>Elevation (ft)</b>       | 2,337.0     | 2,338.0     | 2,339.0      | 2,340.0      | 2,340.1      | 2,340.2       | 2,340.3   | 2,340.4   | 2,340.5   | -         |
| Weir Coefficient:                    | -NA- |                             |             |             |              |              |              |               |           |           |           |           |
| <b>Low-Level Outlet (SL)</b>         |      |                             | <u>11</u>   | <u>12</u>   | <u>13</u>    | <u>14</u>    | <u>15</u>    | <u>16</u>     | <u>17</u> | <u>18</u> | <u>19</u> | <u>20</u> |
| Centerline Elevation:                | -NA- | <b>Volume (ac-ft)</b>       | -           | -           | -            | -            | -            | -             | -         | -         | -         | -         |
| Cross-Section Area:                  | -NA- | <b>Discharge (cfs)</b>      | -           | -           | -            | -            | -            | -             | -         | -         | -         | -         |
| Discharge Coefficient:               | -NA- | <b>Elevation (ft)</b>       | -           | -           | -            | -            | -            | -             | -         | -         | -         | -         |
| Orifice Equation Exponent:           | -NA- |                             |             |             |              |              |              |               |           |           |           |           |
| <b>Top of Dam Overflow (ST)</b>      |      |                             | <u>2 Yr</u> | <u>5 Yr</u> | <u>10 Yr</u> | <u>25 Yr</u> | <u>50 Yr</u> | <u>100 Yr</u> |           |           |           |           |
| Elevation Top of Dam:                | -NA- | <b>Peak Volume (ac-ft)</b>  | 0.00        | 0.00        | 0.00         | 0.00         | 0.00         | 0.00          |           |           |           |           |
| Length of Dam:                       | -NA- | <b>Peak Stage (ft)</b>      | 2,338.00    | 0.00        | 2,339.00     | 0.00         | 0.00         | 2,340.12      |           |           |           |           |
| Discharge Coefficient:               | -NA- | <b>Peak Discharge (cfs)</b> | 1           | 0           | 2            | 0            | 0            | 11            |           |           |           |           |
| Weir Coefficient:                    | -NA- |                             |             |             |              |              |              |               |           |           |           |           |

## Worksheet for Circular Orifice - B

| Project Description             |                     |
|---------------------------------|---------------------|
| Solve For                       | Discharge           |
| Input Data                      |                     |
| Headwater Elevation             | 3.10 ft             |
| Centroid Elevation              | 0.75 ft             |
| Tailwater Elevation             | 0.00 ft             |
| Discharge Coefficient           | 0.600               |
| Diameter                        | 6.0 in              |
| Results                         |                     |
| Discharge                       | 1.45 cfs            |
| Headwater Height Above Centroid | 2.35 ft             |
| Tailwater Height Above Centroid | -0.75 ft            |
| Flow Area                       | 0.2 ft <sup>2</sup> |
| Velocity                        | 7.38 ft/s           |

## Rating Table for Circular Orifice - B

|                       |           |
|-----------------------|-----------|
| Project Description   |           |
| Solve For             | Discharge |
| Input Data            |           |
| Headwater Elevation   | 3.10 ft   |
| Centroid Elevation    | 0.75 ft   |
| Tailwater Elevation   | 0.00 ft   |
| Discharge Coefficient | 0.600     |
| Diameter              | 6.0 in    |

| Centroid Elevation<br>(ft) | Discharge<br>(cfs) | Velocity<br>(ft/s) |
|----------------------------|--------------------|--------------------|
| 0.76                       | 1.45               | 7.36               |
| 1.26                       | 1.28               | 6.53               |
| 1.76                       | 1.09               | 5.57               |
| 2.26                       | 0.87               | 4.41               |
| 2.76                       | 0.55               | 2.81               |

## Worksheet for Circular Orifice - A

| Project Description             |                     |
|---------------------------------|---------------------|
| Solve For                       | Discharge           |
| Input Data                      |                     |
| Headwater Elevation             | 1.00 ft             |
| Centroid Elevation              | 0.50 ft             |
| Tailwater Elevation             | 0.00 ft             |
| Discharge Coefficient           | 0.600               |
| Diameter                        | 12.0 in             |
| Results                         |                     |
| Discharge                       | 2.67 cfs            |
| Headwater Height Above Centroid | 0.50 ft             |
| Tailwater Height Above Centroid | -0.50 ft            |
| Flow Area                       | 0.8 ft <sup>2</sup> |
| Velocity                        | 3.40 ft/s           |

## Rating Table for Circular Orifice - A

|                       |           |
|-----------------------|-----------|
| Project Description   |           |
| Solve For             | Discharge |
| Input Data            |           |
| Headwater Elevation   | 1.00 ft   |
| Centroid Elevation    | 0.50 ft   |
| Tailwater Elevation   | 0.00 ft   |
| Discharge Coefficient | 0.600     |
| Diameter              | 12.0 in   |

| Headwater Elevation<br>(ft) | Discharge<br>(cfs) | Velocity<br>(ft/s) |
|-----------------------------|--------------------|--------------------|
| 0.51                        | 0.38               | 0.48               |
| 1.01                        | 2.70               | 3.44               |
| 1.51                        | 3.80               | 4.84               |
| 2.01                        | 4.65               | 5.91               |
| 2.51                        | 5.36               | 6.82               |



## Worksheet for Broad Crested Weir - A

| Project Description          |                             |
|------------------------------|-----------------------------|
| Solve For                    | Discharge                   |
| Input Data                   |                             |
| Headwater Elevation          | 2,323.50 ft                 |
| Crest Elevation              | 2,323.00 ft                 |
| Tailwater Elevation          | 2,323.00 ft                 |
| Crest Surface Type           | Gravel                      |
| Crest Breadth                | 4.00 ft                     |
| Crest Length                 | 70.0 ft                     |
| Results                      |                             |
| Discharge                    | 66.65 cfs                   |
| Headwater Height Above Crest | 0.50 ft                     |
| Tailwater Height Above Crest | 0.00 ft                     |
| Weir Coefficient             | 2.69 ft <sup>(1/2)</sup> /s |
| Submergence Factor           | 1.000                       |
| Adjusted Weir Coefficient    | 2.69 ft <sup>(1/2)</sup> /s |
| Flow Area                    | 35.0 ft <sup>2</sup>        |
| Velocity                     | 1.90 ft/s                   |
| Wetted Perimeter             | 71.0 ft                     |
| Top Width                    | 70.00 ft                    |

## Rating Table for Broad Crested Weir - A

| Project Description |             |  |  |
|---------------------|-------------|--|--|
| Solve For           | Discharge   |  |  |
| Input Data          |             |  |  |
| Headwater Elevation | 2,323.50 ft |  |  |
| Crest Elevation     | 2,323.00 ft |  |  |
| Tailwater Elevation | 2,323.00 ft |  |  |
| Crest Surface Type  | Gravel      |  |  |
| Crest Breadth       | 4.00 ft     |  |  |
| Crest Length        | 70.0 ft     |  |  |

| Headwater Elevation<br>(ft) | Discharge<br>(cfs) | Velocity<br>(ft/s) |      |
|-----------------------------|--------------------|--------------------|------|
| 2,323.00                    | (N/A)              |                    |      |
| 2,323.10                    | 5.63               |                    | 0.80 |
| 2,323.20                    | 16.19              |                    | 1.16 |
| 2,323.30                    | 30.18              |                    | 1.44 |
| 2,323.40                    | 47.10              |                    | 1.68 |
| 2,323.50                    | 66.65              |                    | 1.90 |

## Worksheet for Broad Crested Weir - B

| Project Description          |                             |
|------------------------------|-----------------------------|
| Solve For                    | Discharge                   |
| Input Data                   |                             |
| Headwater Elevation          | 2,340.50 ft                 |
| Crest Elevation              | 2,340.00 ft                 |
| Tailwater Elevation          | 2,340.00 ft                 |
| Crest Surface Type           | Gravel                      |
| Crest Breadth                | 4.00 ft                     |
| Crest Length                 | 62.0 ft                     |
| Results                      |                             |
| Discharge                    | 59.03 cfs                   |
| Headwater Height Above Crest | 0.50 ft                     |
| Tailwater Height Above Crest | 0.00 ft                     |
| Weir Coefficient             | 2.69 ft <sup>(1/2)</sup> /s |
| Submergence Factor           | 1.000                       |
| Adjusted Weir Coefficient    | 2.69 ft <sup>(1/2)</sup> /s |
| Flow Area                    | 31.0 ft <sup>2</sup>        |
| Velocity                     | 1.90 ft/s                   |
| Wetted Perimeter             | 63.0 ft                     |
| Top Width                    | 62.00 ft                    |

## Rating Table for Broad Crested Weir - B

| Project Description |             |  |  |
|---------------------|-------------|--|--|
| Solve For           | Discharge   |  |  |
| Input Data          |             |  |  |
| Headwater Elevation | 2,340.50 ft |  |  |
| Crest Elevation     | 2,340.00 ft |  |  |
| Tailwater Elevation | 2,340.00 ft |  |  |
| Crest Surface Type  | Gravel      |  |  |
| Crest Breadth       | 4.00 ft     |  |  |
| Crest Length        | 62.0 ft     |  |  |

| Headwater Elevation<br>(ft) | Discharge<br>(cfs) | Velocity<br>(ft/s) |      |
|-----------------------------|--------------------|--------------------|------|
| 2,340.00                    | (N/A)              |                    |      |
| 2,340.10                    | 4.99               |                    | 0.80 |
| 2,340.20                    | 14.34              |                    | 1.16 |
| 2,340.30                    | 26.73              |                    | 1.44 |
| 2,340.40                    | 41.72              |                    | 1.68 |
| 2,340.50                    | 59.03              |                    | 1.90 |

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* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
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* RUN DATE 08OCT19 TIME 10:00:10
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**PROPOSED 2-YEAR**

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* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

| LINE | ID | 1   | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9     | 10    |
|------|----|---|---------|---------|---------|---------|---------|---------|---------|-------|-------|
| 1    | ID | Flood Control District of Maricopa County     |         |         |         |         |         |         |         |       |       |
| 2    | ID | HVR & ALMA SCHOOL-PR - HVR AND ALMA SCHOOL-PR |         |         |         |         |         |         |         |       |       |
| 3    | ID | 2 YEAR  |         |         |         |         |         |         |         |       |       |
| 4    | ID | 6 Hour Storm                                  |         |         |         |         |         |         |         |       |       |
| 5    | ID | Unit Hydrograph: Clark                        |         |         |         |         |         |         |         |       |       |
| 6    | ID | Storm: Multiple                               |         |         |         |         |         |         |         |       |       |
| 7    | ID | 10/04/2019                                    |         |         |         |         |         |         |         |       |       |
| 8    | IT | 2   | 1JAN99  | 0       | 2000    |         |         |         |         |       |       |
| 9    | IO | 5   |         |         |         |         |         |         |         |       |       |
| 10   | IN | 15  |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 11   | JD | 1.368   | 0.0001  |         |         |         |         |         |         |       |       |
| 12   | PC | 0.000   | 0.008   | 0.016   | 0.025   | 0.033   | 0.041   | 0.050   | 0.058   | 0.066 | 0.074 |
| 13   | PC | 0.087   | 0.099   | 0.118   | 0.138   | 0.216   | 0.377   | 0.834   | 0.911   | 0.931 | 0.950 |
| 14   | PC | 0.962   | 0.972   | 0.983   | 0.991   | 1.000   |         |         |         |       |       |
| 15   | JD | 1.360   | 0.5000  |         |         |         |         |         |         |       |       |
| 16   | PC | 0.000   | 0.008   | 0.016   | 0.025   | 0.033   | 0.041   | 0.050   | 0.058   | 0.066 | 0.074 |
| 17   | PC | 0.087   | 0.099   | 0.118   | 0.138   | 0.216   | 0.377   | 0.834   | 0.911   | 0.931 | 0.950 |
| 18   | PC | 0.962   | 0.972   | 0.983   | 0.991   | 1.000   |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 19   | KK | SOFF20  | BASIN   |         |         |         |         |         |         |       |       |
| 20   | BA | 0.038   |         |         |         |         |         |         |         |       |       |
| 21   | LG | 0.25  | 0.17    | 6.76    | 0.16    | 20      |         |         |         |       |       |
| 22   | UC | 0.585   | 1.045   |         |         |         |         |         |         |       |       |
| 23   | UA | 0   | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0  | 97.0  |
| 24   | UA | 100   |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 25   | KK | ROFF20  | ROUTE   |         |         |         |         |         |         |       |       |
| 26   | RS | 1   | FLOW    |         |         |         |         |         |         |       |       |
| 27   | RC | 0.035   | 0.035   | 0.035   | 41      | 0.9699  | 2373.61 |         |         |       |       |
| 28   | RX | 0.00  | 3.90    | 21.40   | 25.80   | 28.90   | 34.70   | 39.00   | 41.40   |       |       |
| 29   | RY | 2375.5  | 2374.98 | 2373.33 | 2373.18 | 2371.85 | 2373.26 | 2373.41 | 2373.61 |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 30   | KK | SOFF15  | BASIN   |         |         |         |         |         |         |       |       |
| 31   | BA | 0.014   |         |         |         |         |         |         |         |       |       |
| 32   | LG | 0.24  | 0.16    | 7.94    | 0.10    | 24      |         |         |         |       |       |
| 33   | UC | 0.302   | 0.537   |         |         |         |         |         |         |       |       |
| 34   | UA | 0   | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0  | 97.0  |
| 35   | UA | 100   |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 36   | KK | CP15  | COMBINE |         |         |         |         |         |         |       |       |
| 37   | HC | 2   |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 38   | KK | ROFF15  | ROUTE   |         |         |         |         |         |         |       |       |
| 39   | RS | 1   | FLOW    |         |         |         |         |         |         |       |       |
| 40   | RC | 0.035   | 0.035   | 0.035   | 86      | 0.0320  | 2362.00 |         |         |       |       |
| 41   | RX | 0.00  | 3.60    | 19.60   | 38.80   | 44.80   | 48.00   | 55.10   | 86.00   |       |       |
| 42   | RY | 2362.0  | 2361.80 | 2359.82 | 2359.05 | 2357.41 | 2357.32 | 2360.24 | 2363.00 |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |

1 HEC-1 INPUT PAGE 2

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



|     |    |        |         |         |         |         |         |         |         |      |      |
|-----|----|--------|---------|---------|---------|---------|---------|---------|---------|------|------|
| 107 | RS | 1      | FLOW    |         |         |         |         |         |         |      |      |
| 108 | RC | 0.035  | 0.035   | 0.035   | 51      | 0.0570  | 2350.88 |         |         |      |      |
| 109 | RX | 7.20   | 14.80   | 16.60   | 21.20   | 32.40   | 46.10   | 49.40   | 51.20   |      |      |
| 110 | RY | 2350.4 | 2349.76 | 2349.78 | 2349.45 | 2348.17 | 2349.63 | 2350.43 | 2350.88 |      |      |
|     | *  |        |         |         |         |         |         |         |         |      |      |
| 111 | KK | SON25  | BASIN   |         |         |         |         |         |         |      |      |
| 112 | BA | 0.003  |         |         |         |         |         |         |         |      |      |
| 113 | LG | 0.35   | 0.29    | 7.94    | 0.08    | 1       |         |         |         |      |      |
| 114 | UC | 0.253  | 0.377   |         |         |         |         |         |         |      |      |
| 115 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 116 | UA | 100    |         |         |         |         |         |         |         |      |      |
|     | *  |        |         |         |         |         |         |         |         |      |      |

1

HEC-1 INPUT

PAGE 4

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

|     |    |        |         |         |         |         |         |         |         |  |  |
|-----|----|--------|---------|---------|---------|---------|---------|---------|---------|--|--|
| 117 | KK | CP40   | COMBINE |         |         |         |         |         |         |  |  |
| 118 | HC | 3      |         |         |         |         |         |         |         |  |  |
|     | *  |        |         |         |         |         |         |         |         |  |  |
| 119 | KK | RSON40 | ROUTE   |         |         |         |         |         |         |  |  |
| 120 | RS | 1      | FLOW    |         |         |         |         |         |         |  |  |
| 121 | RC | 0.020  | 0.020   | 0.020   | 71      | 0.0174  | 2325.00 |         |         |  |  |
| 122 | RX | 0.00   | 17.40   | 19.80   | 32.80   | 45.80   | 48.00   | 58.50   | 70.70   |  |  |
| 123 | RY | 2326.0 | 2326.00 | 2325.00 | 2322.89 | 2324.00 | 2325.00 | 2325.00 | 2325.00 |  |  |
|     | *  |        |         |         |         |         |         |         |         |  |  |

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 124 | KK | SON45 | BASIN |      |      |      |      |      |      |      |      |
| 125 | BA | 0.002 |       |      |      |      |      |      |      |      |      |
| 126 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |      |
| 127 | UC | 0.096 | 0.072 |      |      |      |      |      |      |      |      |
| 128 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 129 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

|     |    |      |         |  |  |  |  |  |  |  |  |
|-----|----|------|---------|--|--|--|--|--|--|--|--|
| 130 | KK | CP45 | COMBINE |  |  |  |  |  |  |  |  |
| 131 | HC | 2    |         |  |  |  |  |  |  |  |  |
|     | *  |      |         |  |  |  |  |  |  |  |  |

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 132 | KK | SON40 | BASIN |      |      |      |      |      |      |      |      |
| 133 | BA | 0.012 |       |      |      |      |      |      |      |      |      |
| 134 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |      |
| 135 | UC | 0.210 | 0.216 |      |      |      |      |      |      |      |      |
| 136 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 137 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

|     |    |        |         |         |         |         |         |         |         |         |  |
|-----|----|--------|---------|---------|---------|---------|---------|---------|---------|---------|--|
| 138 | KK | BASINA | STORAGE |         |         |         |         |         |         |         |  |
| 139 | KO |        |         |         |         |         |         |         |         |         |  |
| 140 | RS | 1      | STOR    |         |         |         |         |         |         |         |  |
| 141 | SA | 0.1    | 0.2     | 0.2     | 0.3     | 0.3     | 0.3     | 0.3     | 0.3     | 0.3     |  |
| 142 | SQ |        | 3.00    | 5.00    | 6.00    | 7.00    | 16.00   | 30.00   | 47.00   | 67.00   |  |
| 143 | SE | 2320.0 | 2321.00 | 2322.00 | 2323.00 | 2323.10 | 2323.20 | 2323.30 | 2323.40 | 2323.50 |  |
|     | *  |        |         |         |         |         |         |         |         |         |  |

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 144 | KK | SON50 | BASIN |      |      |      |      |      |      |      |      |
| 145 | BA | 0.002 |       |      |      |      |      |      |      |      |      |
| 146 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |      |
| 147 | UC | 0.093 | 0.070 |      |      |      |      |      |      |      |      |
| 148 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 149 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

|     |    |      |         |  |  |  |  |  |  |  |  |
|-----|----|------|---------|--|--|--|--|--|--|--|--|
| 150 | KK | CP50 | COMBINE |  |  |  |  |  |  |  |  |
| 151 | HC | 2    |         |  |  |  |  |  |  |  |  |
|     | *  |      |         |  |  |  |  |  |  |  |  |

1

HEC-1 INPUT

PAGE 5

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

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 152 | KK | SON55 | BASIN |      |      |      |      |      |      |      |      |
| 153 | BA | 0.002 |       |      |      |      |      |      |      |      |      |
| 154 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |      |
| 155 | UC | 0.090 | 0.068 |      |      |      |      |      |      |      |      |
| 156 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 157 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 158 | KK | SON60 | BASIN |      |      |      |      |      |      |      |      |
| 159 | BA | 0.001 |       |      |      |      |      |      |      |      |      |
| 160 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |      |
| 161 | UC | 0.133 | 0.184 |      |      |      |      |      |      |      |      |
| 162 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 163 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 164 | KK | SON05 | BASIN |      |      |      |      |      |      |      |      |
| 165 | BA | 0.001 |       |      |      |      |      |      |      |      |      |
| 166 | LG | 0.23  | 0.19  | 7.94 | 0.08 | 31   |      |      |      |      |      |
| 167 | UC | 0.199 | 0.191 |      |      |      |      |      |      |      |      |
| 168 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 169 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

```

1          170          ZZ
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
LINE      (V) ROUTING      (--->) DIVERSION OR PUMP FLOW
NO.       (.) CONNECTOR   (<---) RETURN OF DIVERTED OR PUMPED FLOW
19        SOFF20
          V
          V
25        ROFF20
          .
          .
30          .      SOFF15
          .      .
          .      .
36        CP15.....
          V
          V
38        ROFF15
          .
          .
43          .      SOFF05
          .      .
          .      .
49          .      .      SON10
          .      .      .
          .      .      .
55        CP20.....
          V
          V
57        RSON20
          .
          .
62          .      SON15
          .      V
          .      V
68          .      BASINB
          .      .
          .      .
74          .      .      SON20
          .      .      .
          .      .      .
80        CP25.....
          V
          V
82        RSON25
          .
          .
87          .      SON30
          .      V
          .      V
93          .      RSON30
          .      .
          .      .
98          .      .      SON35
          .      .      .
          .      .      .
104         .      CP35.....
          .      V
          .      V
106         .      RSON35
          .      .
          .      .
111         .      .      SON25
          .      .      .
          .      .      .
117         CP40.....
          V
          V
119        RSON40
          .
          .
124         .      SON45
          .      .
          .      .
130        CP45.....
          .
          .
132         .      SON40
          .      V
          .      V
138         .      BASINA
          .      .
          .      .
144         .      .      SON50
          .      .      .
          .      .      .
150         .      CP50.....
          .      .
          .      .
152         .      .      SON55
          .      .      .
          .      .      .
158         .      .      .      SON60
    
```



164 SON05

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

```
*****  
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *  
* JUN 1998 *  
* VERSION 4.1 *  
* RUN DATE 08OCT19 TIME 10:00:10 *  
*****  
*****  
* U.S. ARMY CORPS OF ENGINEERS *  
* HYDROLOGIC ENGINEERING CENTER *  
* 609 SECOND STREET *  
* DAVIS, CALIFORNIA 95616 *  
* (916) 756-1104 *  
*****
```

Flood Control District of Maricopa County  
HVR & ALMA SCHOOL-PR - HVR AND ALMA SCHOOL-PR  
2 YEAR  
6 Hour Storm  
Unit Hydrograph: Clark  
Storm: Multiple  
10/04/2019

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

IT HYDROGRAPH TIME DATA  
NMIN 2 MINUTES IN COMPUTATION INTERVAL  
IDATE 1JAN99 STARTING DATE  
ITIME 0000 STARTING TIME  
NQ 2000 NUMBER OF HYDROGRAPH ORDINATES  
NDDATE 3JAN99 ENDING DATE  
NDTIME 1838 ENDING TIME  
ICENT 19 CENTURY MARK  
  
COMPUTATION INTERVAL .03 HOURS  
TOTAL TIME BASE 66.63 HOURS

ENGLISH UNITS  
DRAINAGE AREA SQUARE MILES  
PRECIPITATION DEPTH INCHES  
LENGTH, ELEVATION FEET  
FLOW CUBIC FEET PER SECOND  
STORAGE VOLUME ACRE-FEET  
SURFACE AREA ACRES  
TEMPERATURE DEGREES FAHRENHEIT

11 JD INDEX STORM NO. 1  
STRM 1.37 PRECIPITATION DEPTH  
TRDA .00 TRANSPOSITION DRAINAGE AREA

12 PI PRECIPITATION PATTERN

|     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
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| .01 | .01 | .01 | .01 | .01 | .01 | .01 | .01 | .01 | .01 | .01 |
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15 JD INDEX STORM NO. 2  
STRM 1.36 PRECIPITATION DEPTH  
TRDA .50 TRANSPOSITION DRAINAGE AREA

16 PI PRECIPITATION PATTERN

|     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
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| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

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\*\*\*\*\*  
 \* \*  
 68 KK \* BASINB \* STORAGE  
 \* \*  
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69 KO OUTPUT CONTROL VARIABLES  
 IPRNT 5 PRINT CONTROL  
 IPLOT 0 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

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\*\*\*\*\*  
 \* \*  
 138 KK \* BASINA \* STORAGE  
 \* \*  
 \*\*\*\*\*

139 KO OUTPUT CONTROL VARIABLES  
 IPRNT 5 PRINT CONTROL  
 IPLOT 0 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

1

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

| OPERATION | STATION       | PEAK FLOW | TIME OF PEAK | AVERAGE FLOW FOR MAXIMUM PERIOD |         |         | BASIN AREA | MAXIMUM STAGE | TIME OF MAX STAGE |
|-----------|---------------|-----------|--------------|---------------------------------|---------|---------|------------|---------------|-------------------|
|           |               |           |              | 6-HOUR                          | 24-HOUR | 72-HOUR |            |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | SOFF20        | 10.       | 4.33         | 2.                              | 1.      | 0.      | .04        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | ROFF20        | 10.       | 4.33         | 2.                              | 1.      | 0.      | .04        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SOFF15        | 7.        | 4.13         | 1.                              | 0.      | 0.      | .01        |               |                   |
| +         | 2 COMBINED AT |           |              |                                 |         |         |            |               |                   |
|           | CP15          | 16.       | 4.23         | 4.                              | 1.      | 0.      | .05        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | ROFF15        | 16.       | 4.23         | 4.                              | 1.      | 0.      | .05        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SOFF05        | 11.       | 4.07         | 1.                              | 0.      | 0.      | .01        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON10         | 2.        | 4.13         | 0.                              | 0.      | 0.      | .00        |               |                   |
| +         | 3 COMBINED AT |           |              |                                 |         |         |            |               |                   |
|           | CP20          | 25.       | 4.13         | 5.                              | 1.      | 0.      | .07        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | RSON20        | 25.       | 4.13         | 5.                              | 1.      | 0.      | .07        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON15         | 8.        | 4.03         | 0.                              | 0.      | 0.      | .01        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | BASINB        | 1.        | 4.37         | 0.                              | 0.      | 0.      | .01        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON20         | 1.        | 4.03         | 0.                              | 0.      | 0.      | .00        |               |                   |
| +         | 3 COMBINED AT |           |              |                                 |         |         |            |               |                   |
|           | CP25          | 27.       | 4.13         | 5.                              | 1.      | 0.      | .08        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | RSON25        | 27.       | 4.13         | 5.                              | 1.      | 0.      | .08        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON30         | 2.        | 4.07         | 0.                              | 0.      | 0.      | .00        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | RSON30        | 2.        | 4.07         | 0.                              | 0.      | 0.      | .00        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON35         | 1.        | 4.10         | 0.                              | 0.      | 0.      | .00        |               |                   |

|   |               |        |     |      |    |    |    |     |
|---|---------------|--------|-----|------|----|----|----|-----|
| + | 2 COMBINED AT | CP35   | 3.  | 4.07 | 0. | 0. | 0. | .00 |
|   | ROUTED TO     |        |     |      |    |    |    |     |
| + |               | RSON35 | 3.  | 4.07 | 0. | 0. | 0. | .00 |
|   | HYDROGRAPH AT |        |     |      |    |    |    |     |
| + |               | SON25  | 1.  | 4.10 | 0. | 0. | 0. | .00 |
| + | 3 COMBINED AT | CP40   | 31. | 4.10 | 6. | 1. | 1. | .08 |
|   | ROUTED TO     |        |     |      |    |    |    |     |
| + |               | RSON40 | 31. | 4.13 | 6. | 1. | 1. | .08 |
|   | HYDROGRAPH AT |        |     |      |    |    |    |     |
| + |               | SON45  | 3.  | 4.00 | 0. | 0. | 0. | .00 |
| + | 2 COMBINED AT | CP45   | 32. | 4.10 | 6. | 1. | 1. | .09 |
|   | HYDROGRAPH AT |        |     |      |    |    |    |     |
| + |               | SON40  | 10. | 4.07 | 1. | 0. | 0. | .01 |
|   | ROUTED TO     |        |     |      |    |    |    |     |
| + |               | BASINA | 3.  | 4.37 | 1. | 0. | 0. | .01 |
|   | HYDROGRAPH AT |        |     |      |    |    |    |     |
| + |               | SON50  | 3.  | 4.00 | 0. | 0. | 0. | .00 |
| + | 2 COMBINED AT | CP50   | 4.  | 4.03 | 1. | 0. | 0. | .01 |
|   | HYDROGRAPH AT |        |     |      |    |    |    |     |
| + |               | SON55  | 3.  | 4.00 | 0. | 0. | 0. | .00 |
|   | HYDROGRAPH AT |        |     |      |    |    |    |     |
| + |               | SON60  | 1.  | 4.03 | 0. | 0. | 0. | .00 |
|   | HYDROGRAPH AT |        |     |      |    |    |    |     |
| + |               | SON05  | 1.  | 4.07 | 0. | 0. | 0. | .00 |

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

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*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 08OCT19 TIME 10:00:17
*
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**PROPOSED 10-YEAR**

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*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****
    
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

| LINE | ID | 1   | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9     | 10    |
|------|----|---|---------|---------|---------|---------|---------|---------|---------|-------|-------|
| 1    | ID | Flood Control District of Maricopa County     |         |         |         |         |         |         |         |       |       |
| 2    | ID | HVR & ALMA SCHOOL-PR - HVR AND ALMA SCHOOL-PR |         |         |         |         |         |         |         |       |       |
| 3    | ID | 10 YEAR                                       |         |         |         |         |         |         |         |       |       |
| 4    | ID | 6 Hour Storm                                  |         |         |         |         |         |         |         |       |       |
| 5    | ID | Unit Hydrograph: Clark                        |         |         |         |         |         |         |         |       |       |
| 6    | ID | Storm: Multiple                               |         |         |         |         |         |         |         |       |       |
| 7    | ID | 10/02/2019                                    |         |         |         |         |         |         |         |       |       |
| 8    | IT | 2   | 1JAN99  | 0       | 2000    |         |         |         |         |       |       |
| 9    | IO | 5   |         |         |         |         |         |         |         |       |       |
| 10   | IN | 15  |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 11   | JD | 2.033   | 0.0001  |         |         |         |         |         |         |       |       |
| 12   | PC | 0.000   | 0.008   | 0.016   | 0.025   | 0.033   | 0.041   | 0.050   | 0.058   | 0.066 | 0.074 |
| 13   | PC | 0.087   | 0.099   | 0.118   | 0.138   | 0.216   | 0.377   | 0.834   | 0.911   | 0.931 | 0.950 |
| 14   | PC | 0.962   | 0.972   | 0.983   | 0.991   | 1.000   |         |         |         |       |       |
| 15   | JD | 2.021   | 0.5000  |         |         |         |         |         |         |       |       |
| 16   | PC | 0.000   | 0.008   | 0.016   | 0.025   | 0.033   | 0.041   | 0.050   | 0.058   | 0.066 | 0.074 |
| 17   | PC | 0.087   | 0.099   | 0.118   | 0.138   | 0.216   | 0.377   | 0.834   | 0.911   | 0.931 | 0.950 |
| 18   | PC | 0.962   | 0.972   | 0.983   | 0.991   | 1.000   |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 19   | KK | SOFF20  | BASIN   |         |         |         |         |         |         |       |       |
| 20   | BA | 0.038   |         |         |         |         |         |         |         |       |       |
| 21   | LG | 0.25  | 0.17    | 6.76    | 0.16    | 20      |         |         |         |       |       |
| 22   | UC | 0.461   | 0.802   |         |         |         |         |         |         |       |       |
| 23   | UA | 0   | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0  | 97.0  |
| 24   | UA | 100   |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 25   | KK | ROFF20  | ROUTE   |         |         |         |         |         |         |       |       |
| 26   | RS | 1   | FLOW    |         |         |         |         |         |         |       |       |
| 27   | RC | 0.035   | 0.035   | 0.035   | 41      | 0.9699  |         |         |         |       |       |
| 28   | RX | 0.00  | 3.90    | 21.40   | 25.80   | 28.90   | 34.70   | 39.00   | 41.40   |       |       |
| 29   | RY | 2375.5  | 2374.98 | 2373.33 | 2373.18 | 2371.85 | 2373.26 | 2373.41 | 2373.61 |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 30   | KK | SOFF15  | BASIN   |         |         |         |         |         |         |       |       |
| 31   | BA | 0.014   |         |         |         |         |         |         |         |       |       |
| 32   | LG | 0.24  | 0.16    | 7.94    | 0.10    | 24      |         |         |         |       |       |
| 33   | UC | 0.241   | 0.417   |         |         |         |         |         |         |       |       |
| 34   | UA | 0   | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0  | 97.0  |
| 35   | UA | 100   |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 36   | KK | CP15  | COMBINE |         |         |         |         |         |         |       |       |
| 37   | HC | 2   |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 38   | KK | ROFF15  | ROUTE   |         |         |         |         |         |         |       |       |
| 39   | RS | 1   | FLOW    |         |         |         |         |         |         |       |       |
| 40   | RC | 0.035   | 0.035   | 0.035   | 86      | 0.0320  |         |         |         |       |       |
| 41   | RX | 0.00  | 3.60    | 19.60   | 38.80   | 44.80   | 48.00   | 55.10   | 86.00   |       |       |
| 42   | RY | 2362.0  | 2361.80 | 2359.82 | 2359.05 | 2357.41 | 2357.32 | 2360.24 | 2363.00 |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |

1 HEC-1 INPUT PAGE 2

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

|    |    |        |         |         |         |         |         |         |         |         |      |
|----|----|--------|---------|---------|---------|---------|---------|---------|---------|---------|------|
| 43 | KK | SOFF05 | BASIN   |         |         |         |         |         |         |         |      |
| 44 | BA | 0.011  |         |         |         |         |         |         |         |         |      |
| 45 | LG | 0.29   | 0.16    | 7.94    | 0.09    | 7       |         |         |         |         |      |
| 46 | UC | 0.163  | 0.178   |         |         |         |         |         |         |         |      |
| 47 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0    | 97.0 |
| 48 | UA | 100    |         |         |         |         |         |         |         |         |      |
|    | *  |        |         |         |         |         |         |         |         |         |      |
| 49 | KK | SON10  | BASIN   |         |         |         |         |         |         |         |      |
| 50 | BA | 0.003  |         |         |         |         |         |         |         |         |      |
| 51 | LG | 0.25   | 0.26    | 7.94    | 0.08    | 28      |         |         |         |         |      |
| 52 | UC | 0.251  | 0.346   |         |         |         |         |         |         |         |      |
| 53 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0    | 97.0 |
| 54 | UA | 100    |         |         |         |         |         |         |         |         |      |
|    | *  |        |         |         |         |         |         |         |         |         |      |
| 55 | KK | CP20   | COMBINE |         |         |         |         |         |         |         |      |
| 56 | HC | 3      |         |         |         |         |         |         |         |         |      |
|    | *  |        |         |         |         |         |         |         |         |         |      |
| 57 | KK | RSON20 | ROUTE   |         |         |         |         |         |         |         |      |
| 58 | RS | 1      | FLOW    |         |         |         |         |         |         |         |      |
| 59 | RC | 0.035  | 0.035   | 0.035   | 52      | 0.0422  |         |         |         |         |      |
| 60 | RX | 0.00   | 16.40   | 22.50   | 26.70   | 27.90   | 32.60   | 51.20   | 52.40   |         |      |
| 61 | RY | 2353.8 | 2351.69 | 2351.59 | 2348.34 | 2348.39 | 2351.27 | 2352.25 | 2352.43 |         |      |
|    | *  |        |         |         |         |         |         |         |         |         |      |
| 62 | KK | SON15  | BASIN   |         |         |         |         |         |         |         |      |
| 63 | BA | 0.008  |         |         |         |         |         |         |         |         |      |
| 64 | LG | 0.30   | 0.15    | 7.94    | 0.09    | 5       |         |         |         |         |      |
| 65 | UC | 0.136  | 0.109   |         |         |         |         |         |         |         |      |
| 66 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0    | 97.0 |
| 67 | UA | 100    |         |         |         |         |         |         |         |         |      |
|    | *  |        |         |         |         |         |         |         |         |         |      |
| 68 | KK | BASINB | STORAGE |         |         |         |         |         |         |         |      |
| 69 | KO |        |         |         |         |         |         |         |         |         |      |
| 70 | RS | 1      | STOR    |         |         |         |         |         |         |         |      |
| 71 | SA | 0.1    | 0.2     | 0.2     | 0.3     | 0.3     | 0.3     | 0.3     | 0.3     | 0.3     |      |
| 72 | SQ |        | 0.47    | 1.06    | 1.42    | 4.99    | 14.34   | 26.73   | 41.72   | 59.03   |      |
| 73 | SE | 2337.0 | 2338.00 | 2339.00 | 2340.00 | 2340.10 | 2340.20 | 2340.30 | 2340.40 | 2340.50 |      |
|    | *  |        |         |         |         |         |         |         |         |         |      |
| 74 | KK | SON20  | BASIN   |         |         |         |         |         |         |         |      |
| 75 | BA | 0.001  |         |         |         |         |         |         |         |         |      |
| 76 | LG | 0.30   | 0.15    | 7.94    | 0.09    | 5       |         |         |         |         |      |
| 77 | UC | 0.092  | 0.141   |         |         |         |         |         |         |         |      |
| 78 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0    | 97.0 |
| 79 | UA | 100    |         |         |         |         |         |         |         |         |      |
|    | *  |        |         |         |         |         |         |         |         |         |      |

1

HEC-1 INPUT

PAGE 3

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

|     |    |        |         |         |         |         |         |         |         |      |      |
|-----|----|--------|---------|---------|---------|---------|---------|---------|---------|------|------|
| 80  | KK | CP25   | COMBINE |         |         |         |         |         |         |      |      |
| 81  | HC | 3      |         |         |         |         |         |         |         |      |      |
|     | *  |        |         |         |         |         |         |         |         |      |      |
| 82  | KK | RSON25 | ROUTE   |         |         |         |         |         |         |      |      |
| 83  | RS | 1      | FLOW    |         |         |         |         |         |         |      |      |
| 84  | RC | 0.035  | 0.035   | 0.035   | 51      | 0.0249  |         |         |         |      |      |
| 85  | RX | 0.00   | 10.60   | 21.50   | 24.40   | 27.90   | 31.40   | 40.40   | 50.70   |      |      |
| 86  | RY | 2335.3 | 2334.78 | 2334.43 | 2332.76 | 2332.98 | 2333.97 | 2334.54 | 2334.37 |      |      |
|     | *  |        |         |         |         |         |         |         |         |      |      |
| 87  | KK | SON30  | BASIN   |         |         |         |         |         |         |      |      |
| 88  | BA | 0.003  |         |         |         |         |         |         |         |      |      |
| 89  | LG | 0.32   | 0.20    | 7.94    | 0.08    | 3       |         |         |         |      |      |
| 90  | UC | 0.136  | 0.175   |         |         |         |         |         |         |      |      |
| 91  | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 92  | UA | 100    |         |         |         |         |         |         |         |      |      |
|     | *  |        |         |         |         |         |         |         |         |      |      |
| 93  | KK | RSON30 | ROUTE   |         |         |         |         |         |         |      |      |
| 94  | RS | 1      | FLOW    |         |         |         |         |         |         |      |      |
| 95  | RC | 0.035  | 0.035   | 0.020   | 22      | 0.0117  |         |         |         |      |      |
| 96  | RX | 0.00   | 3.60    | 9.10    | 13.00   | 13.30   | 14.40   | 19.70   | 21.70   |      |      |
| 97  | RY | 2359.9 | 2359.95 | 2359.31 | 2358.86 | 1358.89 | 2359.16 | 2360.49 | 2360.49 |      |      |
|     | *  |        |         |         |         |         |         |         |         |      |      |
| 98  | KK | SON35  | BASIN   |         |         |         |         |         |         |      |      |
| 99  | BA | 0.001  |         |         |         |         |         |         |         |      |      |
| 100 | LG | 0.32   | 0.21    | 7.94    | 0.08    | 3       |         |         |         |      |      |
| 101 | UC | 0.217  | 0.366   |         |         |         |         |         |         |      |      |
| 102 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 103 | UA | 100    |         |         |         |         |         |         |         |      |      |
|     | *  |        |         |         |         |         |         |         |         |      |      |
| 104 | KK | CP35   | COMBINE |         |         |         |         |         |         |      |      |
| 105 | HC | 2      |         |         |         |         |         |         |         |      |      |
|     | *  |        |         |         |         |         |         |         |         |      |      |
| 106 | KK | RSON35 | ROUTE   |         |         |         |         |         |         |      |      |

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1/28/2020

|     |    |        |         |         |         |         |         |         |         |      |
|-----|----|--------|---------|---------|---------|---------|---------|---------|---------|------|
| 107 | RS | 1      | FLOW    |         |         |         |         |         |         |      |
| 108 | RC | 0.035  | 0.035   | 0.035   | 51      | 0.0570  |         |         |         |      |
| 109 | RX | 7.20   | 14.80   | 16.60   | 21.20   | 32.40   | 46.10   | 49.40   | 51.20   |      |
| 110 | RY | 2350.4 | 2349.76 | 2349.78 | 2349.45 | 2348.17 | 2349.63 | 2350.43 | 2350.88 |      |
|     | *  |        |         |         |         |         |         |         |         |      |
| 111 | KK | SON25  | BASIN   |         |         |         |         |         |         |      |
| 112 | BA | 0.003  |         |         |         |         |         |         |         |      |
| 113 | LG | 0.35   | 0.29    | 7.94    | 0.08    | 1       |         |         |         |      |
| 114 | UC | 0.189  | 0.273   |         |         |         |         |         |         |      |
| 115 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 97.0 |
| 116 | UA | 100    |         |         |         |         |         |         |         |      |
|     | *  |        |         |         |         |         |         |         |         |      |

1

HEC-1 INPUT

PAGE 4

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

|     |    |        |         |         |         |         |         |         |         |  |
|-----|----|--------|---------|---------|---------|---------|---------|---------|---------|--|
| 117 | KK | CP40   | COMBINE |         |         |         |         |         |         |  |
| 118 | HC | 3      |         |         |         |         |         |         |         |  |
|     | *  |        |         |         |         |         |         |         |         |  |
| 119 | KK | RSON40 | ROUTE   |         |         |         |         |         |         |  |
| 120 | RS | 1      | FLOW    |         |         |         |         |         |         |  |
| 121 | RC | 0.020  | 0.020   | 0.020   | 71      | 0.0174  |         |         |         |  |
| 122 | RX | 0.00   | 17.40   | 19.80   | 32.80   | 45.80   | 48.00   | 58.50   | 70.70   |  |
| 123 | RY | 2326.0 | 2326.00 | 2325.00 | 2322.89 | 2324.00 | 2325.00 | 2325.00 | 2325.00 |  |
|     | *  |        |         |         |         |         |         |         |         |  |

|     |    |       |       |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|
| 124 | KK | SON45 | BASIN |      |      |      |      |      |      |      |
| 125 | BA | 0.002 |       |      |      |      |      |      |      |      |
| 126 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |
| 127 | UC | 0.074 | 0.054 |      |      |      |      |      |      |      |
| 128 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 97.0 |
| 129 | UA | 100   |       |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |

|     |    |      |         |  |  |  |  |  |  |  |
|-----|----|------|---------|--|--|--|--|--|--|--|
| 130 | KK | CP45 | COMBINE |  |  |  |  |  |  |  |
| 131 | HC | 2    |         |  |  |  |  |  |  |  |
|     | *  |      |         |  |  |  |  |  |  |  |

|     |    |       |       |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|
| 132 | KK | SON40 | BASIN |      |      |      |      |      |      |      |
| 133 | BA | 0.012 |       |      |      |      |      |      |      |      |
| 134 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |
| 135 | UC | 0.163 | 0.162 |      |      |      |      |      |      |      |
| 136 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 97.0 |
| 137 | UA | 100   |       |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |

|     |    |        |         |         |         |         |         |         |         |         |
|-----|----|--------|---------|---------|---------|---------|---------|---------|---------|---------|
| 138 | KK | BASINA | STORAGE |         |         |         |         |         |         |         |
| 139 | KO |        |         |         |         |         |         |         |         |         |
| 140 | RS | 1      | STOR    |         |         |         |         |         |         |         |
| 141 | SA | 0.1    | 0.2     | 0.2     | 0.3     | 0.3     | 0.3     | 0.3     | 0.3     | 0.3     |
| 142 | SQ |        | 3.00    | 5.00    | 6.00    | 7.00    | 16.00   | 30.00   | 47.00   | 67.00   |
| 143 | SE | 2320.0 | 2321.00 | 2322.00 | 2323.00 | 2323.10 | 2323.20 | 2323.30 | 2323.40 | 2323.50 |
|     | *  |        |         |         |         |         |         |         |         |         |

|     |    |       |       |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|
| 144 | KK | SON50 | BASIN |      |      |      |      |      |      |      |
| 145 | BA | 0.002 |       |      |      |      |      |      |      |      |
| 146 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |
| 147 | UC | 0.072 | 0.053 |      |      |      |      |      |      |      |
| 148 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 97.0 |
| 149 | UA | 100   |       |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |

|     |    |      |         |  |  |  |  |  |  |  |
|-----|----|------|---------|--|--|--|--|--|--|--|
| 150 | KK | CP50 | COMBINE |  |  |  |  |  |  |  |
| 151 | HC | 2    |         |  |  |  |  |  |  |  |
|     | *  |      |         |  |  |  |  |  |  |  |

1

HEC-1 INPUT

PAGE 5

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

|     |    |       |       |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|
| 152 | KK | SON55 | BASIN |      |      |      |      |      |      |      |
| 153 | BA | 0.002 |       |      |      |      |      |      |      |      |
| 154 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |
| 155 | UC | 0.070 | 0.051 |      |      |      |      |      |      |      |
| 156 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 97.0 |
| 157 | UA | 100   |       |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |

|     |    |       |       |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|
| 158 | KK | SON60 | BASIN |      |      |      |      |      |      |      |
| 159 | BA | 0.001 |       |      |      |      |      |      |      |      |
| 160 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |
| 161 | UC | 0.103 | 0.139 |      |      |      |      |      |      |      |
| 162 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 97.0 |
| 163 | UA | 100   |       |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |

|     |    |       |       |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|
| 164 | KK | SON05 | BASIN |      |      |      |      |      |      |      |
| 165 | BA | 0.001 |       |      |      |      |      |      |      |      |
| 166 | LG | 0.23  | 0.19  | 7.94 | 0.08 | 31   |      |      |      |      |
| 167 | UC | 0.161 | 0.151 |      |      |      |      |      |      |      |
| 168 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 97.0 |
| 169 | UA | 100   |       |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |

```

1          170          ZZ
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
LINE      (V) ROUTING      (--->) DIVERSION OR PUMP FLOW
NO.       (.) CONNECTOR   (<---) RETURN OF DIVERTED OR PUMPED FLOW
19        SOFF20
          V
          V
25        ROFF20
          .
          .
30        .          SOFF15
          .          .
          .          .
36        CP15.....
          V
          V
38        ROFF15
          .
          .
43        .          SOFF05
          .          .
          .          .
49        .          .          SON10
          .          .          .
          .          .          .
55        CP20.....
          V
          V
57        RSON20
          .
          .
62        .          SON15
          .          V
          .          V
68        .          BASINB
          .          .
          .          .
74        .          .          SON20
          .          .          .
          .          .          .
80        CP25.....
          V
          V
82        RSON25
          .
          .
87        .          SON30
          .          V
          .          V
93        .          RSON30
          .          .
          .          .
98        .          .          SON35
          .          .          .
          .          .          .
104       .          CP35.....
          .          V
          .          V
106       .          RSON35
          .          .
          .          .
111       .          .          SON25
          .          .          .
          .          .          .
117       CP40.....
          V
          V
119       RSON40
          .
          .
124       .          SON45
          .          .
          .          .
130       CP45.....
          .
          .
132       .          SON40
          .          V
          .          V
138       .          BASINA
          .          .
          .          .
144       .          .          SON50
          .          .          .
          .          .          .
150       .          CP50.....
          .          .
          .          .
152       .          .          SON55
          .          .          .
          .          .          .
158       .          .          .          SON60
    
```





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\*\*\*\*\*  
 \* \*  
 68 KK \* BASINB \* STORAGE  
 \* \*  
 \*\*\*\*\*

69 KO OUTPUT CONTROL VARIABLES  
 IPRNT 5 PRINT CONTROL  
 IPLOT 0 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

\*\*\* \*\*

\*\*\*\*\*  
 \* \*  
 138 KK \* BASINA \* STORAGE  
 \* \*  
 \*\*\*\*\*

139 KO OUTPUT CONTROL VARIABLES  
 IPRNT 5 PRINT CONTROL  
 IPLOT 0 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

1

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

| OPERATION | STATION       | PEAK FLOW | TIME OF PEAK | AVERAGE FLOW FOR MAXIMUM PERIOD |         |         | BASIN AREA | MAXIMUM STAGE | TIME OF MAX STAGE |
|-----------|---------------|-----------|--------------|---------------------------------|---------|---------|------------|---------------|-------------------|
|           |               |           |              | 6-HOUR                          | 24-HOUR | 72-HOUR |            |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | SOFF20        | 22.       | 4.23         | 5.                              | 1.      | 0.      | .04        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | ROFF20        | 22.       | 4.23         | 5.                              | 1.      | 0.      | .04        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SOFF15        | 15.       | 4.10         | 2.                              | 0.      | 0.      | .01        |               |                   |
| +         | 2 COMBINED AT |           |              |                                 |         |         |            |               |                   |
|           | CP15          | 35.       | 4.17         | 7.                              | 2.      | 1.      | .05        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | ROFF15        | 35.       | 4.17         | 7.                              | 2.      | 1.      | .05        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SOFF05        | 18.       | 4.03         | 1.                              | 0.      | 0.      | .01        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON10         | 3.        | 4.10         | 0.                              | 0.      | 0.      | .00        |               |                   |
| +         | 3 COMBINED AT |           |              |                                 |         |         |            |               |                   |
|           | CP20          | 52.       | 4.10         | 8.                              | 2.      | 1.      | .07        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | RSON20        | 52.       | 4.10         | 8.                              | 2.      | 1.      | .07        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON15         | 15.       | 4.03         | 1.                              | 0.      | 0.      | .01        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | BASINB        | 1.        | 4.40         | 1.                              | 0.      | 0.      | .01        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON20         | 2.        | 4.00         | 0.                              | 0.      | 0.      | .00        |               |                   |
| +         | 3 COMBINED AT |           |              |                                 |         |         |            |               |                   |
|           | CP25          | 54.       | 4.10         | 9.                              | 2.      | 1.      | .08        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | RSON25        | 54.       | 4.10         | 9.                              | 2.      | 1.      | .08        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON30         | 5.        | 4.03         | 0.                              | 0.      | 0.      | .00        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | RSON30        | 5.        | 4.03         | 0.                              | 0.      | 0.      | .00        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON35         | 1.        | 4.10         | 0.                              | 0.      | 0.      | .00        |               |                   |

|   |               |        |     |      |     |    |    |     |
|---|---------------|--------|-----|------|-----|----|----|-----|
| + | 2 COMBINED AT | CP35   | 6.  | 4.03 | 0.  | 0. | 0. | .00 |
|   | ROUTED TO     |        |     |      |     |    |    |     |
| + |               | RSON35 | 6.  | 4.07 | 0.  | 0. | 0. | .00 |
|   | HYDROGRAPH AT |        |     |      |     |    |    |     |
| + |               | SON25  | 4.  | 4.07 | 0.  | 0. | 0. | .00 |
| + | 3 COMBINED AT | CP40   | 63. | 4.10 | 10. | 3. | 1. | .08 |
|   | ROUTED TO     |        |     |      |     |    |    |     |
| + |               | RSON40 | 63. | 4.10 | 10. | 3. | 1. | .08 |
|   | HYDROGRAPH AT |        |     |      |     |    |    |     |
| + |               | SON45  | 4.  | 4.00 | 0.  | 0. | 0. | .00 |
| + | 2 COMBINED AT | CP45   | 65. | 4.07 | 10. | 3. | 1. | .08 |
|   | HYDROGRAPH AT |        |     |      |     |    |    |     |
| + |               | SON40  | 20. | 4.03 | 1.  | 0. | 0. | .01 |
|   | ROUTED TO     |        |     |      |     |    |    |     |
| + |               | BASINA | 5.  | 4.33 | 1.  | 0. | 0. | .01 |
|   | HYDROGRAPH AT |        |     |      |     |    |    |     |
| + |               | SON50  | 4.  | 4.00 | 0.  | 0. | 0. | .00 |
| + | 2 COMBINED AT | CP50   | 8.  | 4.00 | 2.  | 0. | 0. | .01 |
|   | HYDROGRAPH AT |        |     |      |     |    |    |     |
| + |               | SON55  | 4.  | 4.00 | 0.  | 0. | 0. | .00 |
|   | HYDROGRAPH AT |        |     |      |     |    |    |     |
| + |               | SON60  | 2.  | 4.03 | 0.  | 0. | 0. | .00 |
|   | HYDROGRAPH AT |        |     |      |     |    |    |     |
| + |               | SON05  | 2.  | 4.03 | 0.  | 0. | 0. | .00 |

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

```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
* RUN DATE 08OCT19 TIME 10:00:24
*
*****
    
```

**PROPOSED 100-YEAR**

```

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

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X X XXXXXXX XXXXX X
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```

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

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

1 HEC-1 INPUT PAGE 1

| LINE | ID | 1   | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9     | 10    |
|------|----|---|---------|---------|---------|---------|---------|---------|---------|-------|-------|
| 1    | ID | Flood Control District of Maricopa County     |         |         |         |         |         |         |         |       |       |
| 2    | ID | HVR & ALMA SCHOOL-PR - HVR AND ALMA SCHOOL-PR |         |         |         |         |         |         |         |       |       |
| 3    | ID | 100 YEAR                                      |         |         |         |         |         |         |         |       |       |
| 4    | ID | 6 Hour Storm                                  |         |         |         |         |         |         |         |       |       |
| 5    | ID | Unit Hydrograph: Clark                        |         |         |         |         |         |         |         |       |       |
| 6    | ID | Storm: Multiple                               |         |         |         |         |         |         |         |       |       |
| 7    | ID | 10/02/2019                                    |         |         |         |         |         |         |         |       |       |
| 8    | IT | 2   | 1JAN99  | 0       | 2000    |         |         |         |         |       |       |
| 9    | IO | 5   |         |         |         |         |         |         |         |       |       |
| 10   | IN | 15  |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 11   | JD | 3.078   | 0.0001  |         |         |         |         |         |         |       |       |
| 12   | PC | 0.000   | 0.008   | 0.016   | 0.025   | 0.033   | 0.041   | 0.050   | 0.058   | 0.066 | 0.074 |
| 13   | PC | 0.087   | 0.099   | 0.118   | 0.138   | 0.216   | 0.377   | 0.834   | 0.911   | 0.931 | 0.950 |
| 14   | PC | 0.962   | 0.972   | 0.983   | 0.991   | 1.000   |         |         |         |       |       |
| 15   | JD | 3.060   | 0.5000  |         |         |         |         |         |         |       |       |
| 16   | PC | 0.000   | 0.008   | 0.016   | 0.025   | 0.033   | 0.041   | 0.050   | 0.058   | 0.066 | 0.074 |
| 17   | PC | 0.087   | 0.099   | 0.118   | 0.138   | 0.216   | 0.377   | 0.834   | 0.911   | 0.931 | 0.950 |
| 18   | PC | 0.962   | 0.972   | 0.983   | 0.991   | 1.000   |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 19   | KK | SOFF20  | BASIN   |         |         |         |         |         |         |       |       |
| 20   | BA | 0.038   |         |         |         |         |         |         |         |       |       |
| 21   | LG | 0.25  | 0.17    | 6.76    | 0.16    | 20      |         |         |         |       |       |
| 22   | UC | 0.369   | 0.627   |         |         |         |         |         |         |       |       |
| 23   | UA | 0   | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0  | 97.0  |
| 24   | UA | 100   |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 25   | KK | ROFF20  | ROUTE   |         |         |         |         |         |         |       |       |
| 26   | RS | 1   | FLOW    |         |         |         |         |         |         |       |       |
| 27   | RC | 0.035   | 0.035   | 0.035   | 41      | 0.9699  |         |         |         |       |       |
| 28   | RX | 0.00  | 3.90    | 21.40   | 25.80   | 28.90   | 34.70   | 39.00   | 41.40   |       |       |
| 29   | RY | 2375.5  | 2374.98 | 2373.33 | 2373.18 | 2371.85 | 2373.26 | 2373.41 | 2373.61 |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 30   | KK | SOFF15  | BASIN   |         |         |         |         |         |         |       |       |
| 31   | BA | 0.014   |         |         |         |         |         |         |         |       |       |
| 32   | LG | 0.24  | 0.16    | 7.94    | 0.10    | 24      |         |         |         |       |       |
| 33   | UC | 0.197   | 0.334   |         |         |         |         |         |         |       |       |
| 34   | UA | 0   | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0  | 97.0  |
| 35   | UA | 100   |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 36   | KK | CP15  | COMBINE |         |         |         |         |         |         |       |       |
| 37   | HC | 2   |         |         |         |         |         |         |         |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |
| 38   | KK | ROFF15  | ROUTE   |         |         |         |         |         |         |       |       |
| 39   | RS | 1   | FLOW    |         |         |         |         |         |         |       |       |
| 40   | RC | 0.035   | 0.035   | 0.035   | 86      | 0.0320  |         |         |         |       |       |
| 41   | RX | 0.00  | 3.60    | 19.60   | 38.80   | 44.80   | 48.00   | 55.10   | 86.00   |       |       |
| 42   | RY | 2362.0  | 2361.80 | 2359.82 | 2359.05 | 2357.41 | 2357.32 | 2360.24 | 2363.00 |       |       |
|      | *  |   |         |         |         |         |         |         |         |       |       |

1 HEC-1 INPUT PAGE 2

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



|     |    |        |         |         |         |         |         |         |         |      |      |
|-----|----|--------|---------|---------|---------|---------|---------|---------|---------|------|------|
| 107 | RS | 1      | FLOW    |         |         |         |         |         |         |      |      |
| 108 | RC | 0.035  | 0.035   | 0.035   | 51      | 0.0570  |         |         |         |      |      |
| 109 | RX | 7.20   | 14.80   | 16.60   | 21.20   | 32.40   | 46.10   | 49.40   | 51.20   |      |      |
| 110 | RY | 2350.4 | 2349.76 | 2349.78 | 2349.45 | 2348.17 | 2349.63 | 2350.43 | 2350.88 |      |      |
|     | *  |        |         |         |         |         |         |         |         |      |      |
| 111 | KK | SON25  | BASIN   |         |         |         |         |         |         |      |      |
| 112 | BA | 0.003  |         |         |         |         |         |         |         |      |      |
| 113 | LG | 0.35   | 0.29    | 7.94    | 0.08    | 1       |         |         |         |      |      |
| 114 | UC | 0.147  | 0.207   |         |         |         |         |         |         |      |      |
| 115 | UA | 0      | 5.0     | 16.0    | 30.0    | 65.0    | 77.0    | 84.0    | 90.0    | 94.0 | 97.0 |
| 116 | UA | 100    |         |         |         |         |         |         |         |      |      |
|     | *  |        |         |         |         |         |         |         |         |      |      |

1

HEC-1 INPUT

PAGE 4

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

|     |    |        |         |         |         |         |         |         |         |  |  |
|-----|----|--------|---------|---------|---------|---------|---------|---------|---------|--|--|
| 117 | KK | CP40   | COMBINE |         |         |         |         |         |         |  |  |
| 118 | HC | 3      |         |         |         |         |         |         |         |  |  |
|     | *  |        |         |         |         |         |         |         |         |  |  |
| 119 | KK | RSON40 | ROUTE   |         |         |         |         |         |         |  |  |
| 120 | RS | 1      | FLOW    |         |         |         |         |         |         |  |  |
| 121 | RC | 0.020  | 0.020   | 0.020   | 71      | 0.0174  |         |         |         |  |  |
| 122 | RX | 0.00   | 17.40   | 19.80   | 32.80   | 45.80   | 48.00   | 58.50   | 70.70   |  |  |
| 123 | RY | 2326.0 | 2326.00 | 2325.00 | 2322.89 | 2324.00 | 2325.00 | 2325.00 | 2325.00 |  |  |
|     | *  |        |         |         |         |         |         |         |         |  |  |

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 124 | KK | SON45 | BASIN |      |      |      |      |      |      |      |      |
| 125 | BA | 0.002 |       |      |      |      |      |      |      |      |      |
| 126 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |      |
| 127 | UC | 0.060 | 0.043 |      |      |      |      |      |      |      |      |
| 128 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 129 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

|     |    |      |         |  |  |  |  |  |  |  |  |
|-----|----|------|---------|--|--|--|--|--|--|--|--|
| 130 | KK | CP45 | COMBINE |  |  |  |  |  |  |  |  |
| 131 | HC | 2    |         |  |  |  |  |  |  |  |  |
|     | *  |      |         |  |  |  |  |  |  |  |  |

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 132 | KK | SON40 | BASIN |      |      |      |      |      |      |      |      |
| 133 | BA | 0.012 |       |      |      |      |      |      |      |      |      |
| 134 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |      |
| 135 | UC | 0.131 | 0.128 |      |      |      |      |      |      |      |      |
| 136 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 137 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

|     |    |        |         |         |         |         |         |         |         |         |     |
|-----|----|--------|---------|---------|---------|---------|---------|---------|---------|---------|-----|
| 138 | KK | BASINA | STORAGE |         |         |         |         |         |         |         |     |
| 139 | KO |        |         |         |         |         |         |         |         |         |     |
| 140 | RS | 1      | STOR    |         |         |         |         |         |         |         |     |
| 141 | SA | 0.1    | 0.2     | 0.2     | 0.3     | 0.3     | 0.3     | 0.3     | 0.3     | 0.3     | 0.3 |
| 142 | SQ |        | 3.00    | 5.00    | 6.00    | 7.00    | 16.00   | 30.00   | 47.00   | 67.00   |     |
| 143 | SE | 2320.0 | 2321.00 | 2322.00 | 2323.00 | 2323.10 | 2323.20 | 2323.30 | 2323.40 | 2323.50 |     |
|     | *  |        |         |         |         |         |         |         |         |         |     |

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 144 | KK | SON50 | BASIN |      |      |      |      |      |      |      |      |
| 145 | BA | 0.002 |       |      |      |      |      |      |      |      |      |
| 146 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |      |
| 147 | UC | 0.058 | 0.042 |      |      |      |      |      |      |      |      |
| 148 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 149 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

|     |    |      |         |  |  |  |  |  |  |  |  |
|-----|----|------|---------|--|--|--|--|--|--|--|--|
| 150 | KK | CP50 | COMBINE |  |  |  |  |  |  |  |  |
| 151 | HC | 2    |         |  |  |  |  |  |  |  |  |
|     | *  |      |         |  |  |  |  |  |  |  |  |

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HEC-1 INPUT

PAGE 5

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

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 152 | KK | SON55 | BASIN |      |      |      |      |      |      |      |      |
| 153 | BA | 0.002 |       |      |      |      |      |      |      |      |      |
| 154 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |      |
| 155 | UC | 0.056 | 0.040 |      |      |      |      |      |      |      |      |
| 156 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 157 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 158 | KK | SON60 | BASIN |      |      |      |      |      |      |      |      |
| 159 | BA | 0.001 |       |      |      |      |      |      |      |      |      |
| 160 | LG | 0.30  | 0.15  | 7.94 | 0.09 | 5    |      |      |      |      |      |
| 161 | UC | 0.083 | 0.109 |      |      |      |      |      |      |      |      |
| 162 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 163 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

|     |    |       |       |      |      |      |      |      |      |      |      |
|-----|----|-------|-------|------|------|------|------|------|------|------|------|
| 164 | KK | SON05 | BASIN |      |      |      |      |      |      |      |      |
| 165 | BA | 0.001 |       |      |      |      |      |      |      |      |      |
| 166 | LG | 0.23  | 0.19  | 7.94 | 0.08 | 31   |      |      |      |      |      |
| 167 | UC | 0.133 | 0.122 |      |      |      |      |      |      |      |      |
| 168 | UA | 0     | 5.0   | 16.0 | 30.0 | 65.0 | 77.0 | 84.0 | 90.0 | 94.0 | 97.0 |
| 169 | UA | 100   |       |      |      |      |      |      |      |      |      |
|     | *  |       |       |      |      |      |      |      |      |      |      |

```

1          170          ZZ
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
LINE   (V) ROUTING      (--->) DIVERSION OR PUMP FLOW
NO.    (.) CONNECTOR   (<---) RETURN OF DIVERTED OR PUMPED FLOW
19     SOFF20
      V
      V
25     ROFF20
      .
      .
30     .      SOFF15
      .      .
      .      .
36     CP15.....
      V
      V
38     ROFF15
      .
      .
43     .      SOFF05
      .      .
      .      .
49     .      .      SON10
      .      .      .
      .      .      .
55     CP20.....
      V
      V
57     RSON20
      .
      .
62     .      SON15
      .      V
      .      V
68     .      BASINB
      .      .
      .      .
74     .      .      SON20
      .      .      .
      .      .      .
80     CP25.....
      V
      V
82     RSON25
      .
      .
87     .      SON30
      .      V
      .      V
93     .      RSON30
      .      .
      .      .
98     .      .      SON35
      .      .      .
      .      .      .
104    .      CP35.....
      .      V
      .      V
106    .      RSON35
      .      .
      .      .
111    .      .      SON25
      .      .      .
      .      .      .
117    CP40.....
      V
      V
119    RSON40
      .
      .
124    .      SON45
      .      .
      .      .
130    CP45.....
      .
      .
132    .      SON40
      .      V
      .      V
138    .      BASINA
      .      .
      .      .
144    .      .      SON50
      .      .      .
      .      .      .
150    .      CP50.....
      .      .
      .      .
152    .      .      SON55
      .      .      .
      .      .      .
158    .      .      .      SON60
    
```

164 : : : : SON05

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

\*\*\*\*\*  
\* FLOOD HYDROGRAPH PACKAGE (HEC-1) \*  
\* JUN 1998 \*  
\* VERSION 4.1 \*  
\* RUN DATE 08OCT19 TIME 10:00:24 \*  
\*\*\*\*\*

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

Flood Control District of Maricopa County  
HVR & ALMA SCHOOL-PR - HVR AND ALMA SCHOOL-PR  
100 YEAR  
6 Hour Storm  
Unit Hydrograph: Clark  
Storm: Multiple  
10/02/2019

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

IT HYDROGRAPH TIME DATA  
NMIN 2 MINUTES IN COMPUTATION INTERVAL  
IDATE 1JAN99 STARTING DATE  
ITIME 0000 STARTING TIME  
NQ 2000 NUMBER OF HYDROGRAPH ORDINATES  
NDDATE 3JAN99 ENDING DATE  
NDTIME 1838 ENDING TIME  
ICENT 19 CENTURY MARK  
  
COMPUTATION INTERVAL .03 HOURS  
TOTAL TIME BASE 66.63 HOURS

ENGLISH UNITS  
DRAINAGE AREA SQUARE MILES  
PRECIPITATION DEPTH INCHES  
LENGTH, ELEVATION FEET  
FLOW CUBIC FEET PER SECOND  
STORAGE VOLUME ACRE-Feet  
SURFACE AREA ACRES  
TEMPERATURE DEGREES FAHRENHEIT

11 JD INDEX STORM NO. 1  
STRM 3.08 PRECIPITATION DEPTH  
TRDA .00 TRANSPOSITION DRAINAGE AREA

12 PI PRECIPITATION PATTERN  
.00 .00 .00 .00 .00 .00 .00 .00 .00 .00  
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.00 .00 .00 .00 .00 .00 .00 .00 .00 .00

15 JD INDEX STORM NO. 2  
STRM 3.06 PRECIPITATION DEPTH  
TRDA .50 TRANSPOSITION DRAINAGE AREA

16 PI PRECIPITATION PATTERN  
.00 .00 .00 .00 .00 .00 .00 .00 .00 .00  
.00 .00 .00 .00 .00 .00 .00 .00 .00 .00  
.00 .00 .00 .00 .00 .00 .00 .00 .00 .00  
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\*\*\*\*\*  
 \* \*  
 68 KK \* BASINB \* STORAGE  
 \* \*  
 \*\*\*\*\*

69 KO OUTPUT CONTROL VARIABLES  
 IPRNT 5 PRINT CONTROL  
 IPLOT 0 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

\*\*\* \*\*

\*\*\*\*\*  
 \* \*  
 138 KK \* BASINA \* STORAGE  
 \* \*  
 \*\*\*\*\*

139 KO OUTPUT CONTROL VARIABLES  
 IPRNT 5 PRINT CONTROL  
 IPLOT 0 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

1

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

| OPERATION | STATION       | PEAK FLOW | TIME OF PEAK | AVERAGE FLOW FOR MAXIMUM PERIOD |         |         | BASIN AREA | MAXIMUM STAGE | TIME OF MAX STAGE |
|-----------|---------------|-----------|--------------|---------------------------------|---------|---------|------------|---------------|-------------------|
|           |               |           |              | 6-HOUR                          | 24-HOUR | 72-HOUR |            |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | SOFF20        | 46.       | 4.17         | 8.                              | 2.      | 1.      | .04        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | ROFF20        | 46.       | 4.17         | 8.                              | 2.      | 1.      | .04        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SOFF15        | 28.       | 4.07         | 3.                              | 1.      | 0.      | .01        |               |                   |
| +         | 2 COMBINED AT |           |              |                                 |         |         |            |               |                   |
|           | CP15          | 71.       | 4.13         | 12.                             | 3.      | 1.      | .05        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | ROFF15        | 71.       | 4.13         | 12.                             | 3.      | 1.      | .05        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SOFF05        | 31.       | 4.03         | 2.                              | 1.      | 0.      | .01        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON10         | 6.        | 4.07         | 1.                              | 0.      | 0.      | .00        |               |                   |
| +         | 3 COMBINED AT |           |              |                                 |         |         |            |               |                   |
|           | CP20          | 103.      | 4.07         | 15.                             | 4.      | 1.      | .07        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | RSON20        | 103.      | 4.07         | 15.                             | 4.      | 1.      | .07        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON15         | 25.       | 4.00         | 2.                              | 0.      | 0.      | .01        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | BASINB        | 12.       | 4.13         | 1.                              | 0.      | 0.      | .01        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON20         | 3.        | 4.00         | 0.                              | 0.      | 0.      | .00        |               |                   |
| +         | 3 COMBINED AT |           |              |                                 |         |         |            |               |                   |
|           | CP25          | 112.      | 4.10         | 16.                             | 4.      | 1.      | .08        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | RSON25        | 112.      | 4.13         | 16.                             | 4.      | 1.      | .08        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON30         | 9.        | 4.03         | 1.                              | 0.      | 0.      | .00        |               |                   |
| +         | ROUTED TO     |           |              |                                 |         |         |            |               |                   |
|           | RSON30        | 9.        | 4.03         | 1.                              | 0.      | 0.      | .00        |               |                   |
| +         | HYDROGRAPH AT |           |              |                                 |         |         |            |               |                   |
|           | SON35         | 2.        | 4.10         | 0.                              | 0.      | 0.      | .00        |               |                   |



|   |               |        |      |      |     |    |    |     |
|---|---------------|--------|------|------|-----|----|----|-----|
| + | 2 COMBINED AT | CP35   | 10.  | 4.03 | 1.  | 0. | 0. | .00 |
|   | ROUTED TO     |        |      |      |     |    |    |     |
| + |               | RSON35 | 10.  | 4.03 | 1.  | 0. | 0. | .00 |
|   | HYDROGRAPH AT |        |      |      |     |    |    |     |
| + |               | SON25  | 7.   | 4.03 | 1.  | 0. | 0. | .00 |
| + | 3 COMBINED AT | CP40   | 126. | 4.10 | 17. | 5. | 2. | .08 |
|   | ROUTED TO     |        |      |      |     |    |    |     |
| + |               | RSON40 | 126. | 4.10 | 17. | 5. | 2. | .08 |
|   | HYDROGRAPH AT |        |      |      |     |    |    |     |
| + |               | SON45  | 7.   | 4.00 | 0.  | 0. | 0. | .00 |
| + | 2 COMBINED AT | CP45   | 128. | 4.10 | 18. | 5. | 2. | .08 |
|   | HYDROGRAPH AT |        |      |      |     |    |    |     |
| + |               | SON40  | 35.  | 4.03 | 3.  | 1. | 0. | .01 |
|   | ROUTED TO     |        |      |      |     |    |    |     |
| + |               | BASINA | 26.  | 4.10 | 3.  | 1. | 0. | .01 |
|   | HYDROGRAPH AT |        |      |      |     |    |    |     |
| + |               | SON50  | 7.   | 4.00 | 0.  | 0. | 0. | .00 |
| + | 2 COMBINED AT | CP50   | 28.  | 4.10 | 3.  | 1. | 0. | .01 |
|   | HYDROGRAPH AT |        |      |      |     |    |    |     |
| + |               | SON55  | 7.   | 4.00 | 0.  | 0. | 0. | .00 |
|   | HYDROGRAPH AT |        |      |      |     |    |    |     |
| + |               | SON60  | 3.   | 4.00 | 0.  | 0. | 0. | .00 |
|   | HYDROGRAPH AT |        |      |      |     |    |    |     |
| + |               | SON05  | 3.   | 4.03 | 0.  | 0. | 0. | .00 |

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

## Appendix C – Stormwater Storage



# Request for Stormwater Storage Waiver

### City of Scottsdale Case Numbers:

\_\_\_\_ - PA - \_\_\_\_    \_\_\_\_ - ZN - \_\_\_\_    \_\_\_\_ - UP - \_\_\_\_    \_\_\_\_ - DR - \_\_\_\_    \_\_\_\_ - PP - \_\_\_\_    PC# \_\_\_\_\_

The applicant/developer must complete and submit this form to the city for processing and obtain approval of waiver request **before submitting improvement plans**. Denial of the waiver may require the developer to submit a revised site plan to the Development Review Board.

Date \_\_\_\_\_ Project Name \_\_\_\_\_  
Project Location \_\_\_\_\_  
Applicant Contact \_\_\_\_\_ Company Name \_\_\_\_\_  
Phone \_\_\_\_\_ Fax \_\_\_\_\_ E-mail \_\_\_\_\_  
Address \_\_\_\_\_

### Waiver Criteria

A project must meet at least one of three criteria listed below for the city to consider waiving some or all required stormwater storage. **However, regardless of the criteria, a waiver will only be granted if the applicant can demonstrate that the effect of a waiver will not increase the potential for flooding on any property.** Check the applicable box and provide a signed engineering report and supporting engineering analysis that demonstrate the project meets the criteria and that the effect of a waiver will not increase the potential for flooding on any property.

If the runoff for the project has been included in a storage facility at another location, the applicant must demonstrate that the stormwater storage facility was specifically designed to accommodate runoff from the subject property and that the runoff will be conveyed to this location through an adequately designed conveyance facility.

- 1. The development is adjacent to a conveyance facility that an engineering analysis shows is designed and constructed to handle the additional runoff from the site as a result of development.
- 2. The development is on a parcel less than one-half acre in size.
- 3. Stormwater storage requirements conflict with requirements of the Environmentally Sensitive Lands Ordinance (ESLO).

For a full storage waiver, a conflict with ESLO is limited to:

- Property located in the hillside landform as defined in the city Zoning Ordinance
- Property in the upper desert landform that has a land slope steeper than 5% as defined in the city Zoning Ordinance
- Property within the ESL zoning overlay district where the only viable location for a stormwater storage basin requires blasting

This full waiver only applies to those portions of property meeting one of these three requirements.

Partial waivers are available for projects or portions of properties within the Environmentally Sensitive Lands Zoning Overlay District, not meeting any of the three full waiver criteria above, if post-development peak discharge rates do not exceed pre-development conditions, based on the 10- and 100-year storm events.

By signing below, I certify that the stated project meets the waiver criteria selected above as demonstrated by the attached documentation.

  
\_\_\_\_\_  
Engineer

\_\_\_\_\_  
Date

## Planning, Neighborhood & Transportation Division

7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone: 480-312-2500 • Fax: 480-312-7781



# Request for Stormwater Storage Waiver

City of Scottsdale Case Numbers:

\_\_\_\_ - PA - \_\_\_\_    \_\_\_\_ - ZN - \_\_\_\_    \_\_\_\_ - UP - \_\_\_\_    \_\_\_\_ - DR - \_\_\_\_    \_\_\_\_ - PP - \_\_\_\_    PC# \_\_\_\_\_

**CITY STAFF TO COMPLETE THIS PAGE**

Project Name \_\_\_\_\_

Check Appropriate Boxes:

Meets waiver criteria (specify):  1     2     3

Recommend approve waiver.

Recommend deny waiver:

None of waiver criteria met.

Downstream conditions prohibit waiver of any storage.

Other:

Explain: \_\_\_\_\_  
\_\_\_\_\_

Return waiver request:

Insufficient data provided.

Other: \_\_\_\_\_

Explain: \_\_\_\_\_  
\_\_\_\_\_

Recommended Conditions of Waiver:

All storage requirements waived.

Post-development peak discharge rates do not exceed pre-development conditions.

Other:

Explain: \_\_\_\_\_  
\_\_\_\_\_

**Waiver approved per above conditions.**

**Waiver denied.**

\_\_\_\_\_  
Floodplain Administrator or Designee

\_\_\_\_\_  
Date

**Planning, Neighborhood & Transportation Division**

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# Request for Stormwater Storage Waiver

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## In-Lieu Fee and In-Kind Contributions

In-lieu fees are only applicable to projects where post-development peak discharge rates exceed pre-development levels, based on the 10- and 100-year storm events. If the city grants a waiver, the developer is required to calculate and contribute an in-lieu fee based on what it would cost the city to provide a storage basin, sized as described below, including costs such as land acquisition, construction, landscaping, design, construction management, and maintenance over a 75-year design life. The fee for this cost is \$1.87 per cubic foot of stormwater storage for a virtual storage basin designed to mitigate the increase in runoff associated with the 100-year/2-hour storm event. The applicant may submit site-specific in-lieu fee calculations subject to the Floodplain Administrator's approval.

The Floodplain Administrator considers in-kind contributions on a case-by-case basis. An in-kind contribution can serve as part of or instead of the calculated in-lieu fee. In-kind contributions must be stormwater related and must constitute a public benefit. In-lieu fees and in-kind contributions are subject to the approval of the Floodplain Administrator or designee.

Project Name \_\_\_\_\_

The waived stormwater storage volume is calculated using a simplified approach as follows:

**V = ΔCRA; where**

V = stormwater storage volume required, in cubic feet,

ΔC = increase in weighted average runoff coefficient over disturbed area ( $C_{post} - C_{pre}$ ),

R = 100-year/2-hour precipitation depth, in feet (DSPM, Appendix 4-1D, page 11), and

A = area of disturbed ground, in square feet

Furthermore,

R = \_\_\_\_\_

ΔC = \_\_\_\_\_

$V_w = V - V_p$ ; where

A = \_\_\_\_\_

$V_w$  = volume waived,

V = \_\_\_\_\_

V = volume required, and

$V_p$  = \_\_\_\_\_

$V_p$  = volume provided

$V_w$  = \_\_\_\_\_

An in-lieu fee will be paid, based on the following calculations and supporting documentation:

In-lieu fee (\$) =  $V_w$  (cu. ft.) x \$1.87 per cubic foot = \_\_\_\_\_

An in-kind contribution will be made, as follows:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

No in-lieu fee is required. Reason:

\_\_\_\_\_  
\_\_\_\_\_

**Approved by:**

\_\_\_\_\_  
Floodplain Administrator or Designee

\_\_\_\_\_  
Date

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## Appendix D. Disclaimer and Liability



# WARNING & DISCLAIMER OF LIABILITY

The Drainage and Floodplain Regulations and Ordinances of the City of Scottsdale are intended to “minimize the occurrence of losses, hazards and conditions adversely affecting the public health, safety and general welfare which might result from flooding caused by the surface runoff of rainfall” (Scottsdale Revised Code §37-16).

As defined in S.R.C. §37-17, a flood plain or “*Special flood hazard* area means an area having flood and/or flood related erosion hazards as shown on a FHBM or FIRM as zone A, AO, A1-30, AE, A99, AH, or E, and those areas identified as such by the floodplain administrator, delineated in accordance with subsection 37-18(b) and adopted by the floodplain board.” It is possible that a property could be inundated by greater frequency flood events or by a flood greater in magnitude than a 100-year flood. Additionally, much of the Scottsdale area is a dynamic flood area; that is, the floodplains may shift from one location to another, over time, due to natural processes.

### **WARNING AND DISCLAIMER OF LIABILITY PURSUANT TO S.R.C §37-22**

“The degree of flood protection provided by the requirements in this article is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Floods larger than the base flood can and will occur on rare occasions. Floodwater heights may be increased by man-made or natural causes. This article (Chapter 37, Article II) shall not create liability on the part of the city, any officer or employee thereof, or the federal government for any flood damages that result from reliance on this article or any administrative decision lawfully made thereunder.”

Compliance with Drainage and Floodplain Regulations and Ordinances does not insure complete protection from flooding. The Floodplain Regulations and Ordinances meet established local and federal standards for floodplain management, but neither this review nor the Regulations and Ordinances take into account such flood related problems as natural erosion, streambed meander or man-made obstructions and diversions, all of which may have an adverse affect in the event of a flood. You are advised to consult your own engineer or other expert regarding these considerations.

I have read and understand the above. If I am an agent for an owner I have made the owner aware of and explained this disclaimer.

|                |                |      |  |
|----------------|----------------|------|--|
|                |                |      |  |
| Plan Check No. | Owner or Agent | Date |  |