

PRELIMINARY DRAINAGE REPORT

STORYROCK PHASE 1A



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INTRODUCTION

PROJECT DESCRIPTION

This Preliminary Drainage report has been prepared for the proposed Storyrock Phase 1A residential development. StoryRock Phase 1A (Phase 1A) is part of the StoryRock Master Planned Community (formerly named Cavalliere Ranch), a development consisting of 462-acres of single family residential construction. A Conceptual Master Drainage report was approved October 2014 with the project Zoning Case (13-ZN-2014).

StoryRock Phase 1A is a proposed 94-acre single family residential subdivision consisting of 66 single family residential units. Phase 1A is zoned for R1-18, R1-35, R1-43, and R1-70 development. All R1-18 areas are proposed to be mass-graded and R1-35, R1-43, and R1-70 areas will require separate single lot grading plans for each lot developed. The proposed site is located within the City of Scottsdale and falls under the City's Environmentally Sensitive Lands Ordinance (ESLO).

PROJECT LOCATION AND DESCRIPTION

StoryRock is located within Section 12 of Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The site is bound to the north by the Happy Valley Road Alignment and to the west by 128th Street. The Pinnacle Peak Road Alignment borders the site to the south. The McDowell Sonoran Preserve borders the site to the east and portions of the site to the north and south. Phase 1A is located in the northern portion of the site, north of Ranch Gate Road. (See **Figure 1: Location Map**).

The development is located within one flood zone as shown on Flood Insurance Rate Map (FIRM) panel number 04013C1335L, dated October 16, 2013 (see **Appendix A** for FIRM). The flood zones that pertain to the site are as follows:

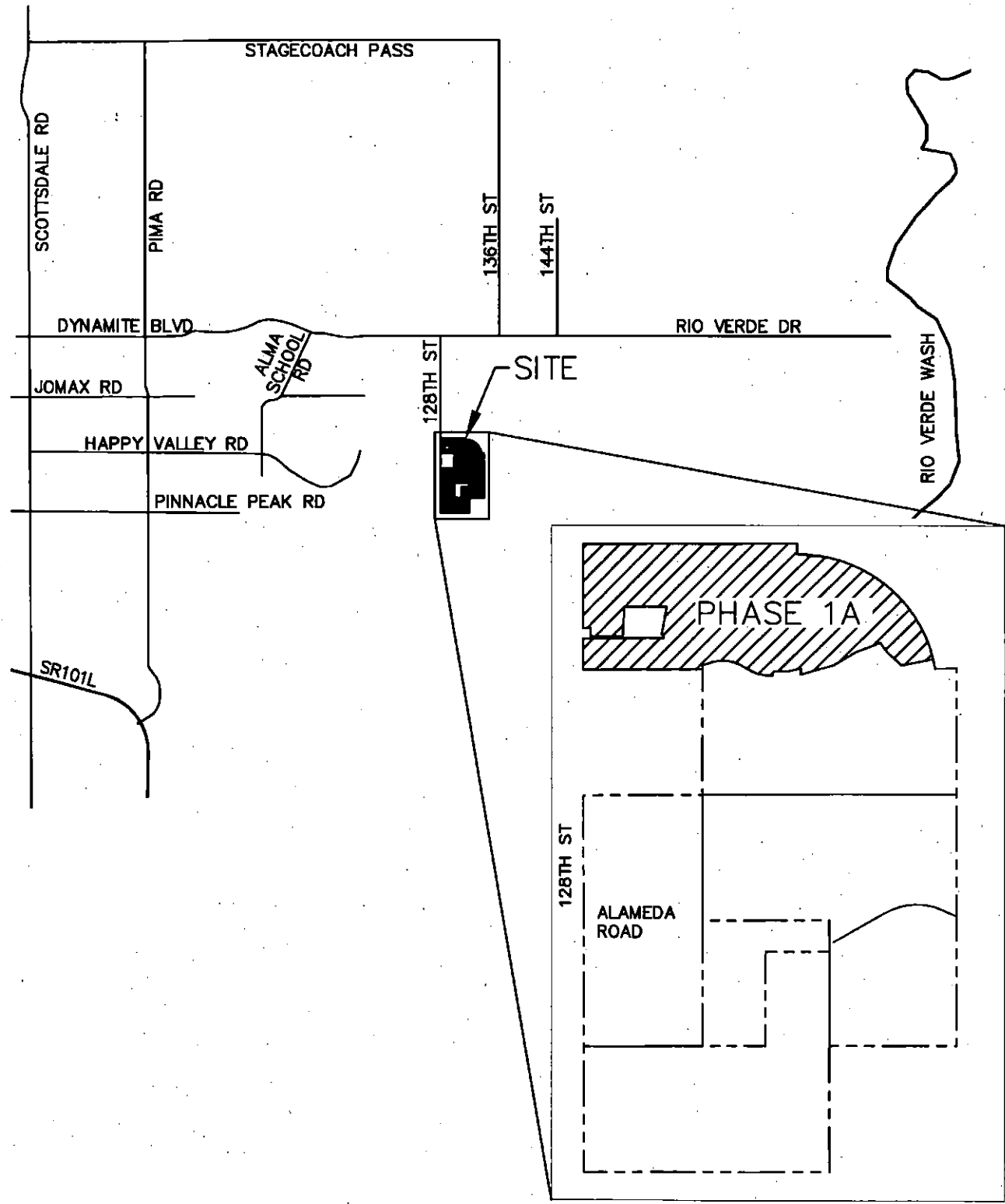
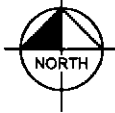
“Other Areas” Zone D – “Areas in which flood hazards are undetermined, but possible”

The property is undeveloped natural desert, characterized by braided washes and rock features of varying sizes. Undeveloped desert is also characterized by native desert grasses and brush.

SCOPE OF DRAINAGE REPORT

The approved master drainage report and associated zoning material established the general drainage parameter and criteria for site planning. This report for Phase 1A further establishes drainage parameters and criteria for preliminary design. This report provides a hydrologic plan for the development of the site as well as preliminary hydraulic analysis for the washes crossing the site.

All drainage criteria presented in this report will conform to the City of Scottsdale Design Standards & Polices Manual (DS&PM).



K:\EAV_Civil\191886002 - Storyrock\Reports\Phase 1A\WaterBOD\Exhibits\Figure 1 Vicinity Map.dwg Aug 31, 2016 erf.hopkins

FIGURE 1
VICINITY MAP
STORYROCK



DESCRIPTION OF EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

EXISTING SITE CONDITIONS

The site is characterized by many washes and rock features of varying sizes. The on-site washes vary in size and depth, but generally flow from the southwest to northeast or east through the site. Phase 1A is located in the northern portion of the Storyrock development. Phase 1A is bound by Storyrock Phase 1B to the south, and the McDowell Sonoran Preserve to the north and east. Storm water runoff impacts Phase 1A from the west and south, and is conveyed through the site in existing washes. Runoff is discharged into the Preserve to the north and east. Multiple ridgelines run through the site, in the general direction of southwest to northeast.

The site falls within the City of Scottsdale Environmentally Sensitive Lands (ESL) and is subject to the design criteria of the Environmentally Sensitive Lands Ordinance (ELSO). Specifically, the site is categorized as Upper Desert Landform of ESL. Per the DS&PM "The ordinance requires that a percentage of each property be permanently preserved as natural area open space (NAOS) and the specific environmental features, including vegetation, washes, mountain ridges and peaks be protected for inappropriate development".

EXISTING OFF-SITE DRAINAGE CONDITIONS

Off-site flows impact the site from the south, and west. Off-site flows originate from large undeveloped sub-basins. The areas to the west of 128th Street are mostly undeveloped residential properties. The sub-basin to the south of Phase 1A are part of other Storyrock Phases. Refer to **Figure 2: Offsite Drainage Map**.

Off-site flows vary from local low flows up to large wash flows over 250 cfs. Most off-site flows will be conveyed through the site by the existing washes. 128th Street from Ranch Gate Road south to the Tom's Thumb trailhead consists of a two-lane paved road with several at-grade drainage crossings. A few locations provide low flow pipe culvert crossings that are undersized to accommodate larger storm events from overtopping the roadway section. No curb exists along the roadway and runoff generated along 128th Street sheet flows in the eastwardly direction through the StoryRock development.

An existing conditions hydrologic model was completed to develop peak discharges for the offsite runoff contributing to the Site. Offsite sub-basins were delineated based on the City of Scottsdale Quarter Section Topography. Significant washes are defined as having a 100-year flow of 50 cfs or more. There are no washes with 100-year peak flows of 750 cfs or greater, which indicates that no Vista Corridors exist within the project area. Significant washes been identified on **Figure 3: Existing Drainage Condition**. Hydrologic results can be found in **Appendix B**.

EXISTING ON-SITE DRAINAGE CONDITIONS

Three significant offsite washes cross Phase 1A and have been identified **Figure 3: Existing Drainage Condition**.

An existing conditions hydrologic model was completed to determine the peak stormwater discharges leaving the site. The existing condition discharges will be compared to the proposed condition discharges

in a "pre-vs-post" analysis. The proposed condition discharges must be equal to or below the existing condition.

An existing conditions hydraulic model was completed for the three significant washes crossing the site. The existing conditions hydraulic analysis was used as the basis for a post-conditions analysis. Hydraulic analysis has been performed on the significant washes to determine the 100 year Base Flood Elevations (BFEs) at specific cross sections. These elevations are used to map the existing 100 year limits of inundation.

The 100-year flow within Wash75 is not fully contained within the main channel section between river stations 14+45 and 8+31. The left overbank in this section diverts away from the main channel section. A lateral weir was modelled to calculate the quantity of flow diverting from Wash75. A minor diversion flow of 11 cfs occurs in this location and has been added to the hydrologic model.

Hydrology and hydraulic results can be found in **Appendix B** and **Appendix C** respectively.

PROPOSED PRELIMINARY DRAINAGE PLAN

PROPOSED ON-SITE DRAINAGE PLAN

The proposed Phase 1A development consists of 66 single family residential units. Lots located along the washes will have finished floor elevations a minimum of one foot above the 100-year base flood elevation (BFE). In general, lots will drain to the street system and runoff will be conveyed in the streets and/or in on-site swales and storm drain systems to detention basins or wash crossing locations located throughout the project. Due to the steep and undulating terrain, some lots will require rear or side yard drainage into adjacent washes or drainage swales within the development in order to minimize impacts to environmental features, existing natural area open space, and meet design criteria as required with the Environmentally Sensitive Lands Ordinance for the project. Specific lots that drain via rear or side yard locations within the project have been identified on **Figure 4** and on the preliminary grading and drainage plan in **Appendix E**. Detention basins will detain runoff before discharging into the existing washes and will be sized to meet first flush criteria. Specific areas that discharge into existing washes and are not routed through drainage basins will provide for alternative methods to meet first flush criteria. A further discussion regarding alternative methods to first flush is provided in the "Stormwater Storage Method" section below. Post development flows exiting the site will be attenuated through detention basins to a level equal to or less than pre-development flows. See **Figure 4: Proposed Conditions Drainage Map**.

Lots that are zoned R1-18 will be mass graded with the roadway improvements as part of this project. All other lots zoned as R1-35, R1-43, and R1-70 will require single lot grading plans in the future for separate review and permit. The roadways and drainage facilities will be graded as part of this project to account for existing undisturbed areas located within future lot locations. Limits of grading have been shown on the preliminary grading and drainage plan in **Appendix E**.

PROPOSED OFF-SITE DRAINAGE PLAN

Offsite flows impact the site from the south, and west. Flows will be conveyed through the site and will discharge at their historic locations on the east and north side of the Site. In most cases, off-site flows are conveyed within the existing washes. All of the significant washes are maintained within their existing wash corridors.

Associated with the development of Storyrock, 128th Street and Ranch Gate Road roadway infrastructure will be constructed. These roadway improvements will be completed under a separate plan from the on-site improvements, and will include final drainage reports, however, the run-off from the off-site roadways is included within the on-site drainage plans.

128th Street consists of a median divided roadway with curb, and will include multiple culvert crossings to convey flow under the proposed roadway. Ranch Gate road consists for a median divided road with curb for the west portion, and a crowned two lane road with curb for the eastern portion.

The proposed 128th Street Road improvements includes multiple culvert crossings to convey off-site flow under the proposed roadway. In the existing condition, 128th Street roadway flows sheet flow to the east. The proposed 128th Street roadway design consolidates the roadway discharges locations to major wash crossings. Due to this consolidation of discharge locations, there is a small increase in the run-off at the

proposed discharge locations into the property to at the southeast corner of 128th Street and Ranch Gate Road. The peak flow increases at concentration points CP5 and CP8, but decreases at CP6, CP7 and CP9. Additionally, the total run-off is unchanged, shown by the overall flow at CP 10.

The proposed Ranch Gate Road will utilize detention basins located within Phase 1A. These basins; DB58, DB60, and DB61, will be constructed with Ranch Gate Road improvements. Basin DB60 collects run-off from Ranch Gate Road and a portion of development in Phase 1A.

Any increased run-off created by the off-site roadways from either the increased impervious area or changes to the drainage patterns are accounted for with the Phase 1A drainage plan. The pre-vs post analysis for Phase 1A includes the 128th Street and Ranch Gate proposed sub basins and land uses. It should be noted that the southern portions of 128th Street are included within the Storyrock Phase 2 drainage plan.

PROPOSED ON-SITE HYDROLOGY

On-site runoff from the proposed development maintains post-development flows at or below pre-development conditions at each of the Phase 1A exit points, for the three design storms (2-year, 10-year, and 100-year). Except for five locations, CP5, CP8, CP14, CP15 and CP18, in which the post development flow exceeds the existing condition flow by approximately 1-3 cfs. This is within the level of accuracy of the analysis, and should be considered incidental and in conformance with the design. Furthermore, the downstream condition is undeveloped McDowell Sonoran Preserve and the minor increase does not negatively impact any downstream properties. A summary of pre- and post-development peak discharges is provided in **Table 1**. Multiple detention basins are used to attenuate peak discharge from on-site runoff. A basin summary table has been provided in **Appendix B** indicating basin volumes, maximum depths, orifice sizes, side slopes, peak inflow and outflow rates, drain times, and storage volumes provided for the 2, 10, and 100 year events. Each basin utilizes a bleed-off pipe with orifice plate with the intent to control post-development runoff exiting the development, with a spillway for larger storm events. The total drain time for all basins is less than 36 hours. Detention Basin 20 (DB20) is an in-line basin and takes advantage of the natural detention and attenuation created by a roadway culvert crossing which allows for minimal disturbance to NAOS in the area. This specific in-line basin experiences depths greater than 3 feet for a very short period during the peak of larger storm events. DB20 provides a drain time of less than 9 minutes which helps minimize safety concerns in this location. Furthermore, the basin is located within the private community, setback from pedestrian walkways and a safety rail will be provided at the inlet headwall of the culvert. For in-line basins, the potential for culvert sedimentation build-up is increased. Sedimentation deposit within the culvert should be minimized, however, due to the high flow velocities within the culvert. Additionally, a culvert maintenance program is proposed with the development (see additional information in the "Culvert Sedimentation" section below). Refer to **Appendix B** for the detailed hydrologic model results.

Table 1: Peak Discharge Summary

Concentration Point	Prop. Cond. 2-Year (cfs)	Ex. Cond. 2-Year (cfs)	Prop. Cond. 10-Year (cfs)	Ex. Cond. 10-Year (cfs)	Prop. Cond. 100-Year (cfs)	Ex. Cond. 100-Year (cfs)
CP1	1	1	1	1	3	3
CP2	2	2	5	5	11	11
CP3	3	3	10	10	23	23
CP4	1	1	5	5	11	11
CP5	28	28	82	81	206	205

Concentration Point	Prop. Cond. 2-Year (cfs)	Ex. Cond. 2-Year (cfs)	Prop. Cond. 10-Year (cfs)	Ex. Cond. 10-Year (cfs)	Prop. Cond. 100-Year (cfs)	Ex. Cond. 100-Year (cfs)
CP6	9	10	25	26	59	61
CP7	0	1	1	2	2	5
CP8	10	10	30	29	77	74
CP9	1	1	2	4	4	7
CP10	39	39	112	113	288	289
CP11	0	0	0	0	0	11
CP12	5	5	13	13	27	30
CP13	11	11	28	32	69	77
CP14	9	7	21	21	53	53
CP15	1	1	2	1	3	3
CP16	7	10	28	30	65	74
CP17	1	1	2	2	3	5
CP18	59	57	171	172	440	437

PROPOSED ON-SITE HYDRAULICS

On-site runoff will be conveyed in the local streets, swales, storm drains, and culverts to the detention basins or wash discharge locations. 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. 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 with storm drains or scuppers will capture pavement runoff and outfall to the proposed detention basins. In specific roadway discharge locations areas where detention basins are not provided, alternative methods such as stormceptor structures will be provided to meet first flush criteria (see additional information in the "Stormwater Storage Method" section below). The scupper, catch basins and storm drains will be designed per the DS&PM and FCDMC's Drainage Policies and Standards. Detailed catch basin and street capacity analysis is beyond the scope of this preliminary drainage report and will be completed as part of the final design.

The existing hydraulic model was revised for a proposed hydraulic model to determine the proposed condition 100-year BFE and limits of inundation. Development of the site, including roadway, culverts and lots encroach into the existing BFE. The proposed hydraulic model includes these encroachments and modifications to calculate the proposed BFEs and proposed 100-year limits of inundations. The proposed BFEs at the boundary of the site, both upstream and downstream cannot be higher than the existing condition. Table 2 provides a summary of the existing and proposed 100-year BFE at the boundary conditions of the site. Refer to Appendix C for a complete HEC-RAS summary table.

Table 2: Boundary Base Flood Elevation Summary

Wash	HEC-RAS Cross Sections	Ex. Cond BFE	Prop. Cond BFE	Note:
Wash 10	243	2581.86	2581.86	Site Exit
Wash 60	576	2603.16	2603.13	Site Entrance
Wash 65	608	2605.07	2605.07	Site Entrance
Wash 75	197	2536.54	2536.53	Site Exit

Roadway culvert crossings of significant washes were designed. The proposed culverts are designed to pass at least the 10-year flow without overtopping. The culverts will pass the 100-year flow with a maximum overtopping of 12-inches. Culverts will include design measures to protect the roadway from erosion during overtopping events. All lots and structures will be accessible by at least one route with a depth of flow no

greater than 1 foot during the 100-year event. The proposed culverts are included in the hydraulic analysis. Refer to **Appendix C** for hydraulic results.

Minor flows less than 50 cfs impact lots, driveways, and roadways within the development. These flows will be routed around the lots in swales, and under driveways and roadways in culverts. The flows will discharge at their historic location onsite. The swales will be designed to be natural in appearance and match the existing topography of the site. For areas that will require future R1-35, R1-43, and R1-70 single lot grading plans, flows will be routed around and match existing drainage discharge locations. A typical lot grading detail has been provided on the preliminary grading and drainage plan in **Appendix E** for reference.

Per section 4-1.407 of the DS&PM development within ESL should minimize the modification of significant washes and maintain these washes in their native locations and conditions. All significant washes within Phase 1A are maintained in their existing corridors. See **Appendix E** for a copy of the preliminary grading plan. The preliminary grading plan shows the HEC-RAS cross sections and BFEs for the proposed conditions. The plan also includes information on the proposed detentions basins, fished floor elevations and culvert sizes.

LOWEST FINISH FLOORS

The finished floor elevations for each lot will have a minimum elevation of one foot above the 100-year base flood elevation (BFE). See **Appendix C** for complete hydraulic results and **Appendix E** for a copy of the preliminary grading plan with BFEs and pad elevations.

SPECIAL CONDITIONS

404 PERMIT/JURISDICTIONAL WASHES

Kimley-Horn has submitted and received approval of Jurisdictional Delineation (JD) for the entire Storyrock development from U.S. Army Corps of Engineers (Corp). Kimley-Horn will also prepare and process an Individual Permit for proposed disturbances.

EROSION SETBACK ANALYSIS

A Level I erosion setback analysis was performed on the significant washes on the site. The analysis followed the requirement in the Arizona Department of Water Resources (ADWR) Sate Standard Attachment 5-96. Locations along the washes, where roadways or lot wall encroaches into the erosion setback, a form of erosion protection is required. A summary of the erosion setbacks for the significant washes is provided in **Table 3**. The erosion hazard setback and preliminary erosion protection is shown on the preliminary grading plan, see **Appendix E**, for reference. The erosion cutoff walls or other form of erosion protection will be designed during the final design.

Setback = $\text{Sqrt}(Q100)$ for straight wash sections, with a minimum setback of 20'

Setback = $2.5 * \text{Sqrt}(Q100)$ for curved wash sections, with a minimum setback of 50'

Example; Wash 10 Setback = $\text{sqrt}(69) = 8'$ for straight sections and $8 * 2.5 = 21'$ for curved sections. However, the minimum setbacks of 20' and 50' respectively would be used.

Table 3 Erosion Setback Summary

	Q100 (cfs)	Erosion Hazard Setback, Straight Reach (Calculated)	Erosion Hazard Setback, Straight Reach (Design)	Erosion Hazard Setback, Curved Reach (Calculated)	Erosion Hazard Setback, Curved Reach (Design)
Wash 10	69	8'	20'	21'	50'
Wash 60	289	17'	20'	43'	50'
Wash 65	96	10'	20'	25'	50'
Wash 75	420	21'	21'	51'	51'

ADEQ WATER QUALITY REQUIREMENTS

Development of the project will impact a large enough area to require a submittal of a Notice of Intent (NOI) to the Arizona Department of Environmental Quality (ADEQ). The NOI will be submitted to ADEQ and an approved NOI certificate with an AZCON number will be provided to the city before approval of any improvement plans.

CULVERT SEDIMENTATION

Sedimentation reduces the hydraulic performance of culverts and can lead to safety, erosion, and maintenance issues. The proposed culverts and storm drains within the project have been designed to minimize sedimentation when possible, as well as providing solutions to reduce the impact of sedimentation. Culverts are designed to match the slope of the existing channel. Additionally, the majority of the culverts are "inlet" control, with flow velocity greater than 10 ft/s. These "self-cleaning" velocities help clear the culverts of sedimentation in larger storm events.

Storm drains which receive natural channel flow are susceptible to sedimentation. Storm drains will be designed with sediment traps prior to the storm drain to capture sediment.

Sedimentation is inevitable given the natural condition of the existing washes traversing the property. To help alleviate the potential concerns that arise from sediment build-up in culverts and storm drains on the project, it is recommended that the HOA implement a culvert and storm drain maintenance program. The scheduled program will inspect and clean the culverts to limit sedimentation and ensure proper operation of the drainage facilities. The program will inspect all culverts and storm drains bi-annually, and after significant storm events.

DATA ANALYSIS METHODS

GENERAL DISCUSSION

A detailed hydrologic model was prepared for the existing and proposed site condition. A hydraulic model was prepared for the significant washes that traverse the site. The sections below provide the hydrology and hydraulic methodology.

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 off-site and on-site flows. HEC-1 models were prepared for the existing and proposed development conditions. The Drainage Design Management System for Windows (DDMSW) program was used to develop the hydrologic parameters for the on-site drainage areas and off-site drainage areas east of the site. Green and Ampt rainfall loss parameters were estimated using DDMSW, the City of Scottsdale parameters, and the Flood Control District of Maricopa County (FCDMC) Drainage Design Manual – Hydrology (Hydrology Manual). Time of Concentration calculations were calculated using DDMSW. Values that show non-default values or out-of-range results are due to the NMIN parameter selected for the HEC-1 Model. Because of the varying sub-basin sizes, the selected NMIN parameter will not meet the time of concentration requirements specified in the FCDMC Drainage Design Manual - Hydrology for each sub-basin. The HEC-1 models were run with varying NMIN parameters to confirm that the hydrograph shape and peaks were valid. The HEC-1 models were prepared using the Clark Unit Hydrograph. Rainfall depth were estimated for the site from the National Oceanic and Atmospheric Administration Atlas 14 (NOAA14).

Two different soil types were identified for the on-site and off-site sub-basins using the web soil survey from the National Resource Conservation Service (NRCS). A list of the soils found in the watershed is shown below:

- Gran-Wickenburg complex, 1 to 10 percent slopes
- Gran-Wickenburg-Rock outcrop complex, 10 to 65 percent slopes

The majority of the site, with the exception of a small portion of a few offsite sub-basins, falls within the 1 to 10 percent range. A map showing the different soil types, which was developed as part of the approved master drainage report, along with web soil survey results is included within **Appendix B**.

Land use parameters for the HEC-1 models were determined for each of the project zoning types, roadway and natural desert. The initial abstraction (IA) and Vegetation cover parameters are based on matching land use types from Table 4.2 of the County Hydrology Manual. The RTIMP for each zoning case was calculated by taking a sample area of roadway and lots and determining the percent of hydraulically connected area. See **Table 4** below for complete Land Use Parameters. The sample areas and RTIMP calculations are included in **Appendix B**. Land use maps for the existing and proposed development conditions are provided in **Appendix B**.

Table 4 Land Use Parameters

Land Use Code	Description	IA	RTIMP	Vegetation Cover
R1-18	Min Lot Size = 13,500 Sq Ft	0.30	27	50.0
R1-35	Min Lot Size = 26,250 Sq Ft	0.30	21	50.0
R1-43	Min Lot Size = 32,250 Sq Ft	0.30	17	20.0
R1-70	Min Lot Size = 52,500 Sq Ft	0.30	14	20.0
Road	24' Roadway, 40' Tract/ROW	0.10	60	75.0
Natural Desert	Natural Desert	0.35	0	25.0

A stage storage and outfall rate calculation spreadsheet was prepared for the proposed detention basins. The stage storage volume is based on end-area calculations at 1-foot intervals. The basin discharge rates through the proposed bleed pipes is calculated from Manning and Orifice equations. Overflow for larger storm events are provided in an overflow weir, which will be sized at final design. Individual basin stage storage and discharge rate tables, as well as a basin summary table, are provided in **Appendix B**.

HYDRAULICS

100-year BFEs for the significant washes were established using the U.S. Army Corps of Engineers HEC-RAS (v4.1.1) computer program. Cross sections were cut for the existing washes using the 1' flown aerial topography. The hydraulic models were run using mixed flow regime conditions with the normal depth boundary condition. Manning's 'n' coefficients for the channels was set at 0.035 and values for the overbanks are 0.050. Values were selected from Table 3-1 of the HEC-RAS Reference Manual. See **Appendix C** for Table 3-1. Based on field observations and aerial photography the washes are an undisturbed natural desert with an impervious weed barrier. One flow profile is used in the existing condition model representing the design flow. The proposed condition model uses two flow profiles. The first is a baseline of the design flow, the second is the same base design flow with the development encroachments included in the model.

Culvert crossing of the significant washes were sized using the Federal Highway Administration HY-8 version 7.30 computer program. Culverts were preliminary size to convey at least the 10-year storm through the structure, and convey the 100-year flow with a maximum roadway overtopping of 12-inches.

Refer to **Appendix C** for the results of the hydraulic modeling for the existing and proposed condition. See the attached CD for copy of the HEC-RAS report for the existing and proposed condition.

STORMWATER STORAGE METHOD

The existing property is a part of the ESLO. Based on new City ordinances, a waiver will need to be obtained for any volume less than the 100-year, 2-hour volume. However, there is no waiver fee associated with the

volumes that do not result in an increase in downstream runoff. See **Appendix D** for a copy of the waiver. Refer to **Appendix B** for the pre- and post-development hydrologic model results.

Where detention basins are provided within the development to capture runoff generated on-site and discharged from roadway improvements, the basins have been sized to meet first flush storage requirements (See First Flush Summary Table in **Appendix B**). In specific areas within the development, a detention basin is not feasible to meet the first flush criteria. As outlined in the City's Stormwater and Floodplain Management Ordinance, an alternative stormwater control can be provided if the development is located within the upper desert landform and runoff has no additional adverse impact on other properties. The locations where an alternative method is proposed are identified on the preliminary grading and drainage plan (**Appendix E**) and do not adversely impact any adjacent properties. In various areas, a rip-rap spillway and small dissipation basin is proposed as an alternative stormwater control. The rip-rap basins are proposed to be 1-foot deep and sized to reduce the velocity entering the basin for better capture of sedimentation and potential contaminants that may be present. The basin bottom was calculated using the rip-rap apron dimension requirements as outlined in the Drainage Design Manual for Maricopa County, Table 8.6. The spillways will be designed for a median rip-rap size (D50) of 6 inches to convey flow at 6-inch flow depth for the 2-year, 10-minute design storm. The higher frequency storm events are appropriate when evaluating water quality and represents the first-half inch of rainfall within the street network. Refer to **Appendix C** for the spillway and dissipation basin calculations.

There are other options for stormwater quality that could be considered for this project such as a Stormceptor system or other oil grit separators on the market. If a particular area on the project warrants this type of application in the future, specific stormwater control design measures will be provided for the City's review and approval during final design.

CONCLUSIONS

- Multiple significant washes cross the development. Proposed development will encroach on the washes. Hydraulic models for the existing and proposed conditions were prepared to determine the BFE. The BFE was used to set the finished floor elevations for each lot.
- Significant washes are maintained in their existing corridors.
- Onsite runoff will be conveyed through the local streets and storm drains to the detention basins and wash corridors. Culverts will convey the flow under the new roads. The conveyance facilities will be sized during final design.
- Hydrologic models were prepared for the on-site and off-site areas for the pre- and post-development conditions. Onsite detention basins were sized to ensure that the post-development runoff exiting the site are equal or less than pre-development conditions. Basins are design to drain within 36 hours.
- A Level 1 Erosion Setback analysis was performed for each major wash corridor. Locations where the setback is located within future development will require an erosion protection. The erosion protection will be designed as part of the final design. The Erosion Setback is shown on the Preliminary Grading Plan.
- Where detention basins are provided within the development to capture runoff generated on-site and discharged from roadway improvements, the basins have been sized to meet first flush storage requirements (See First Flush Summary Table in Appendix B). In specific areas within the development, a detention basin is not feasible to meet the first flush criteria. As outlined in the City's Stormwater and Floodplain Management Ordinance, an alternative stormwater control can be provided if the development is located within the upper desert landform and runoff has no additional adverse impact on other properties. In various areas, a rip-rap spillway and small dissipation basin is proposed as an alternative stormwater control.

REFERENCES

City of Scottsdale, *Design Standards and Policies Manual*, January 2010.

City of Scottsdale, Stormwater and Floodplain Management Ordinance, Chapter 37, July 2016.

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Flood Control District of Maricopa County, Drainage Design Manual – Hydrology, updated August 15, 2013.

U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS, River Analysis System Hydraulic Reference Manual Version 4.1, January 2010.

U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS, River Analysis System User's Manual Version 4.1, January 2010.

City of Scottsdale Topography Quarter Section Maps.

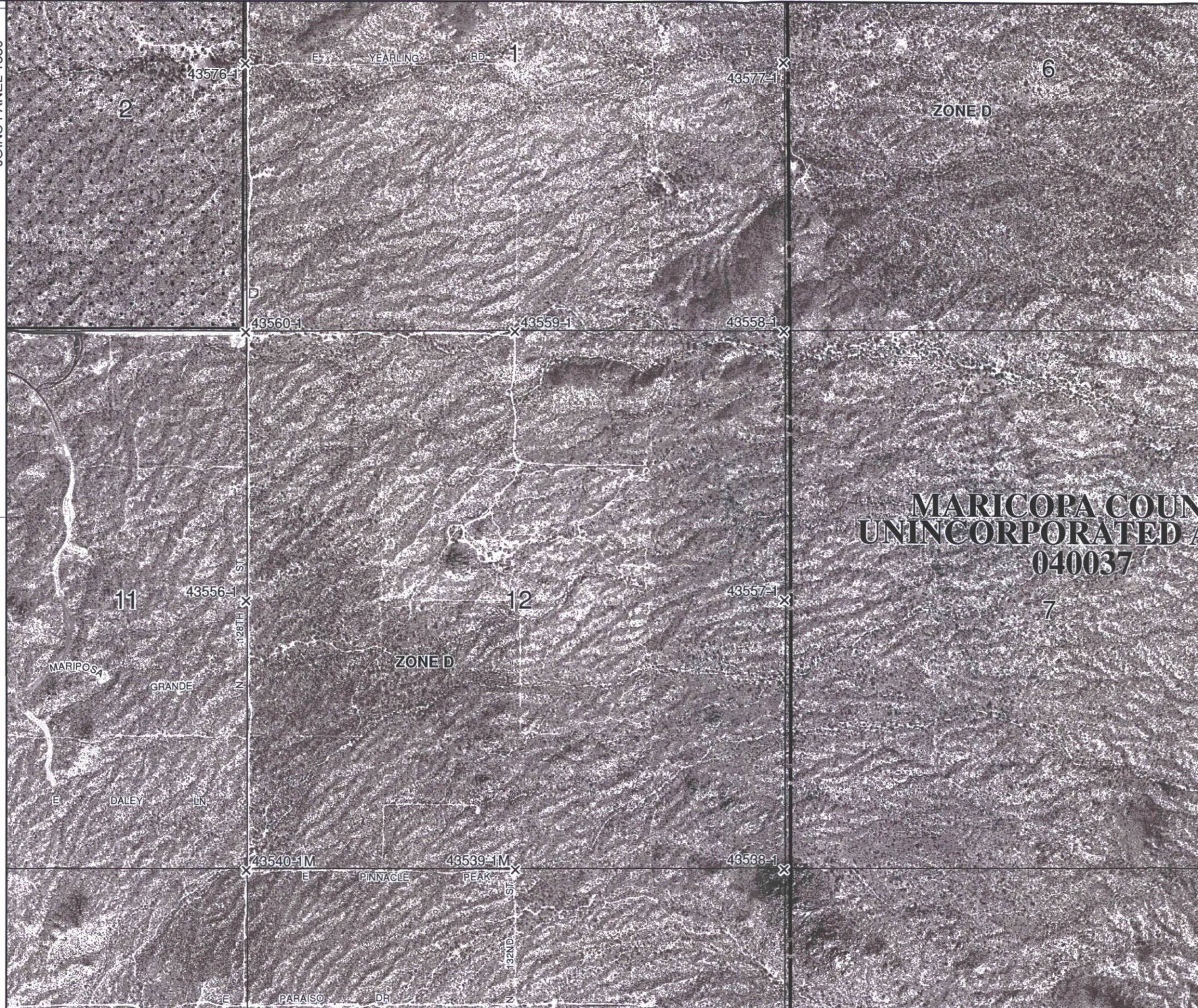
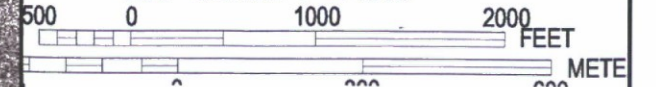
Appendix A – Flood Insurance Rate Map

990000 FT

JOINS PANEL 1330



MAP SCALE 1" = 1000'



985000 FT

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1335L

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY,
ARIZONA
AND INCORPORATED AREAS

PANEL 1335 OF 4425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1335	L
SCOTTSDALE, CITY OF	045012	1335	L

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER
04013C1335L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance

Appendix B – Hydrology

HEC-1 Exhibits (Existing and Proposed Conditions)

- HEC-1 Schematic Map
- Soils Map
- Land Use

DDSMW Output: (Existing and Proposed Conditions)

- Rainfall
- Land use
- Soils
- Storage
- Routing

HEC-1 Output

- Existing Condition
- Proposed Condition

Existing Condition

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
Major Basin ID: 01																	
OFF05	0.001	0.04	263.2	247.4	NATURAL	0.083	0.35	0.40	6.00	0.176	Tc (Hrs)	0.142*	0.133*	0.118*	0.104*	0.096*	0.089*
											Vel (f/s)	0.41	0.44	0.50	0.56	0.61	0.66
											R (Hrs)	0.166	0.154	0.135	0.117	0.107	0.099
OFF10	0.005	0.12	183.3	183.3	NATURAL	0.073	0.35	0.40	6.00	0.176	Tc (Hrs)	0.253*	0.236*	0.210*	0.185*	0.170*	0.158*
											Vel (f/s)	0.70	0.75	0.84	0.95	1.04	1.11
											R (Hrs)	0.303	0.280	0.246	0.214	0.195	0.180
OFF15	0.014	0.29	169.6	169.6	NATURAL	0.067	0.35	0.40	6.00	0.176	Tc (Hrs)	0.386	0.359	0.321	0.282*	0.259*	0.241*
											Vel (f/s)	1.10	1.18	1.33	1.51	1.64	1.76
											R (Hrs)	0.544	0.503	0.443	0.384	0.350	0.323
OFF20	0.005	0.13	198.5	198.5	NATURAL	0.073	0.35	0.40	6.00	0.176	Tc (Hrs)	0.257*	0.240*	0.214*	0.188*	0.173*	0.161*
											Vel (f/s)	0.74	0.79	0.89	1.01	1.10	1.18
											R (Hrs)	0.328	0.304	0.267	0.232	0.211	0.195
OFF30	0.149	1.02	154.6	154.6	NATURAL	0.053	0.35	0.40	6.00	0.176	Tc (Hrs)	0.660	0.615	0.548	0.483	0.443	0.412
											Vel (f/s)	2.27	2.43	2.73	3.10	3.38	3.63
											R (Hrs)	0.702	0.649	0.571	0.496	0.451	0.416
OFF35	0.032	0.37	232.4	228.0	NATURAL	0.062	0.35	0.40	6.00	0.176	Tc (Hrs)	0.382	0.356	0.317	0.279*	0.257*	0.239*
											Vel (f/s)	1.42	1.52	1.71	1.95	2.11	2.27
											R (Hrs)	0.408	0.377	0.332	0.288	0.262	0.242
OFF40	0.002	0.07	246.6	237.7	NATURAL	0.079	0.35	0.40	6.00	0.176	Tc (Hrs)	0.186*	0.173*	0.154*	0.136*	0.125*	0.116*
											Vel (f/s)	0.55	0.59	0.67	0.75	0.82	0.89
											R (Hrs)	0.235	0.218	0.192	0.166	0.151	0.140
OFF45	0.025	0.33	177.2	177.2	NATURAL	0.063	0.35	0.40	6.00	0.176	Tc (Hrs)	0.393	0.366	0.327	0.288*	0.264*	0.246*
											Vel (f/s)	1.23	1.32	1.48	1.68	1.83	1.97
											R (Hrs)	0.443	0.409	0.360	0.313	0.285	0.263
OFF50	0.063	0.86	177.6	177.6	NATURAL	0.058	0.35	0.40	6.00	0.176	Tc (Hrs)	0.608	0.566	0.505	0.445	0.408	0.380
											Vel (f/s)	2.07	2.23	2.50	2.83	3.09	3.32
											R (Hrs)	0.913	0.844	0.743	0.645	0.587	0.541

* 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
Major Basin ID: 01																	
OFF55	0.003	0.09	269.7	250.7	NATURAL	0.076	0.35	0.40	6.00	0.176	Tc (Hrs)	0.203*	0.189*	0.169*	0.149*	0.137*	0.127*
											Vel (f/s)	0.65	0.70	0.78	0.89	0.96	1.04
											R (Hrs)	0.252	0.233	0.205	0.178	0.162	0.150
OFF60	0.018	0.37	174.3	174.3	NATURAL	0.065	0.35	0.40	6.00	0.176	Tc (Hrs)	0.425	0.396	0.353	0.311	0.286*	0.266*
											Vel (f/s)	1.28	1.37	1.54	1.74	1.90	2.04
											R (Hrs)	0.639	0.590	0.520	0.451	0.411	0.379
OFF65	0.004	0.14	260.6	246.0	NATURAL	0.074	0.35	0.40	6.00	0.176	Tc (Hrs)	0.252*	0.234*	0.209*	0.184*	0.169*	0.157*
											Vel (f/s)	0.81	0.88	0.98	1.12	1.21	1.31
											R (Hrs)	0.386	0.357	0.314	0.273	0.248	0.229
ON05	0.010	0.23	179.5	179.5	NATURAL	0.069	0.35	0.40	6.00	0.176	Tc (Hrs)	0.343	0.319	0.285*	0.251*	0.230*	0.214*
											Vel (f/s)	0.98	1.06	1.18	1.34	1.47	1.58
											R (Hrs)	0.480	0.444	0.391	0.339	0.309	0.285
ON10	0.019	0.26	159.7	159.7	NATURAL	0.065	0.35	0.40	6.00	0.176	Tc (Hrs)	0.366	0.341	0.304	0.268*	0.246*	0.229*
											Vel (f/s)	1.04	1.12	1.25	1.42	1.55	1.67
											R (Hrs)	0.396	0.366	0.322	0.280	0.254	0.235
ON11	0.010	0.24	130.3	130.3	NATURAL	0.069	0.35	0.40	6.00	0.176	Tc (Hrs)	0.387	0.360	0.321	0.283*	0.260*	0.242*
											Vel (f/s)	0.91	0.98	1.10	1.24	1.35	1.45
											R (Hrs)	0.568	0.525	0.462	0.401	0.365	0.337
ON15	0.012	0.25	203.2	203.0	NATURAL	0.068	0.35	0.40	6.00	0.176	Tc (Hrs)	0.341	0.318	0.284*	0.250*	0.229*	0.213*
											Vel (f/s)	1.08	1.15	1.29	1.47	1.60	1.72
											R (Hrs)	0.461	0.426	0.375	0.325	0.296	0.273
ON20	0.034	0.68	145.6	145.6	NATURAL	0.062	0.35	0.40	6.00	0.176	Tc (Hrs)	0.595	0.554	0.494	0.435	0.400	0.372
											Vel (f/s)	1.68	1.80	2.02	2.29	2.49	2.68
											R (Hrs)	1.050	0.970	0.854	0.742	0.675	0.623
ON30	0.033	0.45	171.5	171.5	NATURAL	0.062	0.35	0.40	6.00	0.176	Tc (Hrs)	0.460	0.429	0.382	0.336	0.309	0.287*
											Vel (f/s)	1.43	1.54	1.73	1.96	2.14	2.30
											R (Hrs)	0.577	0.533	0.469	0.407	0.371	0.342

* Non default value or value out of range

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

Project Reference: STORYROCK PH1A EX

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
Major Basin ID: 01																	
ON35	0.001	0.04	500.0	302.5	NATURAL	0.083	0.35	0.40	6.00	0.176	Tc (Hrs)	0.134*	0.125*	0.111*	0.098*	0.090*	0.084*
											Vel (f/s)	0.44	0.47	0.53	0.60	0.65	0.70
											R (Hrs)	0.155	0.143	0.126	0.110	0.100	0.092
ON40	0.007	0.27	178.8	178.8	NATURAL	0.071	0.35	0.40	6.00	0.176	Tc (Hrs)	0.377	0.352	0.314	0.276*	0.253*	0.236*
											Vel (f/s)	1.05	1.13	1.26	1.43	1.57	1.68
											R (Hrs)	0.744	0.688	0.606	0.526	0.479	0.442
ON45	0.006	0.19	171.9	171.9	NATURAL	0.072	0.35	0.40	6.00	0.176	Tc (Hrs)	0.323	0.301	0.268*	0.236*	0.217*	0.202*
											Vel (f/s)	0.86	0.93	1.04	1.18	1.28	1.38
											R (Hrs)	0.516	0.477	0.420	0.365	0.332	0.306
ON50	0.002	0.07	275.4	253.4	NATURAL	0.079	0.35	0.40	6.00	0.176	Tc (Hrs)	0.182*	0.170*	0.151*	0.133*	0.122*	0.114*
											Vel (f/s)	0.56	0.60	0.68	0.77	0.84	0.90
											R (Hrs)	0.230	0.213	0.187	0.163	0.148	0.137
ON55	0.003	0.10	244.9	236.7	NATURAL	0.076	0.35	0.40	6.00	0.176	Tc (Hrs)	0.218*	0.203*	0.181*	0.160*	0.147*	0.136*
											Vel (f/s)	0.67	0.72	0.81	0.92	1.00	1.08
											R (Hrs)	0.297	0.274	0.241	0.210	0.191	0.176
ON60	0.010	0.26	268.5	250.1	NATURAL	0.069	0.35	0.40	6.00	0.176	Tc (Hrs)	0.329	0.306	0.273*	0.240*	0.221*	0.205*
											Vel (f/s)	1.16	1.25	1.40	1.59	1.73	1.86
											R (Hrs)	0.506	0.468	0.412	0.357	0.325	0.300
ON65	0.004	0.15	153.3	153.3	NATURAL	0.074	0.35	0.40	6.00	0.176	Tc (Hrs)	0.301	0.281*	0.250*	0.220*	0.202*	0.188*
											Vel (f/s)	0.73	0.78	0.88	1.00	1.09	1.17
											R (Hrs)	0.499	0.461	0.406	0.352	0.321	0.296
ON70	0.014	0.28	194.2	194.2	NATURAL	0.067	0.35	0.40	6.00	0.176	Tc (Hrs)	0.364	0.339	0.302	0.266*	0.244*	0.227*
											Vel (f/s)	1.13	1.21	1.36	1.54	1.68	1.81
											R (Hrs)	0.495	0.458	0.403	0.350	0.318	0.294
ON75	0.013	0.25	55.1	55.1	NATURAL	0.067	0.35	0.40	6.00	0.176	Tc (Hrs)	0.508	0.473	0.422	0.371	0.341	0.317
											Vel (f/s)	0.72	0.78	0.87	0.99	1.08	1.16
											R (Hrs)	0.683	0.632	0.556	0.483	0.439	0.405

* 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
Major Basin ID: 01																	
DN76	0.010	0.20	264.7	248.2	NATURAL	0.069	0.35	0.40	6.00	0.176	Tc (Hrs)	0.289*	0.269*	0.240*	0.211*	0.194*	0.181*
											Vel (f/s)	1.01	1.09	1.22	1.39	1.51	1.62
											R (Hrs)	0.355	0.329	0.289	0.251	0.229	0.211

* Non default value or value out of range

Flood Control District of Maricopa County
 Drainage Design Management System
 HEC-1 ROUTING DATA
 Project Reference: **STORYROCK PH1A 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															
RF45	0.050	0.035	0.050	980.00	0.0260	-	X: Y:	- 3.00	14.00 2.00	21.00 1.00	25.00 -	31.00 -	35.00 1.00	41.00 2.00	45.00 3.00
RF60A	0.050	0.035	0.050	1,076.00	0.0300	-	X: Y:	- 3.00	8.00 2.00	18.00 1.00	55.00 -	71.00 -	78.00 1.00	83.00 2.00	90.00 3.00
RF60B	0.050	0.035	0.050	1,200.00	0.0320	-	X: Y:	- 3.00	9.00 2.00	14.00 1.00	16.00 -	16.50 -	22.00 1.00	26.00 2.00	33.00 3.00
RF60C	0.050	0.035	0.050	650.00	0.0280	-	X: Y:	- 3.00	25.00 2.00	38.00 1.00	48.00 -	49.00 -	57.00 1.00	67.00 2.00	80.00 3.00
RO100	0.050	0.035	0.050	980.00	0.0290	-	X: Y:	- 3.00	14.00 2.00	28.00 1.00	40.00 -	41.00 -	51.00 1.00	58.00 2.00	64.00 3.00
RO10A	0.050	0.035	0.050	522.00	0.0250	-	X: Y:	- 3.00	12.00 2.00	29.00 1.00	31.00 -	31.50 -	42.00 1.00	59.00 2.00	62.00 3.00
RO10B	0.050	0.035	0.050	675.00	0.0270	-	X: Y:	- 3.00	8.00 2.00	13.00 1.00	17.00 -	17.50 -	22.00 1.00	26.00 2.00	29.00 3.00
RO10C	0.050	0.035	0.050	621.00	0.0220	-	X: Y:	- 3.00	5.00 2.00	10.00 1.00	28.00 -	32.00 -	68.00 1.00	78.00 2.00	83.00 3.00
RO11	0.050	0.035	0.050	1,000.00	0.0220	-	X: Y:	- 3.00	5.00 2.00	10.00 1.00	28.00 -	32.00 -	68.00 1.00	78.00 2.00	83.00 3.00
RO5A	0.050	0.035	0.050	380.00	0.0340	-	X: Y:	- 3.00	12.00 2.00	16.00 1.00	20.00 -	21.00 -	24.00 1.00	32.00 2.00	42.00 3.00
RO5B	0.050	0.035	0.050	490.00	0.0265	-	X: Y:	- 3.00	7.00 2.00	14.00 1.00	21.00 -	22.00 -	31.00 1.00	37.00 2.00	48.00 3.00

Flood Control District of Maricopa County
 Drainage Design Management System
 HEC-1 ROUTING DATA
 Project Reference: STORYROCK PH1A 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.
RO5C	0.050	0.035	0.050	630.00	0.0240	-	X: Y:	- 3.00	4.00 2.00	6.00 1.00	9.00 -	10.00 -	14.00 1.00	21.00 2.00	31.00 3.00
RO60	0.050	0.035	0.050	625.00	0.0220	-	X: Y:	- 3.00	6.00 2.00	10.00 1.00	14.00 -	27.00 -	38.00 1.00	57.00 2.00	83.00 3.00
RO65	0.050	0.035	0.050	756.00	0.0250	-	X: Y:	- 3.00	5.00 2.00	7.00 1.00	8.50 -	9.00 -	19.00 1.00	24.00 2.00	29.00 3.00
RO70	0.050	0.035	0.050	1,280.00	0.0250	-	X: Y:	- 3.00	14.00 2.00	27.00 1.00	31.50 -	32.00 -	36.00 1.00	40.00 2.00	46.00 3.00
RO75A	0.050	0.035	0.050	553.00	0.0240	-	X: Y:	- 3.00	18.00 2.00	20.00 1.00	23.00 -	34.00 -	38.00 1.00	41.00 2.00	44.00 3.00
RO75B	0.050	0.035	0.050	690.00	0.0260	-	X: Y:	- 2.00	15.00 1.50	26.00 1.00	32.00 -	43.00 -	46.00 1.00	50.00 2.00	55.00 3.00
RO76	0.050	0.035	0.050	908.00	0.0260	-	X: Y:	- 3.00	2.00 2.00	5.00 1.00	8.00 -	25.00 -	29.00 1.00	32.00 2.00	35.00 3.00

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
Major Basin ID: 01									
OFF05	645	61	64561	0.001	100.00	0.150	-	100	
OFF10	645	61	64561	0.005	100.00	0.150	-	100	
OFF15	645	61	64561	0.014	100.00	0.150	-	100	
OFF20	645	61	64561	0.005	100.00	0.150	-	100	
OFF30	645	61	64561	0.149	100.00	0.150	-	100	
OFF35	645	61	64561	0.032	100.00	0.150	-	100	
OFF40	645	61	64561	0.002	100.00	0.150	-	100	
OFF45	645	61	64561	0.026	100.00	0.150	-	100	
OFF50	645	61	64561	0.063	100.00	0.150	-	100	
OFF55	645	61	64561	0.003	100.00	0.150	-	100	
OFF60	645	61	64561	0.018	100.00	0.150	-	100	
OFF65	645	61	64561	0.004	100.00	0.150	-	100	
ON05	645	61	64561	0.010	100.00	0.150	-	100	
ON10	645	61	64561	0.019	100.00	0.150	-	100	
ON11	645	61	64561	0.010	100.00	0.150	-	100	
ON15	645	61	64561	0.012	100.00	0.150	-	100	
ON20	645	61	64561	0.034	100.00	0.150	-	100	
ON30	645	61	64561	0.033	100.00	0.150	-	100	
ON35	645	61	64561	0.001	100.00	0.150	-	100	
ON40	645	61	64561	0.007	100.00	0.150	-	100	
ON45	645	61	64561	0.006	100.00	0.150	-	100	
ON50	645	61	64561	0.002	100.00	0.150	-	100	
ON55	645	61	64561	0.003	100.00	0.150	-	100	
ON60	645	61	64561	0.010	100.00	0.150	-	100	
ON65	645	61	64561	0.004	100.00	0.150	-	100	
ON70	645	61	64561	0.014	100.00	0.150	-	100	
ON75	645	61	64561	0.013	100.00	0.150	-	100	
ON76	645	61	64561	0.010	100.00	0.150	-	100	



Legend

SUBBASIN BOUNDARY

Soil ID

64561
 64563

0 375 750 1,500
 Feet

<p>CAVALLIERE EXISTING SOILS MAP</p>	<p>Kimley»Horn © 2014 KIMLEY-HORN AND ASSOCIATES, INC. Engineering, Planning and Environmental Consultants Phoenix, Arizona 85020 (602) 944-5500</p>										
SCALE: 1" = 1500' SCALE (V): N/A DESIGNED BY: MAW DRAWN BY: DWT CHECKED BY: MAW DATE: AUGUST 2014	PROJECT NO. 191089013 DRAWING NAME Existing_Soils.mxd										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">NO.</th> <th style="width: 10%;">REVISION</th> <th style="width: 10%;">BY</th> <th style="width: 10%;">DATE</th> <th style="width: 10%;">APPR.</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	REVISION	BY	DATE	APPR.						
NO.	REVISION	BY	DATE	APPR.							

Flood Control District of Maricopa County
 Drainage Design Management System
 LAND USE
 Project Reference: STORYROCK PH1A EX

0/26/20

	Land Use Code	Area (sq mi)	Area	Initial Loss (IA) (%)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
for Basin ID: 01									
05	DESERT	0.0014	100.0	0.35	0	25.0	DRY	0.083	Desert
		0.0014	100.0						
10	DESERT	0.0047	100.0	0.35	0	25.0	DRY	0.073	Desert
		0.0047	100.0						
15	DESERT	0.0142	100.0	0.35	0	25.0	DRY	0.067	Desert
		0.0142	100.0						
20	DESERT	0.0051	100.0	0.35	0	25.0	DRY	0.073	Desert
		0.0051	100.0						
30	DESERT	0.1487	100.0	0.35	0	25.0	DRY	0.053	Desert
		0.1487	100.0						
35	DESERT	0.0318	100.0	0.35	0	25.0	DRY	0.062	Desert
		0.0318	100.0						
40	DESERT	0.0018	100.0	0.35	0	25.0	DRY	0.079	Desert
		0.0018	100.0						
45	DESERT	0.0255	100.0	0.35	0	25.0	DRY	0.063	Desert
		0.0255	100.0						
50	DESERT	0.0631	100.0	0.35	0	25.0	DRY	0.058	Desert
		0.0631	100.0						
55	DESERT	0.0027	100.0	0.35	0	25.0	DRY	0.076	Desert
		0.0027	100.0						

* Non default value

(stLuDataCG.

Flood Control District of Maricopa County
 Drainage Design Management System
 LAND USE
 Project Reference: STORYROCK PH1A EX

0/26/20

Land Use Code	Area (sq mi)	Area	Initial Loss (IA) (%)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
DESERT	0.0181	100.0	0.35	0	25.0	DRY	0.065	Desert
	0.0181	100.0						
DESERT	0.0041	100.0	0.35	0	25.0	DRY	0.074	Desert
	0.0041	100.0						
DESERT	0.0104	100.0	0.35	0	25.0	DRY	0.069	Desert
	0.0104	100.0						
DESERT	0.0190	100.0	0.35	0	25.0	DRY	0.065	Desert
	0.0190	100.0						
DESERT	0.0100	100.0	0.35	0	25.0	DRY	0.069	Desert
	0.0100	100.0						
DESERT	0.0116	100.0	0.35	0	25.0	DRY	0.068	Desert
	0.0116	100.0						
DESERT	0.0344	100.0	0.35	0	25.0	DRY	0.062	Desert
	0.0344	100.0						
DESERT	0.0331	100.0	0.35	0	25.0	DRY	0.062	Desert
	0.0331	100.0						
DESERT	0.0013	100.0	0.35	0	25.0	DRY	0.083	Desert
	0.0013	100.0						
DESERT	0.0068	100.0	0.35	0	25.0	DRY	0.071	Desert
	0.0068	100.0						

* Non default value

(stLuDataCG

Flood Control District of Maricopa County
 Drainage Design Management System
 LAND USE
 Project Reference: STORYROCK PH1A EX

0/26/20

Land Use Code	Area (sq mi)	Area	Initial Loss (IA) (%)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
DESERT	0.0056	100.0	0.35	0	25.0	DRY	0.072	Desert
	0.0056	100.0						
DESERT	0.0022	100.0	0.35	0	25.0	DRY	0.079	Desert
	0.0022	100.0						
DESERT	0.0028	100.0	0.35	0	25.0	DRY	0.076	Desert
	0.0028	100.0						
DESERT	0.0102	100.0	0.35	0	25.0	DRY	0.069	Desert
	0.0102	100.0						
DESERT	0.0037	100.0	0.35	0	25.0	DRY	0.074	Desert
	0.0037	100.0						
DESERT	0.0139	100.0	0.35	0	25.0	DRY	0.067	Desert
	0.0139	100.0						
DESERT	0.0130	100.0	0.35	0	25.0	DRY	0.067	Desert
	0.0130	100.0						
DESERT	0.0100	100.0	0.35	0	25.0	DRY	0.069	Desert
	0.0100	100.0						

* Non default value

(stLuDataCG.

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 26OCT16 TIME 16:21:12 *
*****
    
```

```

*****
* 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	STORYROCK PH1A EX - STORYROCK PHASE 1A EXCONDITION									
3	ID	2 YEAR									
4	ID	6 Hour Storm									
5	ID	Unit Hydrograph: Clark									
6	ID	Storm: Multiple									
7	ID	10/26/2016									
	*DIAGRAM										
8	IT	5	1JAN99	0	2000						
9	IO	5									
10	IN	15									
	*										
11	JD	1.419	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	1.410	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	JD	1.384	2.8								
20	PC	0.000	0.009	0.016	0.025	0.034	0.042	0.051	0.059	0.067	0.076
21	PC	0.087	0.100	0.120	0.163	0.252	0.451	0.694	0.837	0.900	0.938
22	PC	0.950	0.963	0.975	0.988	1.000					
	*										
23	KK	OFF05	BASIN								
24	BA	0.001									
25	LG	0.35	0.40	6.00	0.18	0					
26	UC	0.142	0.166								
27	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
28	UA	.100									
	*										
29	KK	ROSA	ROUTE								
30	RS	1	FLOW								
31	RC	0.050	0.035	0.050	380	0.0340	0.00				
32	RX	0.00	12.00	16.00	20.00	21.00	24.00	32.00	42.00		
33	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00		

238	BA	0.004									
239	LG	0.35	0.40	6.00	0.18	0					
240	UC	0.252	0.386								
241	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
242	UA	100									
	*										
243	KK	R070	ROUTE								
244	RS	1	FLOW								
245	RC	0.050	0.035	0.050	1280	0.0250	0.00				
246	RX	0.00	14.00	27.00	31.50	32.00	36.00	40.00	46.00		
247	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00		
	*										
248	KK	ON70	BASIN								
249	BA	0.014									
250	LG	0.35	0.40	6.00	0.18	0					
251	UC	0.364	0.495								
252	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
253	UA	100									
	*										
254	KK	C075A	COMBINE								
255	HC	3									
	*										
256	KK	R075B	ROUTE								
257	RS	1	FLOW								
258	RC	0.050	0.035	0.050	690	0.0260	0.00				
259	RX	0.00	15.00	26.00	32.00	43.00	46.00	50.00	55.00		
260	RY	2.00	1.50	1.00	0.00	0.00	1.00	2.00	3.00		
	*										
261	KK	ON75	BASIN								
262	BA	0.013									
263	LG	0.35	0.40	6.00	0.18	0					
264	UC	0.508	0.683								
265	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
266	UA	100									
	*										

HEC-1 INPUT

PAGE 8

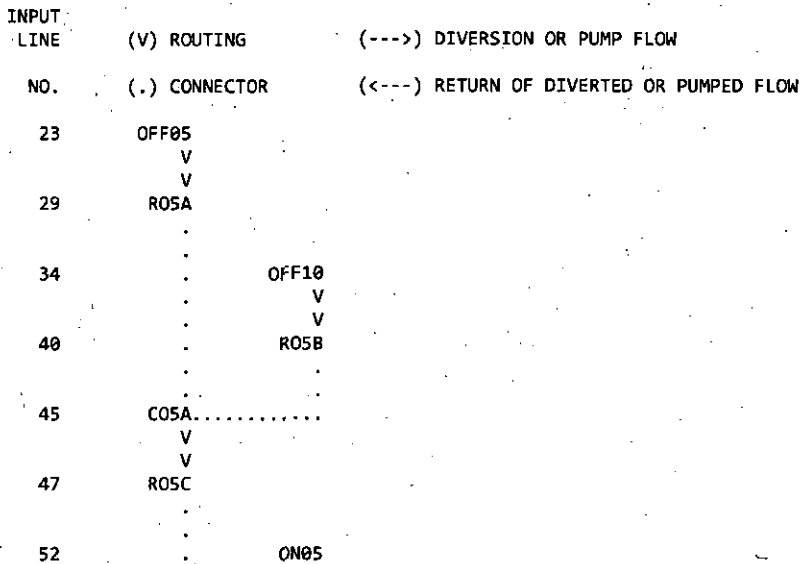
LINE	ID	1	2	3	4	5	6	7	8	9	10
267	KK	C075B	COMBINE								
268	HC	2									
	*										
269	KK	DT1	DIVERT								
270	DT	D45	0.0	0.0							
271	DI	0.0	50.0	100.0	150.0	200.0	250.0	300.0	350.0	400.0	432.0
272	DQ	0.0	0.0	0.0	0.0	0.0	0.3	1.5	4.0	7.5	11.0
	*										
273	KK	R076	ROUTE								
274	RS	1	FLOW								
275	RC	0.050	0.035	0.050	908	0.0260	0.00				
276	RX	0.00	2.00	5.00	8.00	25.00	29.00	32.00	35.00		
277	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00		
	*										
278	KK	ON76	BASIN								
279	BA	0.010									
280	LG	0.35	0.40	6.00	0.18	0					
281	UC	0.289	0.355								
282	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
283	UA	100									
	*										
284	KK	ON55	BASIN								
285	BA	0.003									
286	LG	0.35	0.40	6.00	0.18	0					
287	UC	0.218	0.297								
288	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
289	UA	100									
	*										

291	HC	3												
292	KK	DT1RETRIEVE												
293	DR	D45												
294	KK	RO45	ROUTE											
295	RS	1	FLOW											
296	RC	0.050	0.035	0.050	611	0.0290	0.00							
297	RX	0.00	11.00	15.00	19.00	19.10	25.00	33.00	43.00					
298	RY	2.50	2.00	1.00	0.00	0.00	1.00	2.00	3.00					
299	KK	ON45	BASIN											
300	BA	0.006												
301	LG	0.35	0.40	6.00	0.18	0								
302	UC	0.323	0.516											
303	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0			
304	UA	100												

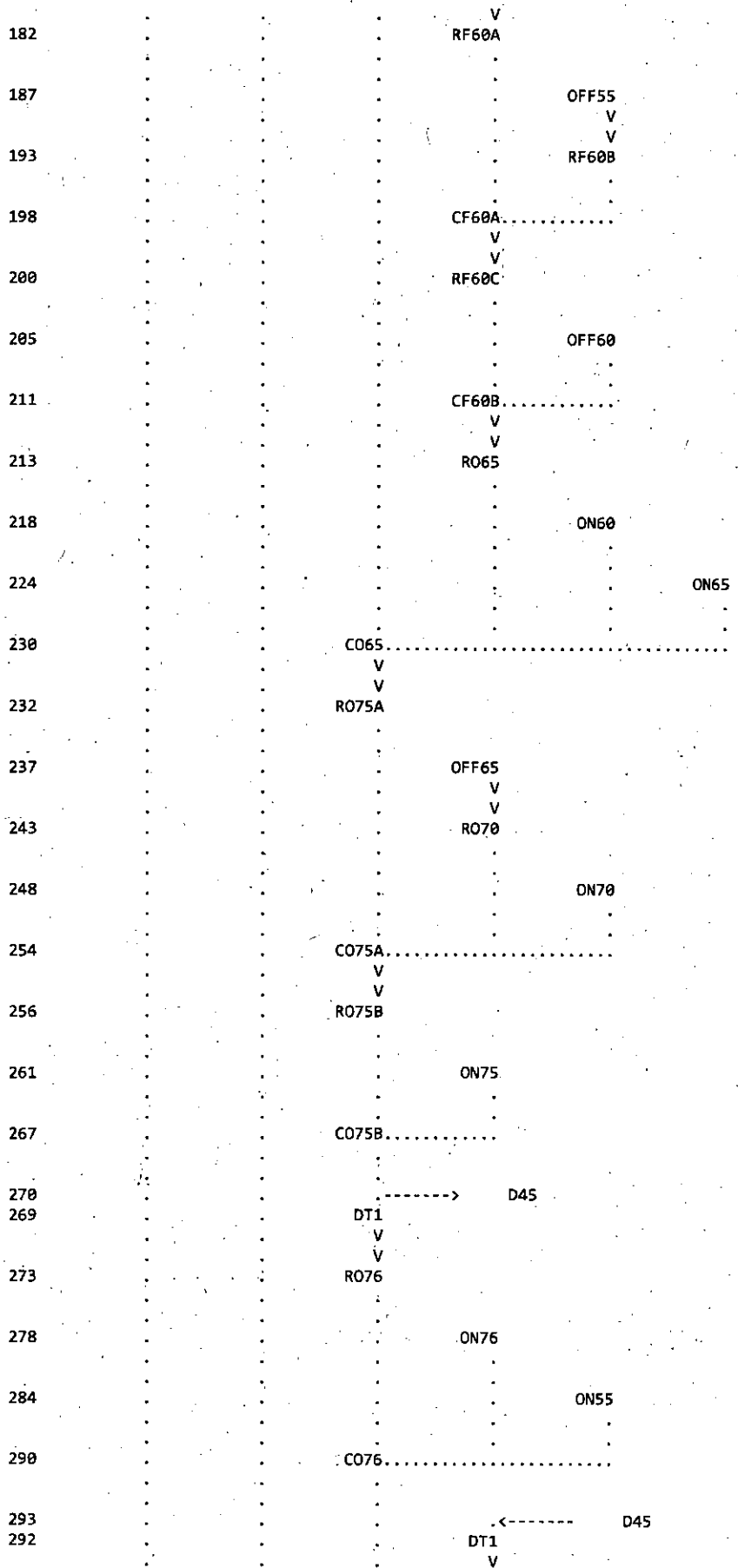
HEC-1 INPUT

LINE	ID	1	2	3	4	5	6	7	8	9	10
305	KK	CO45	COMBINE								
306	HC	2									
307	KK	ON30	BASIN								
308	BA	0.033									
309	LG	0.35	0.40	6.00	0.18	0					
310	UC	0.460	0.577								
311	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
312	UA	100									
313	KK	ON40	BASIN								
314	BA	0.007									
315	LG	0.35	0.40	6.00	0.18	0					
316	UC	0.377	0.744								
317	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
318	UA	100									
319	KK	CO45B	COMBINE								
320	HC	3									
321	ZZ										

SCHEMATIC DIAGRAM OF STREAM NETWORK



60 OFF15
V
V
66 RO10A
71 OFF20
V
V
77 RO10B
82 CO10A.....
V
V
84 RO10C
89 ON10
95 CO10B.....
V
V
97 RO11
102 ON11
108 CO11.....
110 ON15
116 ON20
122 CO20.....
124 ON35
130 COEX1.....
132 ON50
138 OFF30
144 OFF35
150 OFF40
156 CF45A.....
V
V
158 RF45
163 OFF45
169 CF45B.....
V
V
171 RO60



```

299 . . . . . ON45
305 . . . . . CO45.....
307 . . . . . ON30
313 . . . . . ON40
319 . . . . . CO45B.....
    
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

1*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*   JUN 1998 *
*   VERSION 4.1 *
* RUN DATE 26OCT16 TIME 16:21:12 *
* *****
    
```

```

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

Flood Control District of Maricopa County
 STORYROCK PH1A EX - STORYROCK PHASE 1A EXCONDITION
 2 YEAR
 6 Hour Storm
 Unit Hydrograph: Clark
 Storm: Multiple
 10/26/2016

```

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

```

IT        HYDROGRAPH TIME DATA
          NMIN       5 MINUTES IN COMPUTATION INTERVAL
          IDATE      1JAN99 STARTING DATE
          ITIME      0000 STARTING TIME
          NQ         2000 NUMBER OF HYDROGRAPH ORDINATES
          NDDATE     7JAN99 ENDING DATE
          NDTIME     2235 ENDING TIME
          ICENT      19 CENTURY MARK
    
```

COMPUTATION INTERVAL 0.08 HOURS
 TOTAL TIME BASE 166.58 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       1.42 PRECIPITATION DEPTH
          TRDA       0.00 TRANSPOSITION DRAINAGE AREA
    
```

```

12 PI     PRECIPITATION PATTERN
          0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
          0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
          0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
          0.00 0.00 0.00 0.01 0.01 0.01 0.01 0.01 0.01 0.01
          0.03 0.03 0.05 0.05 0.05 0.05 0.15 0.15 0.15 0.03
          0.03 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.00 0.00
          0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
          0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
    
```

15 JD INDEX STORM NO. 2
 STRM 1.41 PRECIPITATION DEPTH
 TRDA 0.50 TRANSPOSITION DRAINAGE AREA

16 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.05	0.05	0.05	0.15	0.15	0.15	0.15	0.03	0.03
0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00									

19 JD INDEX STORM NO. 3
 STRM 1.38 PRECIPITATION DEPTH
 TRDA 2.80 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.05	0.05
0.05	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00									

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								
+		OFF05	1.	4.08	0.	0.	0.	0.00	
	ROUTED TO								
+		ROSA	1.	4.17	0.	0.	0.	0.00	
	HYDROGRAPH AT								
+		OFF10	2.	4.17	0.	0.	0.	0.00	
	ROUTED TO								
+		RO5B	2.	4.25	0.	0.	0.	0.00	
	2 COMBINED AT								
+		COSA	2.	4.17	0.	0.	0.	0.01	
	ROUTED TO								
+		RO5C	2.	4.25	0.	0.	0.	0.01	
	HYDROGRAPH AT								
+		ON05	3.	4.25	0.	0.	0.	0.01	
	2 COMBINED AT								
+		COSB	5.	4.25	1.	0.	0.	0.02	
	HYDROGRAPH AT								
+		OFF15	3.	4.25	0.	0.	0.	0.01	
	ROUTED TO								
+		RO10A	3.	4.33	0.	0.	0.	0.01	
	HYDROGRAPH AT								
+		OFF20	2.	4.17	0.	0.	0.	0.00	
	ROUTED TO								
+		RO10B	2.	4.25	0.	0.	0.	0.00	
	2 COMBINED AT								
+		CO10A	5.	4.33	1.	0.	0.	0.02	
	ROUTED TO								
+		RO10C	5.	4.42	1.	0.	0.	0.02	

+		ON10	6.	4.25	1.	0.	0.	0.02
	2 COMBINED AT							
+		CO10B	10.	4.33	1.	0.	0.	0.04
	ROUTED TO							
+		RO11	8.	4.42	1.	0.	0.	0.04
	HYDROGRAPH AT							
+		ON11	2.	4.25	0.	0.	0.	0.01
	2 COMBINED AT							
+		CO11	11.	4.42	2.	0.	0.	0.05
	HYDROGRAPH AT							
+		ON15	3.	4.25	0.	0.	0.	0.01
	HYDROGRAPH AT							
+		ON20	5.	4.50	1.	0.	0.	0.03
	2 COMBINED AT							
+		CO20	7.	4.42	1.	0.	0.	0.05
	HYDROGRAPH AT							
+		ON35	1.	4.08	0.	0.	0.	0.00
	4 COMBINED AT							
+		COEX1	21.	4.42	4.	1.	0.	0.11
	HYDROGRAPH AT							
+		ON50	1.	4.08	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		OFF30	28.	4.50	5.	1.	0.	0.15
	HYDROGRAPH AT							
+		OFF35	10.	4.25	1.	0.	0.	0.03
	HYDROGRAPH AT							
+		OFF40	1.	4.08	0.	0.	0.	0.00
	3 COMBINED AT							
+		CF45A	35.	4.50	6.	1.	0.	0.18
	ROUTED TO							
+		RF45	34.	4.50	6.	1.	0.	0.18
	HYDROGRAPH AT							
+		OFF45	7.	4.25	1.	0.	0.	0.03
	2 COMBINED AT							
+		CF45B	39.	4.50	7.	2.	1.	0.21
	ROUTED TO							
+		RO60	39.	4.50	7.	2.	1.	0.21
	HYDROGRAPH AT							
+		OFF50	10.	4.50	2.	0.	0.	0.06
	ROUTED TO							
+		RF60A	9.	4.58	2.	0.	0.	0.06
	HYDROGRAPH AT							
+		OFF55	1.	4.17	0.	0.	0.	0.00
	ROUTED TO							
+		RF60B	1.	4.25	0.	0.	0.	0.00
	2 COMBINED AT							
+		CF60A	10.	4.58	2.	1.	0.	0.07
	ROUTED TO							
+		RF60C	9.	4.67	2.	1.	0.	0.07
	HYDROGRAPH AT							
+		OFF60	4.	4.33	1.	0.	0.	0.02
	2 COMBINED AT							

+	ROUTED TO	R065	12.	4.67	3.	1.	0.	0.08
+	HYDROGRAPH AT	ON60	3.	4.25	0.	0.	0.	0.01
+	HYDROGRAPH AT	ON65	1.	4.25	0.	0.	0.	0.00
+	4 COMBINED AT	C065	52.	4.58	10.	2.	1.	0.31
+	ROUTED TO	R075A	52.	4.58	10.	2.	1.	0.31
+	HYDROGRAPH AT	OFF65	1.	4.17	0.	0.	0.	0.00
+	ROUTED TO	R070	1.	4.33	0.	0.	0.	0.00
+	HYDROGRAPH AT	ON70	4.	4.25	0.	0.	0.	0.01
+	3 COMBINED AT	C075A	54.	4.58	10.	3.	1.	0.32
+	ROUTED TO	R075B	54.	4.58	10.	3.	1.	0.32
+	HYDROGRAPH AT	ON75	3.	4.42	0.	0.	0.	0.01
+	2 COMBINED AT	C075B	56.	4.58	11.	3.	1.	0.34
+	DIVERSION TO	D45	0.	0.00	0.	0.	0.	0.34
+	HYDROGRAPH AT	DT1	56.	4.58	11.	3.	1.	0.34
+	ROUTED TO	R076	56.	4.67	11.	3.	1.	0.34
+	HYDROGRAPH AT	ON76	3.	4.25	0.	0.	0.	0.01
+	HYDROGRAPH AT	ON55	1.	4.17	0.	0.	0.	0.00
+	3 COMBINED AT	C076	57.	4.58	11.	3.	1.	0.35
+	HYDROGRAPH AT	DT1	0.	0.00	0.	0.	0.	0.34
+	ROUTED TO	R045	0.	0.00	0.	0.	0.	0.34
+	HYDROGRAPH AT	ON45	2.	4.25	0.	0.	0.	0.01
+	2 COMBINED AT	C045	2.	4.25	0.	0.	0.	0.01
+	HYDROGRAPH AT	ON30	8.	4.33	1.	0.	0.	0.03
+	HYDROGRAPH AT	ON40	1.	4.33	0.	0.	0.	0.01
+	3 COMBINED AT	C045B	10.	4.33	1.	0.	0.	0.05


```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 26OCT16 TIME 16:21:18
*
*****
    
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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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X X XXXXXXX XXXXX X
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XXXXXXXX XXXX X XXXXX X
X X X X X
X X X X X
X X XXXXXXX XXXXX XXX
    
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1G5, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- 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	STORYROCK PH1A EX - STORYROCK PHASE 1A' EXCONDITON									
3	ID	10 YEAR									
4	ID	6 Hour Storm									
5	ID	Unit Hydrograph: Clark									
6	ID	Storm: Multiple									
7	ID	10/26/2016									
	*DIAGRAM										
8	IT	5	1JAN99	0	2000						
9	IO	5									
10	IN	15									
	*										
11	JD	2.105	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	2.092	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	JD	2.052	2.8								
20	PC	0.000	0.009	0.016	0.025	0.034	0.042	0.051	0.059	0.067	0.076
21	PC	0.087	0.100	0.120	0.163	0.252	0.451	0.694	0.837	0.900	0.938
22	PC	0.950	0.963	0.975	0.988	1.000					
	*										
23	KK	OFF05	BASIN								
24	BA	0.001									
25	LG	0.35	0.40	6.00	0.18	0					
26	UC	0.118	0.135								
27	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
28	UA	100									
	*										
29	KK	ROSA	ROUTE								
30	RS	1	FLOW								
31	RC	0.050	0.035	0.050	380	0.0340	0.00				
32	RX	0.00	12.00	16.00	20.00	21.00	24.00	32.00	42.00		
33	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00		

189	LG	0.35	0.40	6.00	0.18	0					
190	UC	0.169	0.205								
191	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
192	UA	100									

1

HEC-1 INPUT

PAGE 6

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

193	KK	RF60B	ROUTE								
194	RS	1	FLOW								
195	RC	0.050	0.035	0.050	1200	0.0320	0.00				
196	RX	0.00	9.00	14.00	16.00	16.50	22.00	26.00	33.00		
197	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00		

198	KK	CF60A	COMBINE								
199	HC	2									

200	KK	RF60C	ROUTE								
201	RS	1	FLOW								
202	RC	0.050	0.035	0.050	650	0.0280	0.00				
203	RX	0.00	25.00	38.00	48.00	49.00	57.00	67.00	80.00		
204	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00		

205	KK	OFF60	BASIN								
206	BA	0.018									
207	LG	0.35	0.40	6.00	0.18	0					
208	UC	0.353	0.520								
209	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
210	UA	100									

211	KK	CF60B	COMBINE								
212	HC	2									

213	KK	R065	ROUTE								
214	RS	1	FLOW								
215	RC	0.050	0.035	0.050	756	0.0250	0.00				
216	RX	0.00	5.00	7.00	8.50	9.00	19.00	24.00	29.00		
217	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00		

218	KK	ON60	BASIN								
219	BA	0.010									
220	LG	0.35	0.40	6.00	0.18	0					
221	UC	0.273	0.412								
222	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
223	UA	100									

224	KK	ON65	BASIN								
225	BA	0.004									
226	LG	0.35	0.40	6.00	0.18	0					
227	UC	0.250	0.406								
228	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
229	UA	100									

1

HEC-1 INPUT

PAGE 7

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

230	KK	C065	COMBINE								
231	HC	4									

232	KK	R075A	ROUTE								
233	RS	1	FLOW								
234	RC	0.050	0.035	0.050	553	0.0240	0.00				
235	RX	0.00	18.00	20.00	23.00	34.00	38.00	41.00	44.00		
236	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00		

291	HC	3									
	*										
292	KK	DT1RETRIEVE									
293	DR	D45									
	*										
294	KK	R045	ROUTE								
295	RS	1	FLOW								
296	RC	0.050	0.035	0.050	611	0.0290	0.00				
297	RX	0.00	11.00	15.00	19.00	19.10	25.00	33.00	43.00		
298	RY	2.50	2.00	1.00	0.00	0.00	1.00	2.00	3.00		
	*										
299	KK	ON45	BASIN								
300	BA	0.006									
301	LG	0.35	0.40	6.00	0.18	0					
302	UC	0.268	0.420								
303	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
304	UA	100									
	*										

HEC-1 INPUT

PAGE 9

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

305	KK	C045	COMBINE								
306	HC	2									
	*										
307	KK	ON30	BASIN								
308	BA	0.033									
309	LG	0.35	0.40	6.00	0.18	0					
310	UC	0.382	0.469								
311	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
312	UA	100									
	*										
313	KK	ON40	BASIN								
314	BA	0.007									
315	LG	0.35	0.40	6.00	0.18	0					
316	UC	0.314	0.606								
317	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
318	UA	100									
	*										
319	KK	C045B	COMBINE								
320	HC	3									
	*										
321	ZZ										

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
23	OFF05	
	V	
	V	
29	ROSA	
	.	
34	OFF10	
	V	
	V	
40	ROSB	
	.	
45	COSA.....	
	V	
	V	
47	ROSC	
	.	
52	ON05	

60	OFF15		
	V		
	V		
66	R010A		
71		OFF20	
		V	
		V	
77		R010B	
82	CO10A		
	V		
	V		
84	R010C		
89		ON10	
95	CO10B		
	V		
	V		
97	R011		
102		ON11	
108	CO11		
110		ON15	
116			ON20
122		CO20	
124			ON35
130	COEX1		
132		ON50	
138		OFF30	
144			OFF35
150			OFF40
156		CF45A	
		V	
		V	
158		RF45	
163			OFF45
169		CF45B	
		V	
		V	
171		R060	
			OFF50

STOCK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BOND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PROPERTY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LIABILITY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DEPARTMENT OF COMMERCE
 BUREAU OF ECONOMIC ANALYSIS
 WASHINGTON, D. C.
 OFFICE OF THE DIRECTOR
 ECONOMIC RESEARCH
 AND STATISTICS
 DIVISION
 REPORT NO. 100-10000
 JANUARY 1960

TITLE: THE ECONOMIC
 SITUATION IN THE
 UNITED STATES
 DURING THE
 YEAR 1959
 AUTHOR: J. B. CONNOR
 DATE: JANUARY 1960

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CONCLUSION
 THE ECONOMIC
 SITUATION IN THE
 UNITED STATES
 DURING THE
 YEAR 1959

SUMMARY
 THE ECONOMIC
 SITUATION IN THE
 UNITED STATES
 DURING THE
 YEAR 1959

15 JD INDEX STORM NO. 2
 STRM 2.09 PRECIPITATION DEPTH
 TRDA 0.50 TRANSPOSITION DRAINAGE AREA

16 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.05	0.05	0.05	0.05	0.15	0.15	0.15	0.03	0.03
0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00									

19 JD INDEX STORM NO. 3
 STRM 2.05 PRECIPITATION DEPTH
 TRDA 2.80 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.05	0.05
0.05	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00									

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								
+	ROUTED TO								
	OFF05	1.	4.00	0.	0.	0.	0.00		
+	ROUTED TO								
	R05A	1.	4.08	0.	0.	0.	0.00		
+	HYDROGRAPH AT								
	OFF10	5.	4.08	0.	0.	0.	0.00		
+	ROUTED TO								
	R05B	5.	4.17	0.	0.	0.	0.00		
+	2 COMBINED AT								
	C05A	6.	4.17	0.	0.	0.	0.01		
+	ROUTED TO								
	R05C	6.	4.17	0.	0.	0.	0.01		
+	HYDROGRAPH AT								
	ON05	8.	4.17	1.	0.	0.	0.01		
+	2 COMBINED AT								
	C05B	13.	4.17	1.	0.	0.	0.02		
+	HYDROGRAPH AT								
	OFF15	10.	4.25	1.	0.	0.	0.01		
+	ROUTED TO								
	R010A	10.	4.25	1.	0.	0.	0.01		
+	HYDROGRAPH AT								
	OFF20	5.	4.17	0.	0.	0.	0.00		
+	ROUTED TO								
	R010B	5.	4.17	0.	0.	0.	0.00		
+	2 COMBINED AT								
	C010A	14.	4.25	1.	0.	0.	0.02		
+	ROUTED TO								
	R010C	13.	4.33	1.	0.	0.	0.02		

+		ON10	16.	4.17	1.	0.	0.	0.02
	2 COMBINED AT							
+		CO10B	28.	4.25	3.	1.	0.	0.04
	ROUTED TO							
+		RO11	26.	4.33	3.	1.	0.	0.04
	HYDROGRAPH AT							
+		ON11	7.	4.25	1.	0.	0.	0.01
	2 COMBINED AT							
+		CO11	32.	4.33	4.	1.	0.	0.05
	HYDROGRAPH AT							
+		ON15	9.	4.17	1.	0.	0.	0.01
	HYDROGRAPH AT							
+		ON20	14.	4.33	3.	1.	0.	0.03
	2 COMBINED AT							
+		CO20	21.	4.33	4.	1.	0.	0.05
	HYDROGRAPH AT							
+		ON35	1.	4.00	0.	0.	0.	0.00
	4 COMBINED AT							
+		COEX1	64.	4.25	9.	2.	1.	0.11
	HYDROGRAPH AT							
+		ONS0	2.	4.08	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		OFF30	81.	4.42	12.	3.	1.	0.15
	HYDROGRAPH AT							
+		OFF35	26.	4.25	2.	1.	0.	0.03
	HYDROGRAPH AT							
+		OFF40	2.	4.08	0.	0.	0.	0.00
	3 COMBINED AT							
+		CF45A	100.	4.33	14.	4.	1.	0.18
	ROUTED TO							
+		RF45	99.	4.42	14.	4.	1.	0.18
	HYDROGRAPH AT							
+		OFF45	20.	4.25	2.	0.	0.	0.03
	2 COMBINED AT							
+		CF45B	113.	4.33	16.	4.	1.	0.21
	ROUTED TO							
+		RO60	113.	4.42	16.	4.	1.	0.21
	HYDROGRAPH AT							
+		OFF50	29.	4.33	5.	1.	0.	0.06
	ROUTED TO							
+		RF60A	27.	4.50	5.	1.	0.	0.06
	HYDROGRAPH AT							
+		OFF55	4.	4.08	0.	0.	0.	0.00
	ROUTED TO							
+		RF60B	3.	4.17	0.	0.	0.	0.00
	2 COMBINED AT							
+		CF60A	29.	4.42	5.	1.	0.	0.07
	ROUTED TO							
+		RF60C	29.	4.50	5.	1.	0.	0.07
	HYDROGRAPH AT							
+		OFF60	11.	4.25	1.	0.	0.	0.02

+	ROUTED TO	R065	36.	4.50	6.	2.	1.	0.08
+	HYDROGRAPH AT	DN60	7.	4.17	1.	0.	0.	0.01
+	HYDROGRAPH AT	DN65	3.	4.17	0.	0.	0.	0.00
+	4 COMBINED AT	C065	154.	4.42	24.	6.	2.	0.31
+	ROUTED TO	R075A	154.	4.42	24.	6.	2.	0.31
+	HYDROGRAPH AT	OFF65	4.	4.17	0.	0.	0.	0.00
+	ROUTED TO	R070	3.	4.25	0.	0.	0.	0.00
+	HYDROGRAPH AT	DN70	10.	4.25	1.	0.	0.	0.01
+	3 COMBINED AT	C075A	164.	4.42	25.	6.	2.	0.32
+	ROUTED TO	R075B	163.	4.42	25.	6.	2.	0.32
+	HYDROGRAPH AT	DN75	7.	4.33	1.	0.	0.	0.01
+	2 COMBINED AT	C075B	169.	4.42	26.	7.	2.	0.34
+	DIVERSION TO	D45	0.	0.00	0.	0.	0.	0.34
+	HYDROGRAPH AT	DT1	169.	4.42	26.	7.	2.	0.34
+	ROUTED TO	R076	167.	4.42	26.	7.	2.	0.34
+	HYDROGRAPH AT	DN76	9.	4.17	1.	0.	0.	0.01
+	HYDROGRAPH AT	DN55	3.	4.08	0.	0.	0.	0.00
+	3 COMBINED AT	C076	172.	4.42	27.	7.	2.	0.35
+	HYDROGRAPH AT	DT1	0.	0.00	0.	0.	0.	0.34
+	ROUTED TO	R045	0.	0.00	0.	0.	0.	0.34
+	HYDROGRAPH AT	DN45	4.	4.17	0.	0.	0.	0.01
+	2 COMBINED AT	C045	4.	4.17	0.	0.	0.	0.01
+	HYDROGRAPH AT	DN30	22.	4.25	3.	1.	0.	0.03
+	HYDROGRAPH AT	DN40	4.	4.25	1.	0.	0.	0.01
+	3 COMBINED AT	C045B	30.	4.25	4.	1.	0.	0.05


```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 26OCT16 TIME 16:21:21
*
*****
    
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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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X X XXXXXXX XXXXX X
X X X X X XX
X X X X X X
XXXXXXXX XXXX X XXXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXXX XXX
    
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1G5, 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

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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 STORYROCK PH1A EX - STORYROCK PHASE 1A EXCONDITION
3 ID 100 YEAR
4 ID 6 Hour Storm
5 ID Unit Hydrograph: Clark
6 ID Storm: Multiple
7 ID 10/26/2016
  *DIAGRAM
8 IT 5 1JAN99 0 2000
9 IO 5
10 IN 15
  *
11 JD 3.174 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 3.155 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 JD 3.095 2.8
20 PC 0.000 0.009 0.016 0.025 0.034 0.042 0.051 0.059 0.067 0.076
21 PC 0.087 0.100 0.120 0.163 0.252 0.451 0.694 0.837 0.900 0.938
22 PC 0.950 0.963 0.975 0.988 1.000
  *
23 KK OFF05 BASIN
24 BA 0.001
25 LG 0.35 0.40 6.00 0.18 0
26 UC 0.089 0.099
27 UA 0 3.0 5.0 8.0 12.0 20.0 43.0 75.0 90.0 96.0
28 UA 100
  *
29 KK ROSA ROUTE
30 RS 1 FLOW
31 RC 0.050 0.035 0.050 380 0.0340 0.00
32 RX 0.00 12.00 16.00 20.00 21.00 24.00 32.00 42.00
33 RY 3.00 2.00 1.00 0.00 0.00 1.00 2.00 3.00
  *
    
```


84	KK	RO10C	ROUTE									
85	RS	1	FLOW									
86	RC	0.050	0.035	0.050	621	0.0220	0.00					
87	RX	0.00	5.00	10.00	28.00	32.00	68.00	78.00	83.00			
88	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00			
	*											
89	KK	ON10	BASIN									
90	BA	0.019										
91	LG	0.35	0.40	6.00	0.18	0						
92	UC	0.229	0.235									
93	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0	
94	UA	100										
	*											
95	KK	CO10B	COMBINE									
96	HC	2										
	*											
97	KK	RO11	ROUTE									
98	RS	1	FLOW									
99	RC	0.050	0.035	0.050	1000	0.0220	0.00					
100	RX	0.00	5.00	10.00	28.00	32.00	68.00	78.00	83.00			
101	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00			
	*											
102	KK	ON11	BASIN									
103	BA	0.010										
104	LG	0.35	0.40	6.00	0.18	0						
105	UC	0.242	0.337									
106	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0	
107	UA	100										
	*											
108	KK	CO11	COMBINE									
109	HC	2										
	*											
110	KK	ON15	BASIN									
111	BA	0.012										
112	LG	0.35	0.40	6.00	0.18	0						
113	UC	0.213	0.273									
114	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0	
115	UA	100										
	*											

HEC-1 INPUT

PAGE 4

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

116	KK	ON20	BASIN									
117	BA	0.034										
118	LG	0.35	0.40	6.00	0.18	0						
119	UC	0.372	0.623									
120	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0	
121	UA	100										
	*											
122	KK	CO20	COMBINE									
123	HC	2										
	*											
124	KK	ON35	BASIN									
125	BA	0.001										
126	LG	0.35	0.40	6.00	0.18	0						
127	UC	0.084	0.092									
128	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0	
129	UA	100										
	*											
130	KK	COEX1	COMBINE									
131	HC	4										
	*											

132	KK	ON50	BASIN									
133	BA	0.002										
134	LG	0.35	0.40	6.00	0.18	0						

238	BA	0.004									
239	LG	0.35	0.40	6.00	0.18	0					
240	UC	0.157	0.229								
241	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
242	UA	100									
	*										
243	KK	R070	ROUTE								
244	RS	1	FLOW								
245	RC	0.050	0.035	0.050	1280	0.0250	0.00				
246	RX	0.00	14.00	27.00	31.50	32.00	36.00	40.00	46.00		
247	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00		
	*										
248	KK	ON70	BASIN								
249	BA	0.014									
250	LG	0.35	0.40	6.00	0.18	0					
251	UC	0.227	0.294								
252	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
253	UA	100									
	*										
254	KK	C075A	COMBINE								
255	HC	3									
	*										
256	KK	R075B	ROUTE								
257	RS	1	FLOW								
258	RC	0.050	0.035	0.050	690	0.0260	0.00				
259	RX	0.00	15.00	26.00	32.00	43.00	46.00	50.00	55.00		
260	RY	2.00	1.50	1.00	0.00	0.00	1.00	2.00	3.00		
	*										
261	KK	ON75	BASIN								
262	BA	0.013									
263	LG	0.35	0.40	6.00	0.18	0					
264	UC	0.317	0.405								
265	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
266	UA	100									
	*										

HEC-1 INPUT

PAGE 8

LINE	ID	1	2	3	4	5	6	7	8	9	10
267	KK	C075B	COMBINE								
268	HC	2									
	*										
269	KK	DT1	DIVERT								
270	DT	D45	0.0	0.0							
271	DI	0.0	50.0	100.0	150.0	200.0	250.0	300.0	350.0	400.0	432.0
272	DQ	0.0	0.0	0.0	0.0	0.0	0.3	1.5	4.0	7.5	11.0
	*										
273	KK	R076	ROUTE								
274	RS	1	FLOW								
275	RC	0.050	0.035	0.050	908	0.0260	0.00				
276	RX	0.00	2.00	5.00	8.00	25.00	29.00	32.00	35.00		
277	RY	3.00	2.00	1.00	0.00	0.00	1.00	2.00	3.00		
	*										
278	KK	ON76	BASIN								
279	BA	0.010									
280	LG	0.35	0.40	6.00	0.18	0					
281	UC	0.181	0.211								
282	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
283	UA	100									
	*										
284	KK	ON55	BASIN								
285	BA	0.003									
286	LG	0.35	0.40	6.00	0.18	0					
287	UC	0.136	0.176								
288	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
289	UA	100									
	*										

291	HC	3								
	*									
292	KK	DT1RETRIEVE								
293	DR	D45								
	*									
294	KK	RO45	ROUTE							
295	RS	1	FLOW							
296	RC	0.050	0.035	0.050	611	0.0290	0.00			
297	RX	0.00	11.00	15.00	19.00	19.10	25.00	33.00	43.00	
298	RY	2.50	2.00	1.00	0.00	0.00	1.00	2.00	3.00	
	*									
299	KK	ON45	BASIN							
300	BA	0.006								
301	LG	0.35	0.40	6.00	0.18	0				
302	UC	0.202	0.306							
303	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	96.0
304	UA	100								
	*									

HEC-1 INPUT

PAGE 9

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

305	KK	CO45	COMBINE							
306	HC	2								
	*									
307	KK	ON30	BASIN							
308	BA	0.033								
309	LG	0.35	0.40	6.00	0.18	0				
310	UC	0.287	0.342							
311	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	96.0
312	UA	100								
	*									
313	KK	ON40	BASIN							
314	BA	0.007								
315	LG	0.35	0.40	6.00	0.18	0				
316	UC	0.236	0.442							
317	UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	96.0
318	UA	100								
	*									
319	KK	CO45B	COMBINE							
320	HC	3								
	*									
321	ZZ									

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
23	OFF05	
	V	
	V	
29	RO5A	
	.	
	.	
34	OFF10	
	V	
	V	
40	RO5B	
	.	
	.	
45	CO5A.....	
	V	
	V	
47	RO5C	
	.	
	.	
52	ON05	

```

60      OFF15
        V
        V
66      RO10A
        .
        .
71      .      OFF20
        .      V
        .      V
77      .      RO10B
        .
        .
82      .      CO10A.....
        .      V
        .      V
84      .      RO10C
        .
        .
89      .      ON10
        .
        .
95      .      CO10B.....
        .      V
        .      V
97      .      RO11
        .
        .
102     .      ON11
        .
        .
108     .      CO11.....
        .
        .
110     .      ON15
        .
        .
116     .      ON20
        .
        .
122     .      CO20.....
        .
        .
124     .      ON35
        .
        .
130     COEX1.....
        .
        .
132     .      ON50
        .
        .
138     .      OFF30
        .
        .
144     .      OFF35
        .
        .
150     .      OFF40
        .
        .
156     .      CF45A.....
        .      V
        .      V
158     .      RF45
        .
        .
163     .      OFF45
        .
        .
169     .      CF45B.....
        .      V
        .      V
171     .      RO60
        .
        .
176     .      OFF50

```

182	.	.	.	V	
	.	.	.	RF60A	
187	.	.	.		OFF55
	.	.	.	V	
	.	.	.	V	
193	.	.	.		RF60B
198	.	.	.	CF60A
	.	.	.	V	
	.	.	.	V	
200	.	.	.		RF60C
205	.	.	.		OFF60
211	.	.	.	CF60B
	.	.	.	V	
	.	.	.	V	
213	.	.	.		RO65
218	.	.	.		ON60
224	.	.	.		ON65
230	.	.	.	C065
	.	.	.	V	
	.	.	.	V	
232	.	.	.		RO75A
237	.	.	.	OFF65	
	.	.	.	V	
	.	.	.	V	
243	.	.	.		RO70
248	.	.	.		ON70
254	.	.	.	C075A
	.	.	.	V	
	.	.	.	V	
256	.	.	.		RO75B
261	.	.	.		ON75
267	.	.	.	C075B
270	.	.	.	----->	D45
269	.	.	.	DT1	
	.	.	.	V	
	.	.	.	V	
273	.	.	.		RO76
278	.	.	.		ON76
284	.	.	.		ON55
290	.	.	.	C076
293	.	.	.	<-----	D45
292	.	.	.	DT1	
	.	.	.	V	
	.	.	.	V	

15 JD INDEX STORM NO. 2
 STRM 3.15 PRECIPITATION DEPTH
 TRDA 0.50 TRANSPOSITION DRAINAGE AREA

16 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.05	0.05	0.05	0.15	0.15	0.15	0.03	0.03
0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00								

19 JD INDEX STORM NO. 3
 STRM 3.10 PRECIPITATION DEPTH
 TRDA 2.80 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.07	0.07	0.07	0.08	0.08	0.08	0.05	0.05
0.05	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00								

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								
	OFF05	3.	4.00	0.	0.	0.	0.00		
+	ROUTED TO								
	R05A	3.	4.00	0.	0.	0.	0.00		
+	HYDROGRAPH AT								
	OFF10	11.	4.08	1.	0.	0.	0.00		
+	ROUTED TO								
	R05B	11.	4.08	1.	0.	0.	0.00		
+	2 COMBINED AT								
	C05A	13.	4.08	1.	0.	0.	0.01		
+	ROUTED TO								
	R05C	13.	4.17	1.	0.	0.	0.01		
+	HYDROGRAPH AT								
	ON05	18.	4.08	2.	0.	0.	0.01		
+	2 COMBINED AT								
	C05B	30.	4.17	3.	1.	0.	0.02		
+	HYDROGRAPH AT								
	OFF15	23.	4.17	2.	1.	0.	0.01		
+	ROUTED TO								
	R010A	23.	4.17	2.	1.	0.	0.01		
+	HYDROGRAPH AT								
	OFF20	11.	4.08	1.	0.	0.	0.00		
+	ROUTED TO								
	R010B	10.	4.17	1.	0.	0.	0.00		
+	2 COMBINED AT								
	C010A	34.	4.17	3.	1.	0.	0.02		
+	ROUTED TO								
	R010C	32.	4.17	3.	1.	0.	0.02		

+		ON10	37.	4.08	3.	1.	0.	0.02
	2 COMBINED AT							
+		CO10B	68.	4.17	6.	2.	1.	0.04
	ROUTED TO							
+		RO11	63.	4.25	6.	2.	1.	0.04
	HYDROGRAPH AT							
+		ON11	16.	4.17	2.	0.	0.	0.01
	2 COMBINED AT							
+		CO11	77.	4.25	8.	2.	1.	0.05
	HYDROGRAPH AT							
+		ON15	22.	4.08	2.	1.	0.	0.01
	HYDROGRAPH AT							
+		ON20	36.	4.25	6.	1.	0.	0.03
	2 COMBINED AT							
+		CO20	53.	4.17	8.	2.	1.	0.05
	HYDROGRAPH AT							
+		ON35	3.	4.00	0.	0.	0.	0.00
	4 COMBINED AT							
+		COEX1	161.	4.17	18.	5.	2.	0.11
	HYDROGRAPH AT							
+		ON50	5.	4.00	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		OFF30	205.	4.25	25.	6.	2.	0.15
	HYDROGRAPH AT							
+		OFF35	61.	4.17	5.	1.	0.	0.03
	HYDROGRAPH AT							
+		OFF40	5.	4.00	0.	0.	0.	0.00
	3 COMBINED AT							
+		CF45A	255.	4.25	30.	8.	3.	0.18
	ROUTED TO							
+		RF45	251.	4.25	30.	8.	3.	0.18
	HYDROGRAPH AT							
+		OFF45	46.	4.17	4.	1.	0.	0.03
	2 COMBINED AT							
+		CF45B	289.	4.25	35.	9.	3.	0.21
	ROUTED TO							
+		RO60	287.	4.25	35.	9.	3.	0.21
	HYDROGRAPH AT							
+		OFF50	74.	4.25	10.	3.	1.	0.06
	ROUTED TO							
+		RF60A	72.	4.33	10.	3.	1.	0.06
	HYDROGRAPH AT							
+		OFF55	7.	4.00	1.	0.	0.	0.00
	ROUTED TO							
+		RF60B	6.	4.08	1.	0.	0.	0.00
	2 COMBINED AT							
+		CF60A	75.	4.33	11.	3.	1.	0.07
	ROUTED TO							
+		RF60C	75.	4.33	11.	3.	1.	0.07
	HYDROGRAPH AT							
+		OFF60	27.	4.17	3.	1.	0.	0.02
	2 COMBINED AT							

+	ROUTED TO	R065	96.	4.33	14.	3.	1.	0.08
+	HYDROGRAPH AT	ON60	17.	4.08	2.	0.	0.	0.01
+	HYDROGRAPH AT	ON65	7.	4.08	1.	0.	0.	0.00
+	4 COMBINED AT	C065	395.	4.25	51.	13.	4.	0.31
+	ROUTED TO	R075A	394.	4.33	51.	13.	4.	0.31
+	HYDROGRAPH AT	OFF65	8.	4.08	1.	0.	0.	0.00
+	ROUTED TO	R070	7.	4.17	1.	0.	0.	0.00
+	HYDROGRAPH AT	ON70	24.	4.17	2.	1.	0.	0.01
+	3 COMBINED AT	C075A	416.	4.25	54.	13.	4.	0.32
+	ROUTED TO	R075B	418.	4.33	54.	13.	4.	0.32
+	HYDROGRAPH AT	ON75	19.	4.25	2.	1.	0.	0.01
+	2 COMBINED AT	C075B	434.	4.33	56.	14.	5.	0.34
+	DIVERSION TO	D45	11.	4.33	1.	0.	0.	0.34
+	HYDROGRAPH AT	DT1	423.	4.33	55.	14.	5.	0.34
+	ROUTED TO	R076	424.	4.33	55.	14.	5.	0.34
+	HYDROGRAPH AT	ON76	21.	4.08	2.	0.	0.	0.01
+	HYDROGRAPH AT	ON55	7.	4.08	1.	0.	0.	0.00
+	3 COMBINED AT	C076	437.	4.33	58.	14.	5.	0.35
+	HYDROGRAPH AT	DT1	11.	4.33	1.	0.	0.	0.34
+	ROUTED TO	R045	11.	4.33	1.	0.	0.	0.34
+	HYDROGRAPH AT	ON45	10.	4.08	1.	0.	0.	0.01
+	2 COMBINED AT	C045	18.	4.33	2.	0.	0.	0.01
+	HYDROGRAPH AT	ON30	53.	4.17	5.	1.	0.	0.03
+	HYDROGRAPH AT	ON40	10.	4.17	1.	0.	0.	0.01
+	3 COMBINED AT	C045B	74.	4.17	8.	2.	1.	0.05

Proposed Condition

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	
Major Basin ID: 01																		
OFF05	0.001	0.04	263.2	247.4	NATURAL	0.083	0.35	0.40	6.00	0.176		Tc (Hrs)	0.142*	0.133*	0.118*	0.104*	0.096*	0.089*
												Vel (f/s)	0.41	0.44	0.50	0.56	0.61	0.66
												R (Hrs)	0.166	0.154	0.135	0.117	0.107	0.099
OFF10	0.005	0.12	183.3	183.3	NATURAL	0.073	0.35	0.40	6.00	0.176		Tc (Hrs)	0.253*	0.236*	0.210*	0.185*	0.170*	0.158*
												Vel (f/s)	0.70	0.75	0.84	0.95	1.04	1.11
												R (Hrs)	0.303	0.280	0.246	0.214	0.195	0.180
OFF15	0.014	0.29	169.6	169.6	NATURAL	0.067	0.35	0.40	6.00	0.176		Tc (Hrs)	0.386	0.359	0.321	0.282*	0.259*	0.241*
												Vel (f/s)	1.10	1.18	1.33	1.51	1.64	1.76
												R (Hrs)	0.544	0.503	0.443	0.384	0.350	0.323
OFF20	0.005	0.13	198.5	198.5	NATURAL	0.073	0.35	0.40	6.00	0.176		Tc (Hrs)	0.257*	0.240*	0.214*	0.188*	0.173*	0.161*
												Vel (f/s)	0.74	0.79	0.89	1.01	1.10	1.18
												R (Hrs)	0.328	0.304	0.267	0.232	0.211	0.195
OFF30	0.150	1.02	154.6	154.6	NATURAL	0.053	0.35	0.40	6.00	0.176		Tc (Hrs)	0.660	0.615	0.548	0.483	0.443	0.412
												Vel (f/s)	2.27	2.43	2.73	3.10	3.38	3.63
												R (Hrs)	0.699	0.646	0.569	0.494	0.449	0.415
OFF35	0.031	0.37	232.4	228.0	NATURAL	0.062	0.35	0.40	6.00	0.176		Tc (Hrs)	0.382	0.356	0.317	0.279*	0.257*	0.239*
												Vel (f/s)	1.42	1.52	1.71	1.95	2.11	2.27
												R (Hrs)	0.416	0.384	0.338	0.294	0.267	0.247
OFF40	0.001	0.07	246.6	237.7	NATURAL	0.083	0.35	0.40	6.00	0.176		Tc (Hrs)	0.191*	0.178*	0.159*	0.140*	0.128*	0.119*
												Vel (f/s)	0.54	0.58	0.65	0.73	0.80	0.86
												R (Hrs)	0.360	0.332	0.293	0.254	0.231	0.213
OFF45	0.025	0.33	177.2	177.2	NATURAL	0.063	0.35	0.40	6.00	0.176		Tc (Hrs)	0.393	0.366	0.327	0.288*	0.264*	0.246*
												Vel (f/s)	1.23	1.32	1.48	1.68	1.83	1.97
												R (Hrs)	0.443	0.409	0.360	0.313	0.285	0.263
OFF50	0.064	0.86	177.6	177.6	NATURAL	0.057	0.35	0.40	6.00	0.177	1	Tc (Hrs)	0.599	0.559	0.499	0.440	0.404	0.376
												Vel (f/s)	2.11	2.26	2.53	2.87	3.12	3.35
												R (Hrs)	0.890	0.824	0.726	0.631	0.575	0.530

* Non default value or value out of range

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

Project Reference: STORYROCK PH1A PROP

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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	
Major Basin ID: 01																		
OFF55	0.002	0.09	269.7	250.7	NATURAL	0.079	0.35	0.40	6.00	0.176		Tc (Hrs)	0.207*	0.193*	0.172*	0.152*	0.139*	0.130*
												Vel (f/s)	0.64	0.68	0.77	0.87	0.95	1.02
												R (Hrs)	0.325	0.300	0.264	0.230	0.209	0.193
OFF60	0.018	0.37	174.3	174.3	NATURAL	0.065	0.35	0.40	6.00	0.176		Tc (Hrs)	0.425	0.396	0.353	0.311	0.286*	0.266*
												Vel (f/s)	1.28	1.37	1.54	1.74	1.90	2.04
												R (Hrs)	0.639	0.590	0.520	0.451	0.411	0.379
OFF65	0.004	0.14	260.6	246.0	NATURAL	0.074	0.35	0.40	6.00	0.176		Tc (Hrs)	0.252*	0.234*	0.209*	0.184*	0.169*	0.157*
												Vel (f/s)	0.81	0.88	0.98	1.12	1.21	1.31
												R (Hrs)	0.386	0.357	0.314	0.273	0.248	0.229
ON05	0.008	0.25	170.7	170.7	NATURAL	0.053	0.33	0.33	6.00	0.171	9	Tc (Hrs)	0.291*	0.275*	0.248*	0.220*	0.204*	0.191*
												Vel (f/s)	1.26	1.33	1.48	1.67	1.80	1.92
												R (Hrs)	0.486	0.456	0.407	0.356	0.327	0.305
ON10	0.014	0.26	159.7	159.7	NATURAL	0.046	0.32	0.30	6.00	0.177	7	Tc (Hrs)	0.282*	0.266*	0.239*	0.212*	0.197*	0.185*
												Vel (f/s)	1.35	1.43	1.60	1.80	1.94	2.06
												R (Hrs)	0.352	0.330	0.294	0.257	0.236	0.220
ON11	0.009	0.18	101.1	101.1	NATURAL	0.039	0.31	0.27	6.00	0.185	16	Tc (Hrs)	0.237*	0.225*	0.204*	0.182*	0.170*	0.160*
												Vel (f/s)	1.11	1.17	1.29	1.45	1.55	1.65
												R (Hrs)	0.279	0.263	0.235	0.208	0.192	0.180
ON12	0.008	0.24	130.3	130.3	NATURAL	0.057	0.33	0.34	6.00	0.173	6	Tc (Hrs)	0.328	0.309	0.278*	0.246*	0.228*	0.213*
												Vel (f/s)	1.07	1.14	1.27	1.43	1.54	1.65
												R (Hrs)	0.538	0.503	0.447	0.390	0.358	0.333
ON15	0.012	0.19	169.3	169.3	NATURAL	0.034	0.30	0.25	6.00	0.192	19	Tc (Hrs)	0.191*	0.181*	0.164*	0.147*	0.138*	0.130*
												Vel (f/s)	1.46	1.54	1.70	1.90	2.02	2.14
												R (Hrs)	0.194	0.183	0.164	0.145	0.135	0.126
ON20	0.017	0.33	157.1	157.1	NATURAL	0.052	0.32	0.34	6.00	0.177	6	Tc (Hrs)	0.347	0.327	0.294*	0.260*	0.240*	0.225*
												Vel (f/s)	1.39	1.48	1.65	1.86	2.02	2.15
												R (Hrs)	0.480	0.449	0.399	0.348	0.319	0.297

* Non default value or value out of range

(stSubBasCG.rpt)

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

Project Reference: STORYROCK PH1A PROP

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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	
Major Basin ID: 01																		
ON22	0.013	0.34	177.3	177.3	NATURAL	0.047	0.30	0.31	6.00	0.185	14	Tc (Hrs)	0.307	0.291*	0.264*	0.235*	0.219*	0.206*
												Vel (f/s)	1.62	1.71	1.89	2.12	2.28	2.42
												R (Hrs)	0.501	0.471	0.422	0.372	0.343	0.320
ON24	0.006	0.14	171.4	171.4	NATURAL	0.036	0.30	0.25	6.00	0.209	20	Tc (Hrs)	0.169*	0.160*	0.146*	0.131*	0.122*	0.115*
												Vel (f/s)	1.21	1.28	1.41	1.57	1.68	1.79
												R (Hrs)	0.196	0.185	0.167	0.148	0.137	0.128
ON30	0.025	0.31	161.8	161.8	NATURAL	0.049	0.33	0.33	6.00	0.191	10	Tc (Hrs)	0.320	0.301	0.272*	0.242*	0.224*	0.210*
												Vel (f/s)	1.42	1.51	1.67	1.88	2.03	2.17
												R (Hrs)	0.335	0.314	0.280	0.245	0.225	0.209
ON31	0.002	0.09	200.0	199.9	NATURAL	0.039	0.30	0.25	6.00	0.167	17	Tc (Hrs)	0.133*	0.126*	0.114*	0.102*	0.096*	0.090*
												Vel (f/s)	0.99	1.05	1.16	1.29	1.38	1.47
												R (Hrs)	0.198	0.187	0.167	0.148	0.138	0.129
ON35	0.001	0.03	360.0	280.3	NATURAL	0.083	0.35	0.40	6.00	0.176		Tc (Hrs)	0.119*	0.111*	0.099*	0.087*	0.080*	0.074*
												Vel (f/s)	0.37	0.40	0.44	0.51	0.55	0.59
												R (Hrs)	0.108	0.100	0.088	0.076	0.069	0.064
ON40	0.017	0.20	158.2	158.2	NATURAL	0.035	0.30	0.26	6.00	0.209	19	Tc (Hrs)	0.205*	0.194*	0.177*	0.158*	0.148*	0.139*
												Vel (f/s)	1.43	1.51	1.66	1.86	1.98	2.11
												R (Hrs)	0.179	0.169	0.152	0.135	0.125	0.117
ON50	0.001	0.06	234.4	229.5	NATURAL	0.041	0.30	0.25	6.00	0.167	17	Tc (Hrs)	0.107*	0.101*	0.092*	0.082*	0.077*	0.073*
												Vel (f/s)	0.82	0.87	0.96	1.07	1.14	1.21
												R (Hrs)	0.167	0.157	0.141	0.125	0.116	0.109
ON58	0.002	0.14	111.9	111.9	NATURAL	0.039	0.10	0.25	6.00	0.258	60	Tc (Hrs)	0.175*	0.169*	0.157*	0.144*	0.137*	0.130*
												Vel (f/s)	1.17	1.21	1.31	1.43	1.50	1.58
												R (Hrs)	0.384	0.367	0.339	0.309	0.291	0.276
ON59	0.001	0.11	141.5	141.5	NATURAL	0.041	0.10	0.25	6.00	0.258	60	Tc (Hrs)	0.148*	0.143*	0.133*	0.122*	0.116*	0.110*
												Vel (f/s)	1.09	1.13	1.21	1.32	1.39	1.47
												R (Hrs)	0.390	0.374	0.345	0.315	0.296	0.281

* Non default value or value out of range

(stSubBasCG.rpt)

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	
Major Basin ID: 01																		
ON60	0.007	0.12	189.7	189.7	NATURAL	0.051	0.29	0.31	6.00	0.206	20	Tc (Hrs)	0.184*	0.174*	0.159*	0.142*	0.133*	0.125*
												Vel (f/s)	0.96	1.01	1.11	1.24	1.32	1.41
												R (Hrs)	0.175	0.165	0.149	0.132	0.122	0.114
ON61	0.005	0.18	314.6	268.3	NATURAL	0.059	0.25	0.34	6.00	0.209	24	Tc (Hrs)	0.215*	0.204*	0.186*	0.168*	0.157*	0.147*
												Vel (f/s)	1.23	1.29	1.42	1.57	1.68	1.80
												R (Hrs)	0.349	0.330	0.298	0.266	0.246	0.230
ON65	0.007	0.16	176.1	176.1	NATURAL	0.071	0.35	0.40	6.00	0.176		Tc (Hrs)	0.292*	0.272*	0.242*	0.213*	0.196*	0.182*
												Vel (f/s)	0.80	0.86	0.97	1.10	1.20	1.29
												R (Hrs)	0.368	0.340	0.300	0.260	0.237	0.218
ON70	0.014	0.28	194.2	194.2	NATURAL	0.067	0.35	0.40	6.00	0.176		Tc (Hrs)	0.364	0.339	0.302	0.266*	0.244*	0.227*
												Vel (f/s)	1.13	1.21	1.36	1.54	1.68	1.81
												R (Hrs)	0.495	0.458	0.403	0.350	0.318	0.294
ON75	0.022	0.43	159.3	159.3	NATURAL	0.056	0.34	0.36	6.00	0.182	5	Tc (Hrs)	0.419	0.393	0.353	0.312	0.288*	0.269*
												Vel (f/s)	1.51	1.60	1.79	2.02	2.19	2.34
												R (Hrs)	0.631	0.588	0.521	0.455	0.416	0.386

* Non default value or value out of range


Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
Major Basin ID: 01									
OFF05	645	61	64561	0.001	100.00	0.150	-	100	
OFF10	645	61	64561	0.005	100.00	0.150	-	100	
OFF15	645	61	64561	0.014	100.00	0.150	-	100	
OFF20	645	61	64561	0.005	100.00	0.150	-	100	
OFF30	645	61	64561	0.150	100.00	0.150	-	100	
OFF35	645	61	64561	0.031	100.00	0.150	-	100	
OFF40	645	61	64561	0.001	100.00	0.150	-	100	
OFF45	645	61	64561	0.026	100.00	0.150	-	100	
OFF50	645	61	64561	0.064	100.00	0.150	-	100	
OFF55	645	61	64561	0.002	100.00	0.150	-	100	
OFF60	645	61	64561	0.018	100.00	0.150	-	100	
OFF65	645	61	64561	0.004	100.00	0.150	-	100	
ON05	645	61	64561	0.008	100.00	0.150	-	100	
ON10	645	61	64561	0.014	100.00	0.150	-	100	
ON11	645	61	64561	0.009	100.00	0.150	-	100	
ON12	645	61	64561	0.008	100.00	0.150	-	100	
ON15	645	61	64561	0.012	100.00	0.150	-	100	
ON20	645	61	64561	0.017	100.00	0.150	-	100	
ON22	645	61	64561	0.013	100.00	0.150	-	100	
ON24	645	61	64561	0.006	100.00	0.150	-	100	
ON30	645	61	64561	0.025	100.00	0.150	-	100	
ON31	645	61	64561	0.002	100.00	0.150	-	100	
ON35	645	61	64561	0.001	100.00	0.150	-	100	
ON40	645	61	64561	0.017	100.00	0.150	-	100	
ON50	645	61	64561	0.001	100.00	0.150	-	100	
ON58	645	61	64561	0.002	100.00	0.150	-	100	
ON59	645	61	64561	0.001	100.00	0.150	-	100	
ON60	645	61	64561	0.007	100.00	0.150	-	100	
ON61	645	61	64561	0.005	100.00	0.150	-	100	
ON65	645	61	64561	0.007	100.00	0.150	-	100	
ON70	645	61	64561	0.014	100.00	0.150	-	100	
ON75	645	61	64561	0.022	100.00	0.150	-	100	





Legend

 SUBBASIN BOUNDARY


Soil ID

 64561

 64563



0 375 750 1,500



Feet

<p>SCALE: 1" = 100'</p> <p>SCALE: N/A</p> <p>DESIGNED BY: MAW</p> <p>DRAWN BY: DWT</p> <p>CHECKED BY: MAW</p> <p>DATE: AUGUST 2014</p>		<p>Kimley»Horn</p> <p>© 2014 KIMLEY-HORN AND ASSOCIATES, INC. 7740 North 16th Street, Suite 300 Phoenix, Arizona 85020 (602) 944-5500</p> <p>Engineering, Planning and Environmental Consultants</p>		NO.	REVISION	BY	DATE	APPR.
<p>CAVALLIERE EXISTING SOILS MAP</p>		<p>PROJECT NO. 191089013</p> <p>DRAWING NAME Existing_Soils.mxd</p>						

Flood Control District of Maricopa County
 Drainage Design Management System
LAND USE
 Project Reference: STORYROCK PH1A PROP

2/20/20

Land Use Code	Area (sq mi)	Area Initial Loss (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
for Basin ID: 01								
DESERT	0.0014	100.0	0.35	0	25.0	DRY	0.083	Desert
	0.0014	100.0						
DESERT	0.0047	100.0	0.35	0	25.0	DRY	0.073	Desert
	0.0047	100.0						
DESERT	0.0142	100.0	0.35	0	25.0	DRY	0.067	Desert
	0.0142	100.0						
DESERT	0.0051	100.0	0.35	0	25.0	DRY	0.073	Desert
	0.0051	100.0						
DESERT	0.1490	99.3	0.35	0	25.0	DRY	0.053	Desert
ROAD	0.0010	0.7	0.10	60	75.0	NORMAL	0.028	Local Roadway 40' Tract 24' BC
	0.1500	100.0						
DESERT	0.0318	100.0	0.35	0	25.0	DRY	0.062	Desert
	0.0318	100.0						
DESERT	0.0018	100.0	0.35	0	25.0	DRY	0.083	Desert
	0.0018	100.0						
DESERT	0.0255	100.0	0.35	0	25.0	DRY	0.063	Desert
	0.0255	100.0						
DESERT	0.0630	98.4	0.35	0	25.0	DRY	0.058	Desert
ROAD	0.0010	1.6	0.10	60	75.0	NORMAL	0.030	Local Roadway 40' Tract 24' BC
	0.0640	100.0						

* Non default value

(stLuDataCG

Flood Control District of Maricopa County
 Drainage Design Management System
 LAND USE
 Project Reference: STORYROCK PH1A PROP

2/20/20

Land Use Code	Area (sq mi)	Area Initial Loss (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
Sub Basin ID: 01								
DESERT	0.0027	100.0	0.35	0	25.0	DRY	0.079	Desert
	0.0027	100.0						
DESERT	0.0181	100.0	0.35	0	25.0	DRY	0.065	Desert
	0.0181	100.0						
DESERT	0.0041	100.0	0.35	0	25.0	DRY	0.074	Desert
	0.0041	100.0						
DESERT	0.0040	50.0	0.35	0	25.0	DRY	0.070	Desert
R1-43	0.0040	50.0	0.30	17	20.0	NORMAL	0.036	Residential 43,000 sq-ft lots
	0.0080	100.0						
DESERT	0.0050	35.7	0.35	0	25.0	DRY	0.067	Desert
R1-190	0.0060	42.9	0.30	6	20.0	NORMAL	0.034	Residential 190,000 sq-ft lots
R1-35	0.0020	14.3	0.30	21	50.0	NORMAL	0.034	Residential 35,000 sq-ft lots
R1-43	0.0010	7.1	0.30	17	20.0	NORMAL	0.034	Residential 43,000 sq-ft lots
	0.0140	100.0						
DESERT	0.0010	11.1	0.35	0	25.0	DRY	0.070	Desert
R1-35	0.0030	33.3	0.30	21	50.0	NORMAL	0.035	Residential 35,000 sq-ft lots
R1-43	0.0050	55.6	0.30	17	20.0	NORMAL	0.035	Residential 43,000 sq-ft lots
	0.0090	100.0						
DESERT	0.0050	62.5	0.35	0	25.0	DRY	0.070	Desert
R1-43	0.0030	37.5	0.30	17	20.0	NORMAL	0.036	Residential 43,000 sq-ft lots

* Non default value

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Flood Control District of Maricopa County
 Drainage Design Management System
 LAND USE
 Project Reference: STORYROCK PH1A PROP

2/20/20

Land Use Code	Area (sq mi)	Area Initial Loss (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
Basin ID: 01								
	0.0080	100.0						
R1-35	0.0060	50.0	0.30	21	50.0	NORMAL	0.034	Residential 35,000 sq-ft lots
R1-43	0.0060	50.0	0.30	17	20.0	NORMAL	0.034	Residential 43,000 sq-ft lots
	0.0120	100.0						
DESERT	0.0100	58.8	0.35	0	25.0	DRY	0.066	Desert
R1-190	0.0060	35.3	0.30	6	20.0	NORMAL	0.034	Residential 190,000 sq-ft lots
ROAD	0.0010	5.9	0.10	60	75.0	NORMAL	0.034	Local Roadway 40' Tract 24' BC
	0.0170	100.0						
DESERT	0.0050	38.5	0.35	0	25.0	DRY	0.067	Desert
R1-35	0.0020	15.4	0.30	21	50.0	NORMAL	0.034	Residential 35,000 sq-ft lots
R1-43	0.0050	38.5	0.30	17	20.0	NORMAL	0.034	Residential 43,000 sq-ft lots
ROAD	0.0010	7.7	0.10	60	75.0	NORMAL	0.034	Local Roadway 40' Tract 24' BC
	0.0130	100.1						
R1-35	0.0050	83.3	0.30	21	50.0	NORMAL	0.036	Residential 35,000 sq-ft lots
R1-43	0.0010	16.7	0.30	17	20.0	NORMAL	0.036	Residential 43,000 sq-ft lots
	0.0060	100.0						
DESERT	0.0130	52.0	0.35	0	25.0	DRY	0.063	Desert
R1-35	0.0100	40.0	0.30	21	50.0	NORMAL	0.032	Residential 35,000 sq-ft lots
R1-43	0.0020	8.0	0.30	17	20.0	NORMAL	0.032	Residential 43,000 sq-ft lots
	0.0250	100.0						

* Non default value

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Flood Control District of Maricopa County
 Drainage Design Management System
 LAND USE
 Project Reference: STORYROCK PH1A PROP

2/20/20

Land Use Code	Area (sq mi)	Area Initial Loss (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
Sub Basin ID: 01								
R1-43	0.0020	100.0	0.30	17	20.0	NORMAL	0.039	Residential 43,000 sq-ft lots
	0.0020	100.0						
DESERT	0.0010	100.0	0.35	0	25.0	DRY	0.083	Desert
	0.0010	100.0						
DESERT	0.0010	5.6	0.35	0	25.0	DRY	0.066	Desert
R1-35	0.0150	83.3	0.30	21	50.0	NORMAL	0.034	Residential 35,000 sq-ft lots
R1-43	0.0020	11.1	0.30	17	20.0	NORMAL	0.034	Residential 43,000 sq-ft lots
	0.0180	100.0						
R1-43	0.0010	100.0	0.30	17	20.0	NORMAL	0.041	Residential 43,000 sq-ft lots
	0.0010	100.0						
ROAD	0.0020	100.0	0.10	60	75.0	NORMAL	0.039	Local Roadway 40' Tract 24' BC
	0.0020	100.0						
ROAD	0.0010	100.0	0.10	60	75.0	NORMAL	0.041	Local Roadway 40' Tract 24' BC
	0.0010	100.0						
DESERT	0.0030	42.9	0.35	0	25.0	DRY	0.071	Desert
R1-18	0.0030	42.9	0.30	27	50.0	NORMAL	0.036	Residential 18,000 sq-ft lots
ROAD	0.0010	14.3	0.10	60	75.0	NORMAL	0.036	Local Roadway 40' Tract 24' BC
	0.0070	100.1						
DESERT	0.0030	60.0	0.35	0	25.0	DRY	0.073	Desert
ROAD	0.0020	40.0	0.10	60	75.0	NORMAL	0.037	Local Roadway 40' Tract 24' BC

* Non default value

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Flood Control District of Maricopa County
 Drainage Design Management System
 LAND USE
 Project Reference: STORYROCK PH1A PROP

2/20/20

Land Use Code	Area (sq mi)	Area Initial Loss (IA) (%)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
for Basin ID: 01							
	0.0050	100.0					
DESERT	0.0070	100.0	0.35	0	25.0	DRY	0.071 Desert
	0.0070	100.0					
DESERT	0.0139	100.0	0.35	0	25.0	DRY	0.067 Desert
	0.0139	100.0					
DESERT	0.0170	73.9	0.35	0	25.0	DRY	0.064 Desert
R1-35	0.0040	17.4	0.30	21	50.0	NORMAL	0.033 Residential 35,000 sq-ft lots
R1-43	0.0020	8.7	0.30	17	20.0	NORMAL	0.033 Residential 43,000 sq-ft lots
	0.0230	100.0					

* Non default value

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Project **Storyrock**

Subject **Land Use Summary Table**

Designed by **ZJH**

Date

2/5/2016

Project No. 191069020

Checked by **JMB**

Date

2/5/2016

Objective: Land Use Hec-1 Values

Land Use Code	Description	IA	RTIMP	Vegetation Cover
R1-18	Min Lot Size = 13,500 Sq Ft.	0.30	27	50.0
R1-35	Min Lot Size = 26,250 Sq Ft.	0.30	21	50.0
R1-43	Min Lot Size = 32,250 Sq Ft.	0.30	17	20.0
R1-70	Min Lot Size = 52,500 Sq Ft.	0.30	14	20.0
Road	24' Roadway, 40' Tract/ROW	0.10	60	75.0
Natural Desert	Natural Desert	0.35	0	25.0

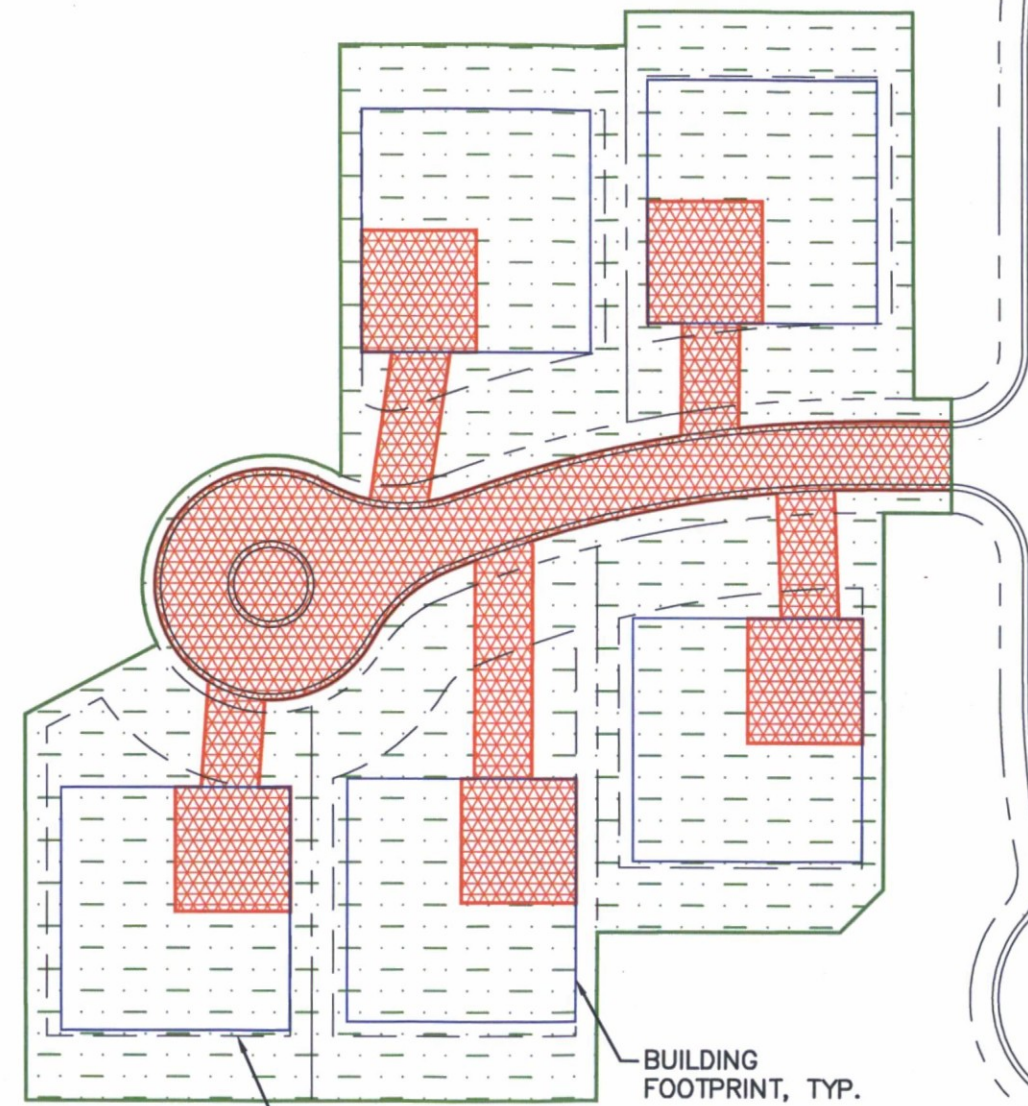


SCALE: 1" = 60'

TOTAL AREA = 88,500 SF

HYDRAULICALLY
CONNECTED AREA = 23,800 SF

RTIMP = $23,800/88,500 = 26.9\%$ CALCULATED
= 27.0% DESIGN



BUILD SETBACK, TYP.

BUILDING
FOOTPRINT, TYP.

STORYROCK - R1-18 RTIMP
DETERMINATION

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