SOUTHWEST LAND CONSULTING, P.C.
CIVIL ENGINEERING ○ PLANNING

FINAL DRAINAGE REPORT

FOR

COCHISE MANOR

(30-PP-2012, COS #5209-12)

(PARCEL 217-31-010)

SCOTTSDALE, ARIZONA

Prepared for:
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7-19-2013

FINAL DRAINAGE REPORT
FOR
COCHISE MANOR

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I. INTRODUCTION

This project is an undeveloped 4.51-acre parcel in North Scottsdale near the intersection of Shea Boulevard and 130th Street (see Vicinity Map, Figure 1). An existing single-family residence lies to the southeast (Lot 5 Boulder Wash), Shea Boulevard forms the north boundary, Cochise Road is situated to the south, an existing APS sub-station to the southwest and undeveloped natural desert makes up the remaining sides. Analysis of existing conditions and recommendations for improvements are specified within this report.

The region consists of low-density, single-family residential and office medical development surrounded by Sonoran Desert rangeland with typical vegetation densities and meandering ephemeral washes sloping to the southwest at a gradient of approximately 3.88%. Soils in the region are "B", per the Aguila-Carefree Area, Parts of Maricopa and Pinal Counties Soil Survey (Reference 1), which have high percolation rates resulting in lesser runoff during storm events. Based on a field walk, an aerial photo and current topography (see Figures 2 and 3) one defined conveyance corridor will be affected by the proposed onsite development.

All onsite modifications have been designed to comply with the Drainage Regulations for the Flood Control District of Maricopa County (FCDMC) and the City of Scottsdale's Design Standards and Policies Manual (References 2, 3 and 4) while maintaining the existing drainage patterns in the region.

II. FLOOD PLAIN DESIGNATION

The site is located within a region where flood studies have been adopted and FEMA Flood Insurance Rate Maps (FIRM) have been printed. This project falls within Zone "X" (shaded) as shown on FEMA Flood Insurance Rate Map 04013C1710F dated 9/30/05 (see FEMA Map, Figure 4). Flood Zone "X" is defined as follows:

> "Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood."

III. OFFSITE DRAINAGE

Multiple drainage reports previously completed for properties in the region were reviewed and used as a basis for the preliminary drainage design presented within this report (see References 5 and 6). Historically, washes in the area originate in the foothills of the McDowell Mountains and meander southwest towards the Central Arizona Project (CAP) canal. Drainage improvements have been constructed in the upstream contributing area as part of the Mayo Clinic Collaborative Research Community and Shea Boulevard Infrastructure. Runoff generated from impervious areas such as office buildings, parking and hardscape within the developments are intercepted by a combination of curb catch basin inlets, storm drain grates, curb openings and natural washes. Shea Boulevard is a crowned roadway consisting of 3 lanes for both east and west

bound travel separated by a landscape median. Vertical curb and gutter on both sides of the main arterial direct storm water towards numerous curb inlets strategically placed along the street. Storm drains beneath Shea Boulevard convey runoff from north of the roadway along with discharge from the afore-mentioned curb inlets. Current drainage patterns impacting Cochise Manor are depicted on Figure 5. Contributing watersheds were delineated based on City of Scottsdale ¼ Section Flown Aerial Topography, Mayo Clinic drainage studies/plans (Reference 5 and Appendix B – Figures 4 and 5) and a field walk. Cochise Manor has four curb inlets (one 3-cell adjacent to project and one 4-cell to the east located on each side of the street) along Shea Boulevard and two 30" CMP storm drains (CP19 and CP20) that direct offsite flow onto or towards the project. Curb inlets will be described in greater detail within the following section. Concentration Point CP19 is conveyed through the Boulder Wash Subdivision within a defined wash and into Cochise Manor along the east boundary. Concentration Point 20 discharges onto the northwest corner of the site via a 30" CMP (smooth lined) storm drain beneath Shea Boulevard and exits soon after along the west property line. The remaining offsite flow enters the site as sheet flow originating less than 200' east of the property. Due to the multiple culvert crossings, mixed use developments, street curb inlets and necessary routing the Rational Method cannot be used to determine peak discharges. Therefore, 100-year, 6-hour peak discharges for all drainage areas impacting the site were calculated using a HEC-1 Model analysis in conjunction with the Drainage Design Management System (DDMS) software provided by the Flood Control District of Maricopa County (see Appendix C). The Flood Control District of Maricopa County recently adopted NOAA14 for determination of rainfall depths and this data resulted in roughly 15% runoff reduction from previous studies using NOAA2. At a minimum each development was represented as a separate sub-basin so altered drainage patterns could be accounted for. Neither storm water storage facilities within the upstream developed areas nor attenuate at culvert inlets were considered as part of this analysis. However, further refinement of the HEC-1 model will continue during the Final Drainage Report preparation corresponding with construction documents. The upstream contributing areas for this project are R1-43 single-family residential and C-O SC commercial surrounded by Sonoran Desert hill slopes. However, the area does not exhibit the usual characteristics of residential zoning types in other portions of the Phoenix Metro region. Lots average 1.0 acres, roads consist of a narrow rural paved section and natural desert has been abundantly maintained on each lot. Selection of a Runoff Coefficient and kb factor for this development density and type of terrain does not equate to the default values within the DDMS program. Therefore Land Uses 13 (1-2 dwelling units per acre) and UNDEVELOPED (natural desert for NAOS areas) with low kb factors were selected to demonstrate the limited watershed development, and to indicate an elevated resistance to flow. Commercial and paved areas in the contributing watersheds were represented by Land Uses 22 (General Commercial) and 44 (Cultural/Institutional), respectively with minimum kb factors indicating limited resistance to flow. Weighted runoff coefficients were calculated utilizing DDMS based on the land use contained in each watershed (see Land Use worksheets for existing and proposed HEC-1 models in Appendix C).

IV. PRE-DEVELOPMENT ONSITE CONDITIONS

The land consists of natural Sonoran Desert with typical vegetation except two dirt trails crossing the northwest corner and roughly parallel with the eastern boundary. When the east trail was constructed 2-18" culverts were installed beneath the trail for conveyance of offsite Wash 19A. Improvements for Cochise Avenue included 2-30" storm drains beneath the roadway for the same watercourse. A field walk was conducted to verify the drainage information revealed by an aerial photo and recently completed as-built survey (see Figures 2 and 3). It was confirmed the two main washes will be left in their natural condition and unaffected by the future onsite development as depicted in the Grading and Drainage Plans (see Figure 6). A drainage easement for Wash 20A was dedicated under previous instrument and there are no plans to alter recorded limits. The approved Preliminary Plat (30-PP-2012) presents a drainage easement for Wash 19A based on the drainage report prepared by Pinnacle Engineering, Inc. during the original case submittal. However, rainfall depth reductions (NOAA14) described in the previous section have lowered the Wash 19A peak discharge well below the 50 cubic foot per second (cfs) threshold requirement for drainage easements in ESLO designated areas. The Final Plat prepared by Bellis Land Services does not include an easement for this watercourse.

A. Existing Hydraulic Modeling

Several curb inlets along Shea Boulevard contribute to both washes crossing the subject parcel. Capacities and flow spread for both 3 and 4 cell inlets were analyzed utilizing FlowMaster v8.0 (see Appendix D). The results demonstrate each curb inlet has sufficient capacity to intercept the calculated 100-year peak discharge for each upstream watershed while maintaining more than one free lane for travel in each direction.

A cross section (located halfway between existing culvert crossings) sampled from recent survey field data was analyzed using FlowMaster v8.0 to determine the Wash 19A onsite high water elevation and corresponding velocity (see Appendix D "Irregular Section Wash 19A" and Figure 6). Manning's Coefficient values were formulated as described in Drainage Design Manual for Maricopa County, Hydraulics - Chapter 7 (Reference 3) and Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona publication (Reference 8) based on pictures taken during the site walk as follows:

Wash 19A

Channel Bottom

All sections are assumed unstable due to moderate levels of sediment transport and lateral migration in the region.

Base Value = 0.025 (median bed material 1.1 mm)

Degree of Irregularity = 0.005 (channel with moderate scour or eroded slopes)

Variation in Channel Cross Section = 0.005 (main wash shifts occasionally from side to side and wash cross sections size changes across site)

Effects of Obstruction = 0.000 (wash bottom has no debris)

Amount of Vegetation = 0.000 (no vegetation present in wash bottom)

Degree of Meandering = 1.00 (minor meandering present)

Total Main Channel Bottom Manning's Coefficient = 0.035*1.00=0.035

Overbank

The overbank for each section was assumed to begin at the transition from the active wash bottom to channel side slopes, which are reflected in the provided hydraulic section.

Base Value = 0.025 (median bed material 1.6 mm)

Degree of Irregularity = 0.005 (channel with moderate scour or eroded slopes)

Variation in Channel Cross Section = 0.005 (main wash shifts occasionally from side to side resulting in changes to slopes in the overbank and wash cross sections size changes across site)

Effects of Obstruction = 0.005 (overbank contains small exposed boulders or rocks)

Amount of Vegetation = 0.010 (significant grasses, shrubs and trees are present within the overbank high water limits)

Degree of Meandering = 1.00 (minor meandering present)

Total Overbank Manning's Coefficient = 0.050*1.00=0.050

V. POST-DEVELOPED ONSITE CONDITIONS

The future improvements will consist of grading, sewer and water mains, streets, curb and gutter, scuppers and detention basin with bleed-off pipe. A single detention basin has been situated to capture runoff from several natural meandering flowlines crossing the site (see Grading & Drainage Plans in pocket folder. As each single-family residence is constructed individual grading and drainage plans will be required to demonstrate historic drainage patterns for the subdivision and region are maintained. All onsite development has been designed to comply with the Drainage Regulations for the Flood Control District of Maricopa County (FCDMC) and the City of Scottsdale Design Standards and Policy Manual (Reference 4).

A. Drainage Structures

Roll curb and gutter will be provided on both sides of 131st Street to direct runoff south towards Detention Basin 1 located within Lot 1 (see Figure 6). The approved Preliminary Plat (30-PP-2012) consisted of three basins located in Tracts which have subsequently been eliminated. Limited outfall options, final grade elevations necessary to create 3' deep basins and development impacts on Cochise Manor made the two

northern most basins unfeasible. New storm water storage calculations were prepared utilizing a NOAA14 100-year, 2-hour rainfall depth of 2.381 inches (see Appendix C – Proposed Detention Basin Volume) which is roughly 15% lower than the previously used NOAA2 depths and runoff coefficients as shown below (NAOS area was excluded from calculations presented in Appendix C).

Land Use Category	2-25 yr Runoff Coeff.	100 yr Runoff Coeff.
Paved Streets	0.90	0.95
R1-43ESL	0.38	0.61

The provided detention basin on Lot 1 meets 62% of the required 100-year, 2-hour storm water storage volume and the developer is applying for a partial storm water storage waiver. Limited site development and a large NAOS dedication reduced the amount of impervious area typical for a small subdivision. A weir with a 12" wide low flow notch will be provided upstream of the existing 2-30" CMP's beneath Cochise Avenue (see Figure 6 and Weir Calculations in Appendix D). The weir was modeled as a broad crested type due to limited flow over the hydraulic structure. The proposed HEC-1 Model (Appendix C) demonstrates Detention Basin 1 maintains post-development discharges equal or less than pre-development. The HEC-1 Model output shows errors warnings for both Detention Basin 1 and the attenuation due to the proposed broad crested weir during routing as described below:

"FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT"

This warning typically is associated with low flows during routing at the beginning of computations or as a result of limited contributing area upstream. No action was taken to remove the warning as it has minimal effects on the final discharges. A 12" HDPE bleed off with a 6" diameter orifice plate on the inlet were specified to ensure the basin drains within 36 hours (see Proposed Detention Basin Volume). Percolation test results contained within the Epsilon Engineering & Materials Soils Report dated 5/9/13 show infiltration into the ground will drain the basin regardless of a bleed off pipe. Runoff in excess of the storm water storage volume will exit the detention basin via a riprap lined spillway into Wash 19A prior to the existing 2-30" CMP's beneath Cochise Avenue. Angular native stone riprap has been specified at all scuppers and detention basin emergency overflows to prevent scour and undermining of adjacent improvements.

B. Army Corps of Engineers

The property consists of mostly natural Sonoran desert with two dirt trails crossing the site. A well-defined 6' sandy bottom wash (20A) enters the site along the north boundary as discharge from a 30" CMP storm drain beneath Shea Boulevard. The southeast corner of the site is crossed by a moderately-defined 2.5' wide bottom wash (19A). Several onsite

meandering flowlines exist on the project but have limited contributing areas. Neither ordinary high water marks nor clearly defined wash thalwegs are present for all watercourses except Wash 20A. Wash 20A has been modified significantly upstream and downstream from this project, thus no longer resulting in a contiguous wildlife corridor. Based on these factors we believe none of the onsite washes meet the criteria to be defined as "waters of the United States". However, both Washes 19A and 20A will be left in their current state unaltered by future site development. A 404 Certification form has been provided in Appendix E.

C. Storm Water Pollution Prevention Plan

A Storm Water Pollution Prevention Plan was created to define how the onsite washes will be protected from pollutants during site development (see 11"x17" copies in Appendix F). This plan will be submitted to ADEQ along with an NOI form (see Appendix F) prior to approval of the construction documents and will remain onsite during construction.

VI. CONCLUSIONS

The proposed development is in compliance with the City of Scottsdale design criteria and other required drainage laws. No adverse drainage impacts are expected to either downstream existing properties or drainage ways from the site. The study has determined that:

- All runoff will enter and exit the site in the same manner and location as in pre-development conditions, thereby preserving natural drainage patterns.
- Water surface elevations and velocities were determined for existing conditions using FlowMaster v8.
- USACOE section 404 jurisdictional washes have been determined not to exist on the property and therefore preservation of onsite watercourses will be unnecessary.

VII. REFERENCES

1. United States Department of Agriculture Soil Conservation Service, 1986. Aguila-Carefree Area, Parts of Maricopa and Pinal Counties Soil Survey. Phoenix, Arizona.
2. Flood Control District of Maricopa County, 2009. Drainage Design Manual for Maricopa County, Arizona, Volume 1. Phoenix, Arizona.
3. Flood Control District of Maricopa County, 2009. Drainage Design Manual for Maricopa County, Arizona, Volume 2. Phoenix, Arizona.
4. City of Scottsdale, 2009. City of Scottsdale Design Standards and Policy Manual. Scottsdale, Arizona.

5. Kimley-Horn and Associates, Inc., 2005. Preliminary Drainage Report Mayo Clinic Collaborative Research Community. Phoenix, Arizona.

6. Rick Engineering Company, 2000. Boulder Wash Drainage Report. Phoenix, Arizona.

7. Bentley Systems, 2008. FlowMaster v8.0. USA.

8. United States Geological Survey, 1991. Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona. Phoenix, Arizona.

APPENDIX A

FIGURES

COCHISE MANOR
13102 E. COCHISE RD - SCOTTSDALE, AZ 85259
12-PP-2006

SOUTHWEST LAND CONSULTING, P.C.
CIVIL ENGINEERING ○ PLANNING

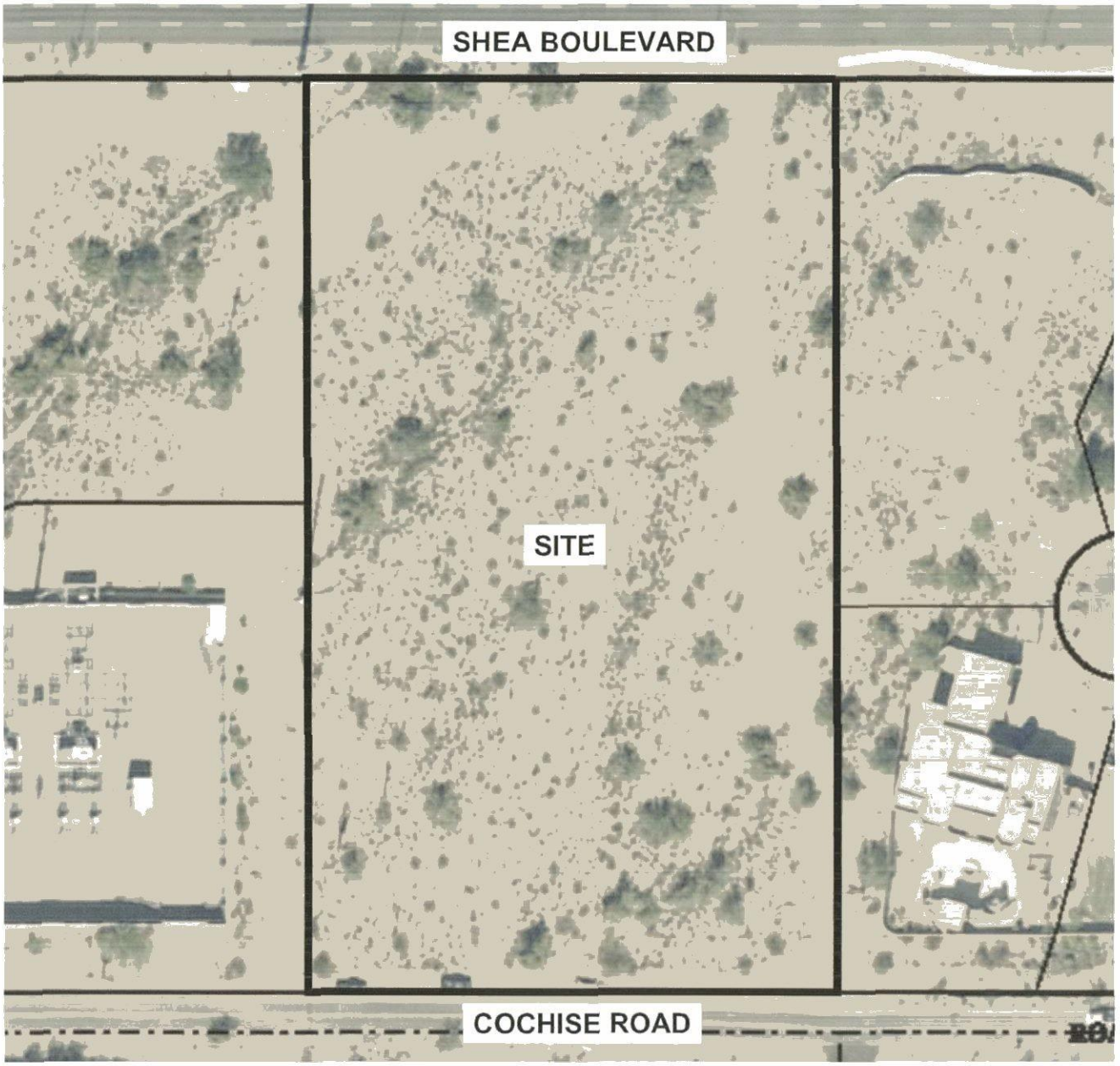
PMB 132
8711 E PINNACLE PEAK RD
SUITE F-211
SCOTTSDALE, AZ 85255

WORK: [480] 585-7521
FAX: [480] 585-7523
WWW.AZSLC.COM

DATE:	FIGURE 1: VICINITY MAP		
5/24/13			
SCALE:	DRAWN BY:	CHECKED BY:	JOB NO.
1"=500'	RMH	SAL	1603

Z:\Jobs\1600\1603 - Cochise Manor\Dwgs\Prelim\DR\1603Fig1_VM.dwg, 5/24/2013 11:34:16 AM, ryan hall

COCHISE MANOR
13102 E. COCHISE RD - SCOTTSDALE, AZ 85259
12-PP-2006



N

SOUTHWEST LAND CONSULTING, P.C.
CIVIL ENGINEERING ○ PLANNING

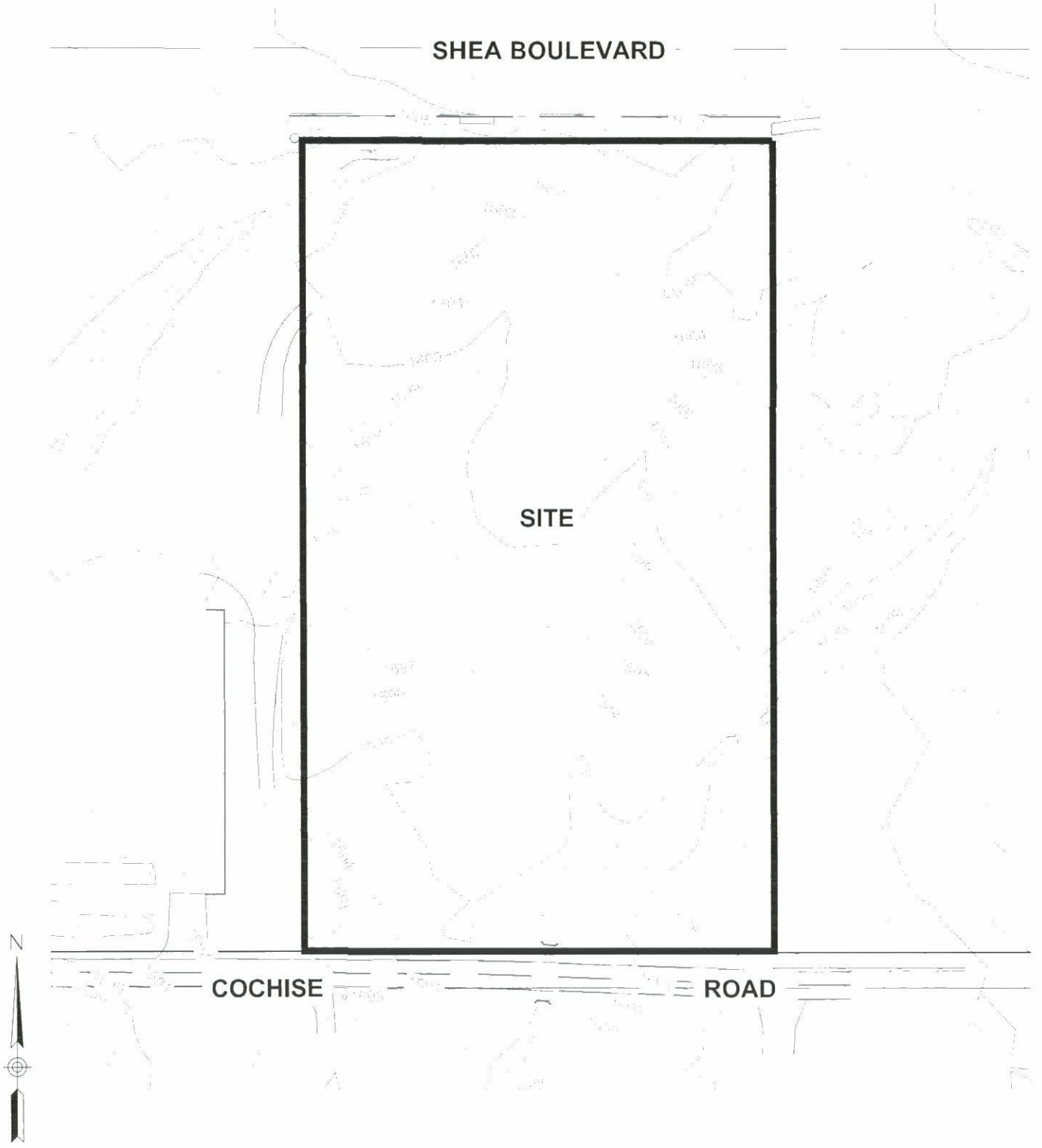
PMB 132
8711 E PINNACLE PEAK RD
SUITE F-211
SCOTTSDALE, AZ 85255

WORK: [480] 585-7521
FAX: [480] 585-7523
WWW.AZSLC.COM

DATE: 5/24/13	FIGURE 2: AERIAL PHOTO		
SCALE: 1"=100'	DRAWN BY: RMH	CHECKED BY: SAL	JOB NO. 1603

Z:\Jobs\1600\1603 - Cochise Manor\Dwgs\Prelim\DR\1603Fig2_AP.dwg, 5/24/2013 11:35:59 AM, ryan hall

COCHISE MANOR
13102 E. COCHISE RD - SCOTTSDALE, AZ 85259
12-PP-2006



SOUTHWEST LAND CONSULTING, P.C.
CIVIL ENGINEERING ○ PLANNING

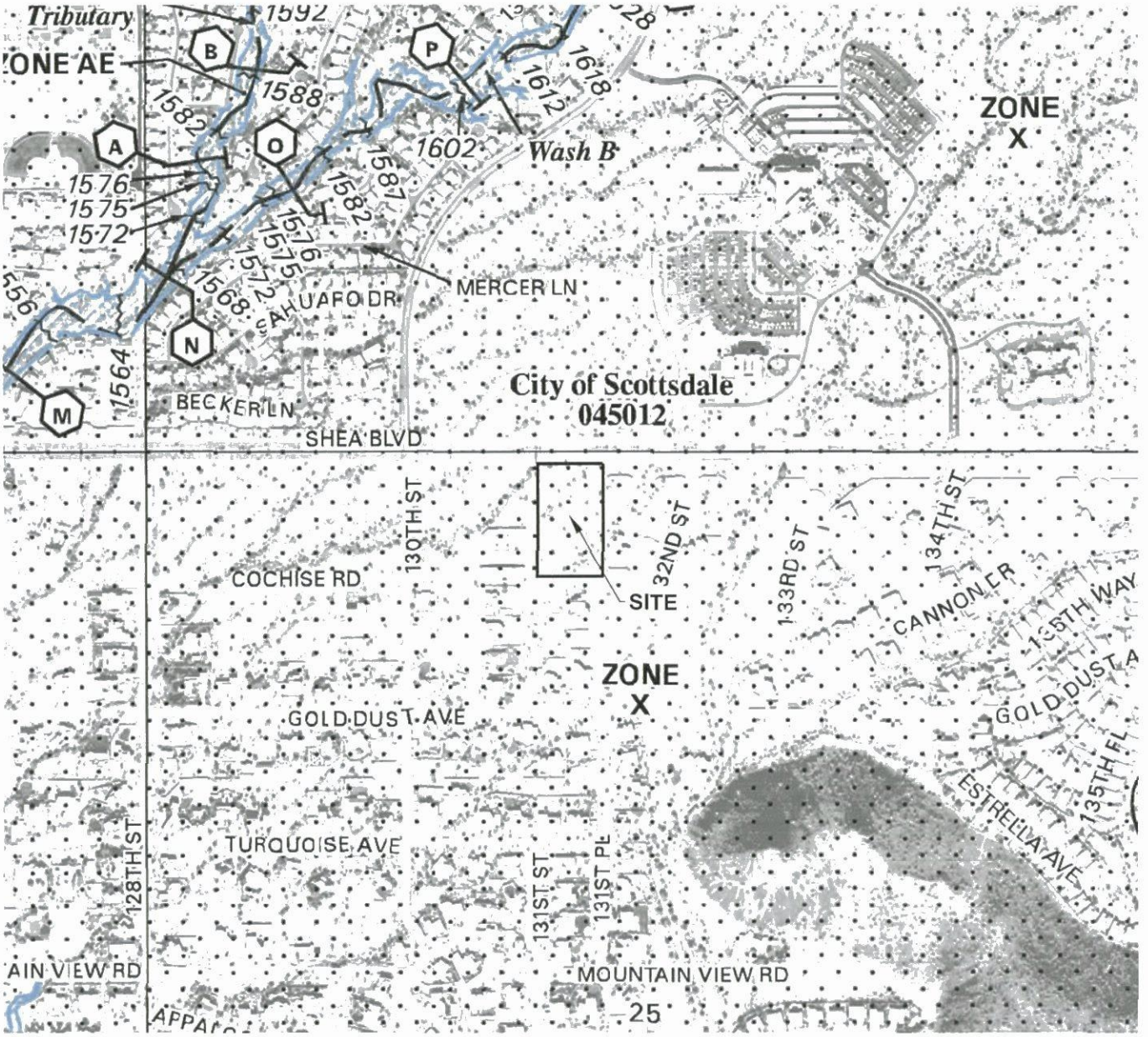
PMB 132
8711 E PINNACLE PEAK RD
SUITE F-211
SCOTTSDALE, AZ 85255

WORK: [480] 585-7521
FAX: [480] 585-7523
WWW.AZSLC.COM

DATE: 7/6/13	FIGURE 3: FIELD TOPO		
SCALE: 1"=100'	DRAWN BY: RMH	CHECKED BY: SAL	JOB NO. 1603

Z:\Jobs\1600\1603 - Cochise Manor\Dwgs\Prelim\DR\1603Fig3_FT.dwg, 7/6/2013 9:50:49 AM, ryan hall

COCHISE MANOR
13102 E. COCHISE RD - SCOTTSDALE, AZ 85259
12-PP-2006



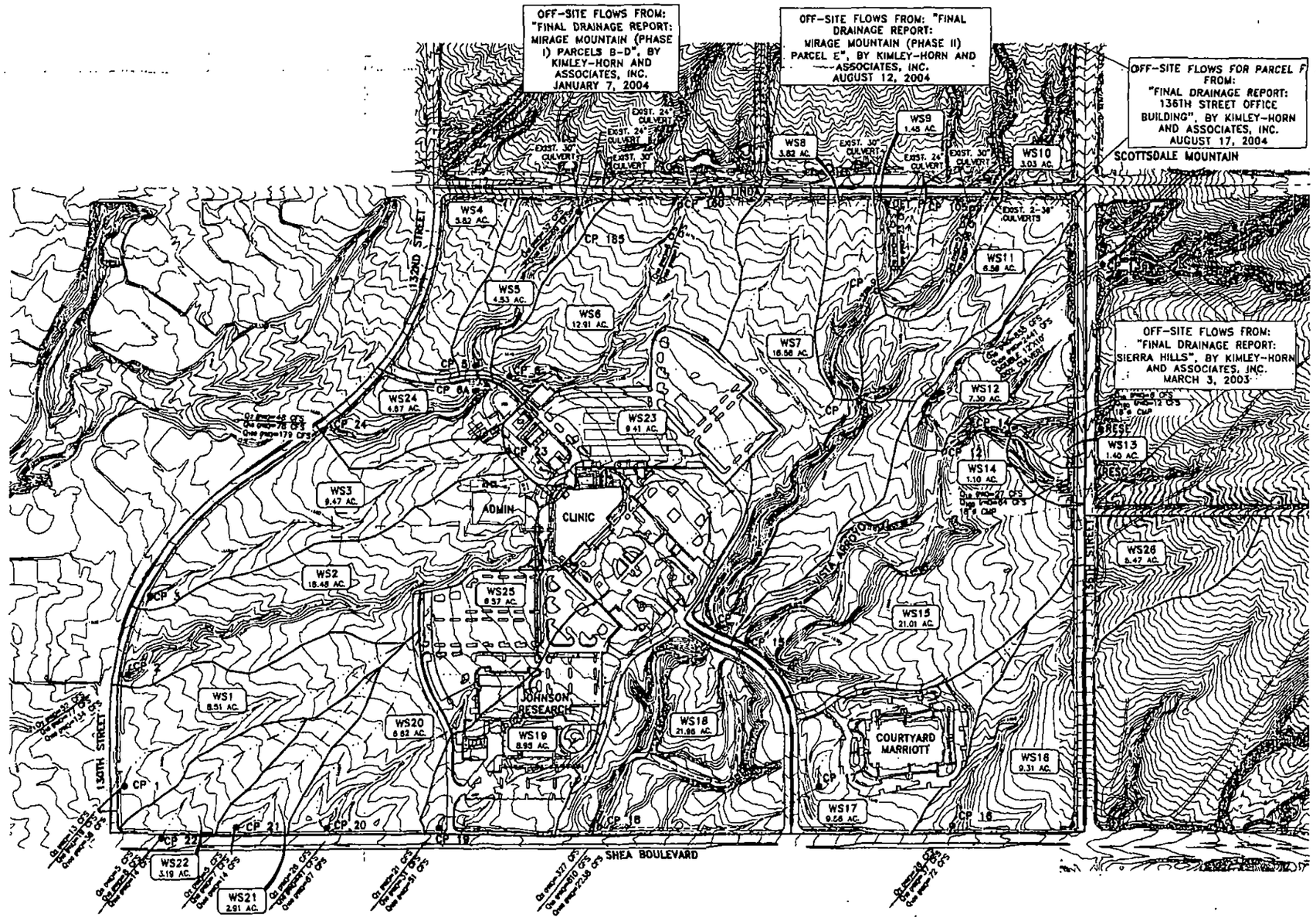
N

SOUTHWEST LAND CONSULTING, P.C. CIVIL ENGINEERING ○ PLANNING	PMB 132 8711 E PINNACLE PEAK RD SUITE F-211 SCOTTSDALE, AZ 85255	WORK: [480] 585-7521 FAX: [480] 585-7523 WWW.AZSLC.COM	DATE: 5/24/13	FIGURE 4: FEMA MAP	
			SCALE: 1"=800'	DRAWN BY: RMH	CHECKED BY: SAL / JOB NO. 1603

Z:\Jobs\1600\1603 - Cochise Manor\Dwgs\Prelim\DR\1603Fig4_FM.dwg, 5/24/2013 11:36:35 AM, ryan hall

APPENDIX B

EXCERPTS FROM PRELIMINARY DRAINAGE REPORT MAYO CLINIC BY KIMLEY-HORN & ASSOCIATES, INC.



Kimley-Horn and Associates, Inc.

7878 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

BY	DATE	APPR.

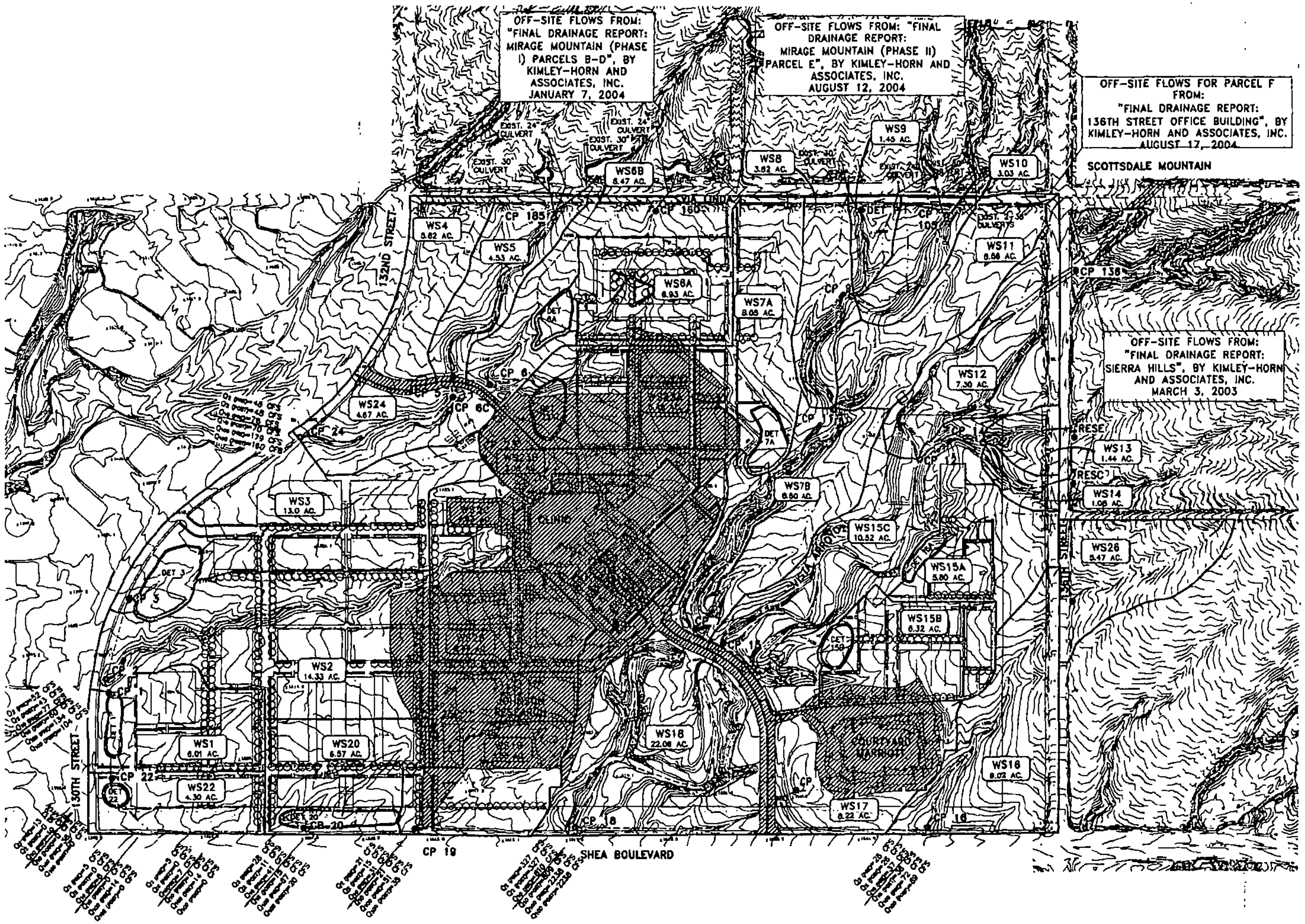
SCALE (H): 1"=200'
SCALE (V): NONE
DESIGNED BY: JDB
DRAWN BY: PAC
CHECKED BY: CM
DATE: 01/25/05

MAYO CLINIC
EXISTING CONDITIONS
DRAINAGE MAP
FIGURE 4

PROJECT NO.
091547000

DRAWING NAME
547000DR04

1 of 1



GRAPHIC SCALE

200 0 100 200 400

(IN FEET)

N

LEGEND

SUBBASIN BOUNDARY

DRAINAGE FLOW PATH

ROUTING REACH

EXISTING FEATURES

FUTURE DEVELOPMENT

EXISTING DISTURBED AREA

Mayo Clinic Proposed Conditions Provided Detention Volume per Basin

Basin	Volume Provided [ac-ft]
WS1	0.8
WS3	3.8
WS6A	1.5
WS7A	1.7
WS15A	0.8
WS15B	1.5
WS20	2.4
WS22	0.6
WS23A	1.6
Total	13.9

Kimley-Horn and Associates, Inc.

© 2005 KIMLEY-HORN AND ASSOCIATES, INC. 7878 North 16th Street, Suite 300 Phoenix, Arizona 85020 (602) 944-5500

Engineering, Planning, and Environmental Consultants

SCALE (H): 1"=200'
SCALE (V): NONE
DESIGNED BY: KOB
DRAWN BY: PAC
CHECKED BY: LSK
DATE: 01/23/06

MAYO CLINIC
PROPOSED CONDITIONS
DRAINAGE MAP
FIGURE 5

PROJECT NO. 091547000

DRAWING NAME PR OFF-SITE

1 OF 1

APPENDIX C

HYDROLOGIC CALCULATIONS

Proposed Detention Basin Volume							
Basin ID	**Top Area (sf)**	**Top Elev (ft)**	**Bot Area (sf)**	**Bot Elev (ft)**	**Depth (ft)**	**Volume Provided (cf)**	**Volume Provided (ac-ft)**
DET-1	4,858	1592.5	3,658	1591.5	1	4,244	0.10
	3,658	1591.5	3,330	1591.2	0.3	1,048	0.02
	3,330	1591.2	2,590	1590.5	0.7	2,066	0.05
	2,590	1590.5	1,636	1589.5	1	2,095	0.05
Total						***9,453***	***0.22***

***Perc Rate (cf/hr/sf)=	0.430
Basin bottom area (sf)=	1,636
****Basin drain time (hr)=	13
*****Basin drain time (hr)=	12

All volumes calculated using the cone frustrum method: (h/3)*(a1+a2+(a1*a2)^0.5)
h=depth
a1=minimum bottom surface area
a2=maximum top surface area

* Weighted runoff coefficient assuming partially developed to reflect future conditions

** 100-Year, 2-hour rainfall depth based on Maricopa County Drainage Design Manual, Hydrology.

*** The perc rate is based on data obtained from a Epsilon Engineering & Materials, LLC. dated 5/9/2013.

**** Basin drain time shown is strictly based on percolation into the ground. The 6" bleed off pipe will drain the top 1.3' faster than water will percolate into the ground

***** Basin drain time includes percolation into ground plus discharge of 0.97 cfs from 6" bleed off pipe

Safety Factor=	1	
Cw=	0.64	
**D=	2.38	
Parcel Area=	120,244	Does not include NAOS area
Vr=	**15,318**	

Land Use	**Area (sf)**	**Cw**
R1-43ESL Area (sf)	108,915	0.61
Impervious Area (sf)	11,329	0.95
Total	**120,244**	**0.64**

EXISTING CONDITIONS HEC-1 MODEL

CITY OF SCOTTSDALE
Drainage Design Management System
RAINFALL DATA
Project Reference: 1603EX

ID	Method	Duration	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
DEFAULT	NOAA14	5 MIN	0.268	0.361	0.433	0.528	0.601	0.675
	NOAA14	10 MIN	0.407	0.550	0.659	0.804	0.915	1.028
	NOAA14	15 MIN	0.505	0.682	0.817	0.996	1.134	1.274
	NOAA14	30 MIN	0.680	0.918	1.099	1.342	1.527	1.715
	NOAA14	1 HOUR	0.841	1.136	1.361	1.660	1.890	2.123
	NOAA14	2 HOUR	0.972	1.293	1.537	1.869	2.121	2.381
	NOAA14	3 HOUR	1.041	1.361	1.614	1.967	2.245	2.536
	NOAA14	6 HOUR	1.236	1.576	1.846	2.216	2.504	2.804
	NOAA14	12 HOUR	1.427	1.798	2.090	2.488	2.793	3.106
	NOAA14	24 HOUR	1.748	2.260	2.670	3.238	3.686	4.154

Code	Description	Initial Abstraction IA	Percent Impervious RTIMP	Vegetation Cover	Moisture Deficit DTHETA	Resistance Coefficient Kb
Commercial						
21	Neighborhood Commercial	0.10	85	75.0	ORMAL	MIN
22	General Commercial	0.10	85	75.0	ORMAL	MIN
31	Minor Office	0.10	85	75.0	ORMAL	MIN
32	Major Office	0.10	85	75.0	ORMAL	MIN
33	Minor Employment	0.10	85	75.0	ORMAL	MIN
34	General Employment	0.10	85	75.0	ORMAL	MIN
Institutional						
36	Research and Development	0.10	72	75.0	ORMAL	MIN
44	Cultural/Institutional	0.10	85	75.0	ORMAL	MIN
45	Utilities	0.30	72	30.0	ORMAL	MIN
Open Space						
41	Natural Open Space	0.30	1	30.0	ORMAL	MIN
42	Limited Use Area	0.30	1	30.0	ORMAL	MIN
43	Developed Open Space	0.30	80	50.0	ORMAL	MIN
GC	Golf Courses	0.35	1	85.0	ORMAL	MIN
PRESERVE	Natural Open Space	0.30	1	30.0	ORMAL	MIN
UNDEVELOPED	Natural Open Space	0.30	1	30.0	ORMAL	MIN
Other						
INDIAN	Indian Land	0.35	10	85.0	ORMAL	MIN
Residential						
10	1/5 Dwelling Units per Acre	0.30	7	30.0	ORMAL	MIN
11	1/3-1/2 Dwelling Units per Acre	0.30	15	30.0	ORMAL	MIN
12	1/2-1 Dwelling Units per Acre	0.30	15	50.0	ORMAL	MIN
13	1-2 Dwelling Units per Acre	0.25	24	50.0	ORMAL	MIN
14	2-4 Dwelling Units per Acre	0.25	35	50.0	ORMAL	MIN
15	4-8 Dwelling Units per Acre	0.25	54	50.0	ORMAL	MIN
16	8-12 Dwelling Units per Acre	0.25	74	50.0	ORMAL	MIN
17	12-22 Dwelling Units per Acre	0.25	94	50.0	ORMAL	MIN
RETAINED	Retained areas	2.66	1	50.0	ORMAL	MIN
Tourist						
18	Tourist Accommodations	0.25	85	50.0	ORMAL	MIN
19	Low Intensity Resort	0.30	85	50.0	ORMAL	MIN

CITY OF SCOTTSDALE
Drainage Design Management System
LAND USE
Project Reference: 1603EX

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb
Major Basin ID: 01								
WS19	44	0.009	78.0	0.10	85	75.0	NORMAL	0.034
	UNDEVELOPED	0.003	22.0	0.30	1	30.0	NORMAL	0.068 *
		0.012	**100.0**					
WS19A	13	0.005	100.0	0.25	24	50.0	NORMAL	0.073 *
		0.005	**100.0**					
WS19B	13	0.001	100.0	0.25	24	50.0	NORMAL	0.083 *
		0.001	**100.0**					
WS19C	UNDEVELOPED	0.003	100.0	0.30	1	30.0	NORMAL	0.076 *
		0.003	**100.0**					
WS19D	UNDEVELOPED	0.002	100.0	0.30	1	30.0	NORMAL	0.079 *
		0.002	**100.0**					
WS19E	13	0.000	10.0	0.25	24	50.0	NORMAL	0.079 *
	UNDEVELOPED	0.002	90.0	0.30	1	30.0	NORMAL	0.079 *
		0.002	**100.0**					
WS20	22	0.002	8.8	0.10	85	75.0	NORMAL	0.032
	44	0.012	45.8	0.10	85	75.0	NORMAL	0.032
	UNDEVELOPED	0.011	45.4	0.30	1	30.0	NORMAL	0.063 *
		0.025	**100.0**					
WS20A	22	0.002	70.0	0.10	85	75.0	NORMAL	0.038
	UNDEVELOPED	0.001	30.0	0.30	1	30.0	NORMAL	0.076 *
		0.003	**100.0**					

* Non default value

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)
Major Basin ID: 01								
WS19	645	68	64568	0.012	100.00	0.63	-	100
WS19A	645	68	64568	0.005	100.00	0.63	-	100
WS19B	645	68	64568	0.001	100.00	0.63	-	100
WS19C	645	68	64568	0.003	100.00	0.63	-	100
WS19D	645	68	64568	0.002	100.00	0.63	-	100
WS19E	645	68	64568	0.002	100.00	0.63	-	100
WS20	645	68	64568	0.025	100.00	0.63	-	100
WS20A	645	68	64568	0.003	100.00	0.63	-	100

CITY OF SCOTTSDALE
Drainage Design Management System
HEC-1 FLOW SUMMARY
Project Reference: 1603EX

ID	Type	Area (sq mi)	Discharge cfs					
			2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin 01								
WS19	Hydrograph	0.010	7	10	13	17	20	23
RCP19	Routed	0.010	7	10	13	17	20	23
RRCP19	Routed	0.010	7	10	12	16	20	23
WS19A	Hydrograph		1	2	3	4	5	7
CP19A	Combined	0.020	8	11	15	20	25	29
RCP19A	Routed	0.020	8	11	15	20	24	29
WS19B	Hydrograph				1	1	1	2
RWS19	Routed				1	1	1	2
WS19C	Hydrograph			1	1	2	3	3
CP19C	Combined	0.020	8	12	16	23	28	34
DCP19C	Routed	0.020	8	12	16	23	28	34
WS19D	Hydrograph				1	1	2	2
WS19E	Hydrograph				1	1	1	2
WS20	Hydrograph	0.030	9	13	18	25	31	37
RCP20	Routed	0.030	9	13	18	25	31	37
WS20A	Hydrograph		1	1	2	2	3	3
CP20A	Combined	0.030	10	14	19	27	33	40

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   17JUL13  TIME  17:56:33   *
*                                       *
*****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   1          ID        CITY OF SCOTTSDALE
   2          ID        1603EX - COCHISE MANOR
   3          ID        100 YEAR
   4          ID        6 Hour  Storm
   5          ID        Unit Hydrograph: Clark
   6          ID        07/17/2013
   7          IT      2       0       0    2000
   8          IN     15
   9          IO      3
              *DIAGRAM
              *
              *

  10          KK    WS19    BASIN
  11          BA   0.012
  12          PB   2.802
  13          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
  14          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
  15          PC   0.962   0.972   0.983   0.991   1.000
  16          LG    0.14    0.27    3.29    1.01      67
  17          UC   0.198   0.235
  18          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  19          UA     100
              *

  20          KK   RCP19   ROUTE
  21          RK     123  0.0100   0.012            CIRC   3.000
              *

  22          KK  RRCP19   ROUTE
  23          RS       1    FLOW
  24          RC   0.055   0.040   0.055     496  0.0262    0.00
  25          RX    0.00   10.00   20.00   24.00   28.00   32.00   42.00   52.00
  26          RY   10.00    9.00    8.00    7.00    7.00    8.00    9.00   10.00
              *

  27          KK   WS19A    BASIN
  28          BA   0.005
  29          LG    0.25    0.27    3.29    0.91      24
  30          UC   0.225   0.317
  31          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  32          UA     100
              *

  33          KK   CP19A  COMBINE
  34          HC       2    .0172
              *

  35          KK   RCP19A   ROUTE
  36          RS       1    FLOW
  37          RC   0.055   0.040   0.055     237  0.0169    0.00
  38          RX    0.00   10.00   20.00   24.00   26.00   30.00   40.00   50.00
  39          RY   10.00    9.00    8.00    7.00    7.00    8.00    9.00   10.00
              *
```

1 HEC-1 INPUT PAGE 2

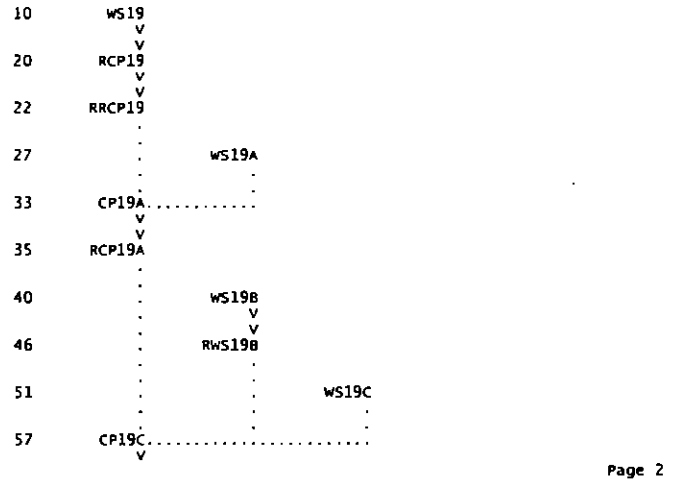
```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
  40          KK   WS19B    BASIN
  41          BA   0.001
  42          LG    0.25    0.27    3.29    0.91      24
  43          UC   0.144   0.200
  44          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  45          UA     100
              *

  46          KK  RWS19B   ROUTE
```

```
47          RS      2    FLOW
48          RC  0.055   0.040   0.055     507  0.0237    0.00
49          RX   0.00   10.00   20.00   24.00   26.00   30.00   40.00   50.00
50          RY  10.00    9.00    8.00    7.00    7.00    8.00    9.00   10.00
            *

51          KK  WS19C   BASIN
52          BA  0.003
53          LG   0.30    0.27    3.29    0.77       1
54          UC  0.226   0.333
55          UA      0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
56          UA    100
            *

57          KK  CP19C COMBINE
58          HC      3   .0205
            *

59          KK  DCP19C STORAGE
60          KO
61          RS      1    STOR
62          SV              0.01    0.02    0.04    0.05    0.07    0.11    0.14
63          SQ           4.89   12.25   22.67   34.00   34.00   34.00   34.00   34.00
64          SE 1591.0 1591.50 1592.00 1592.50 1593.00 1593.20 1593.50 1594.00 1594.20
            *

65          KK  WS19D   BASIN
66          BA  0.002
67          LG   0.30    0.27    3.29    0.77       1
68          UC  0.215   0.368
69          UA      0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
70          UA    100
            *

71          KK  WS19E   BASIN
72          BA  0.002
73          LG   0.30    0.27    3.29    0.78       3
74          UC  0.234   0.468
75          UA      0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
76          UA    100
            *
```



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

77          KK   WS20   BASIN
78          BA  0.025
79          LG   0.19    0.27    3.29    0.95      47
80          UC  0.272   0.316
81          UA      0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
82          UA    100
            *

83          KK  RCP20   ROUTE
84          RK    123  0.0100   0.012            CIRC   3.000
            *

85          KK  WS20A   BASIN
86          BA  0.003
87          LG   0.16    0.27    3.29    0.99      60
88          UC  0.233   0.666
89          UA      0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
90          UA    100
            *

91          KK  CP20A COMBINE
92          HC      2   .0282
            *
93          ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK



```
                 V
  59       DCP19C
              .
  65          .         WS19D
              .           .
  71          .           .           WS19E
              .           .             .
  77          .           .             .          WS20
              .           .             .            V
                                                     V
  83          .           .             .          RCP20
              .           .             .            .
  85          .           .             .            .          WS20A
              .           .             .            .            .
  91          .           .             .          CP20A............

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                        ****************************************
*                                       *                        *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                        *   U.S. ARMY CORPS OF ENGINEERS       *
*              JUN   1998               *                        *   HYDROLOGIC ENGINEERING CENTER      *
*            VERSION 4.1                *                        *         609 SECOND STREET            *
*                                       *                        *      DAVIS, CALIFORNIA 95616         *
* RUN DATE   17JUL13  TIME  17:56:33    *                        *         (916) 756-1104               *
*                                       *                        *                                      *
****************************************                         ****************************************



                              CITY OF SCOTTSDALE
                              1603EX - COCHISE MANOR
                              100 YEAR
                              6 Hour  Storm
                              Unit Hydrograph: Clark
                              07/17/2013

   9 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                        NMIN          2  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1   0  STARTING DATE
                       ITIME       0000  STARTING TIME
                          NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      3   0  ENDING DATE
                      NDTIME       1838  ENDING TIME
                       ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL     0.03 HOURS
                       TOTAL TIME BASE    66.63 HOURS

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


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

             **************
             *            *
  10 KK      *    WS19    *        BASIN
             *            *
             **************

   8 IN          TIME DATA FOR INPUT TIME SERIES
                       JXMIN         15  TIME INTERVAL IN MINUTES
                      JXDATE      1   0  STARTING DATE
                      JXTIME          0  STARTING TIME

               SUBBASIN RUNOFF DATA

  11 BA          SUBBASIN CHARACTERISTICS
                       TAREA       0.01  SUBBASIN AREA

                 PRECIPITATION DATA

  12 PB                STORM       2.80  BASIN TOTAL PRECIPITATION

  13 PI            INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
```

```
                0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                0.01      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
                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

 16 LG          GREEN AND AMPT LOSS RATE
                      STRTL       0.14  STARTING LOSS
                        DTH       0.27  MOISTURE DEFICIT
                       PSIF       3.29  WETTING FRONT SUCTION
                      XKSAT       1.01  HYDRAULIC CONDUCTIVITY
                      RTIMP      67.00  PERCENT IMPERVIOUS AREA

 17 UC          CLARK UNITGRAPH
                         TC       0.20  TIME OF CONCENTRATION
                          R       0.23  STORAGE COEFFICIENT

 18 UA          ACCUMULATED-AREA VS. TIME, 11 ORDINATES
                  0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                100.0

                                                          ***

                                          UNIT HYDROGRAPH PARAMETERS
                                    CLARK    TC= 0.20 HR,        R= 0.23 HR
                                    SNYDER   TP= 0.13 HR,       CP= 0.38

                                               UNIT HYDROGRAPH
                                          40 END-OF-PERIOD ORDINATES
             2.        8.       17.       22.       22.       21.       19.       16.       14.       12.
            11.        9.        8.        7.        6.        5.        5.        4.        3.        3.
             3.        2.        2.        2.        1.        1.        1.        1.        1.        1.
             1.        1.        0.        0.        0.        0.        0.        0.        0.        0.

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

                     HYDROGRAPH AT STATION     WS19

   TOTAL RAINFALL =    2.80, TOTAL LOSS =    0.65, TOTAL EXCESS =    2.15

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR      66.63-HR
+   (CFS)       (HR)
                        (CFS)
+      23.      4.07                  3.          1.          0.          0.
                      (INCHES)    2.130       2.140       2.140       2.140
                       (AC-FT)       1.          1.          1.          1.

                      CUMULATIVE AREA =    0.01 SQ MI


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


             **************
             *            *
 20 KK       *    RCP19   *        ROUTE
             *            *
             **************

               HYDROGRAPH ROUTING DATA

 21 RK          KINEMATIC WAVE STREAM ROUTING
                          L       123.  CHANNEL LENGTH
                          S     0.0100  SLOPE
                          N      0.012  CHANNEL ROUGHNESS COEFFICIENT
                         CA       0.00  CONTRIBUTING AREA
                      SHAPE       CIRC  CHANNEL SHAPE
                         WD       3.00  BOTTOM WIDTH OR DIAMETER
                          Z       0.00  SIDE SLOPE
                     NDXMIN          2  MINIMUM NUMBER OF DX INTERVALS
                                                          ***

     *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

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

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

                  MAIN         8.05      1.25      0.10     41.00     23.45    244.13      2.14      12.46

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1370E+01  EXCESS=0.0000E+00 OUTFLOW=0.1370E+01 BASIN STORAGE=0.5540E-18 PERCENT ERROR=   0.0

                                        INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


                  MAIN         8.05      1.25      2.00               23.44    244.00      2.14
     ***            ***            ***            ***            ***

                     HYDROGRAPH AT STATION     RCP19

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR      66.63-HR
```

```
+  (CFS)     (HR)
                         (CFS)
+     23.    4.07                    3.          1.          0.          0.
                       (INCHES)  2.130       2.140       2.140       2.140
                        (AC-FT)     1.          1.          1.          1.

                     CUMULATIVE AREA =    0.01 SQ MI


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

            **************
            *            *
  22 KK     *   RRCP19   *        ROUTE
            *            *
            **************

              HYDROGRAPH ROUTING DATA

  23 RS         STORAGE ROUTING
                      NSTPS         1  NUMBER OF SUBREACHES
                       ITYP      FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC      0.00  INITIAL CONDITION
                          X      0.00 WORKING R AND D COEFFICIENT

  24 RC         NORMAL DEPTH CHANNEL
                        ANL     0.055  LEFT OVERBANK N-VALUE
                       ANCH     0.040  MAIN CHANNEL N-VALUE
                        ANR     0.055  RIGHT OVERBANK N-VALUE
                      RLNTH      496.  REACH LENGTH
                        SEL    0.0262  ENERGY SLOPE
                      ELMAX       0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                           --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  26 RY       ELEVATION    10.00     9.00      8.00      7.00      7.00      8.00      9.00     10.00
  25 RX       DISTANCE      0.00    10.00     20.00     24.00     28.00     32.00     42.00     52.00
                                                                ***

                                        COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

         STORAGE      0.00      0.01      0.02      0.03      0.05      0.06      0.08      0.11      0.13      0.17
         OUTFLOW      0.00      1.18      3.99      8.41     14.54     22.53     32.52     46.43     64.01     84.86
       ELEVATION      7.00      7.16      7.32      7.47      7.63      7.79      7.95      8.11      8.26      8.42

         STORAGE      0.21      0.25      0.30      0.36      0.42      0.49      0.56      0.64      0.73      0.82
         OUTFLOW    109.34    137.78    170.47    207.70    249.73    296.83    349.25    407.24    471.03    540.86
       ELEVATION      8.58      8.74      8.89      9.05      9.21      9.37      9.53      9.68      9.84     10.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      349. TO       541.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                     HYDROGRAPH AT STATION    RRCP19

  PEAK FLOW   TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR      66.63-HR
+  (CFS)     (HR)
                         (CFS)
+     23.    4.10                    3.          1.          0.          0.
                       (INCHES)  2.129       2.140       2.140       2.140
                        (AC-FT)     1.          1.          1.          1.

 PEAK STORAGE  TIME                        MAXIMUM AVERAGE STORAGE
                                    6-HR        24-HR       72-HR      66.63-HR
+ (AC-FT)     (HR)
       0.     4.07                   0.          0.          0.          0.

  PEAK STAGE   TIME                         MAXIMUM AVERAGE STAGE
                                    6-HR        24-HR       72-HR      66.63-HR
+  (FEET)     (HR)
      7.80    4.10                  7.18        7.04        7.02        7.02

                     CUMULATIVE AREA =    0.01 SQ MI


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

            **************
            *            *
  27 KK     *   WS19A    *        BASIN
            *            *
            **************

              SUBBASIN RUNOFF DATA

  28 BA         SUBBASIN CHARACTERISTICS
                      TAREA      0.00  SUBBASIN AREA

                PRECIPITATION DATA

  12 PB               STORM      2.80  BASIN TOTAL PRECIPITATION

  13 PI           INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
     0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
     0.01      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
     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

 29 LG          GREEN AND AMPT LOSS RATE
                      STRTL         0.25  STARTING LOSS
                        DTH         0.27  MOISTURE DEFICIT
                       PSIF         3.29  WETTING FRONT SUCTION
                      XKSAT         0.91  HYDRAULIC CONDUCTIVITY
                      RTIMP        24.00  PERCENT IMPERVIOUS AREA

 30 UC          CLARK UNITGRAPH
                         TC         0.22  TIME OF CONCENTRATION
                          R         0.32  STORAGE COEFFICIENT

 31 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                      0.0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                    100.0

                                                           ***

                                               UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  0.22 HR,        R=  0.32 HR
                                         SNYDER   TP=  0.21 HR,       CP=  0.49

                                                    UNIT HYDROGRAPH
                                               55 END-OF-PERIOD ORDINATES
                 0.        1.        1.        3.        5.        8.        8.        7.        6.        6.
                 5.        5.        4.        4.        3.        3.        3.        3.        2.        2.
                 2.        2.        1.        1.        1.        1.        1.        1.        1.        1.
                 1.        1.        1.        0.        0.        0.        0.        0.        0.        0.
                 0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                 0.        0.        0.        0.        0.

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

                          HYDROGRAPH AT STATION     WS19A

    TOTAL RAINFALL =     2.80, TOTAL LOSS =     1.48, TOTAL EXCESS =     1.32

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR      66.63-HR
+   (CFS)        (HR)
                            (CFS)
+        7.      4.13                    1.           0.          0.           0.
                          (INCHES)     1.308        1.313       1.313        1.313
                           (AC-FT)        0.           0.          0.           0.

                          CUMULATIVE AREA =     0.00 SQ MI


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

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              *            *
 33 KK        *   CP19A    *        COMBINE
              *            *
              **************

 34 HC           HYDROGRAPH COMBINATION
                      ICOMP              2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                           ***

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

                          HYDROGRAPH AT STATION     CP19A

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR      66.63-HR
+   (CFS)        (HR)
                            (CFS)
+       29.      4.10                    3.           1.          0.           0.
                          (INCHES)     1.887        1.897       1.897        1.897
                           (AC-FT)        2.           2.          2.           2.

                          CUMULATIVE AREA =     0.02 SQ MI


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

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              *            *
 35 KK        *   RCP19A   *          ROUTE
              *            *
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              HYDROGRAPH ROUTING DATA

 36 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC       0.00  INITIAL CONDITION
                         X       0.00 WORKING R AND D COEFFICIENT

 37 RC          NORMAL DEPTH CHANNEL
                       ANL      0.055  LEFT OVERBANK N-VALUE
                      ANCH      0.040  MAIN CHANNEL N-VALUE
                       ANR      0.055  RIGHT OVERBANK N-VALUE
                     RLNTH       237.  REACH LENGTH
                       SEL     0.0169  ENERGY SLOPE
                     ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                         CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 39 RY        ELEVATION    10.00      9.00      8.00      7.00      7.00      8.00      9.00     10.00
 38 RX        DISTANCE      0.00     10.00     20.00     24.00     26.00     30.00     40.00     50.00

                                                ***

                                  COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE      0.00      0.00      0.01      0.01      0.02      0.02      0.03      0.04      0.05      0.07
            OUTFLOW      0.00      0.51      1.84      4.11      7.47     12.06     18.02     26.68     37.91     51.53
          ELEVATION      7.00      7.16      7.32      7.47      7.63      7.79      7.95      8.11      8.26      8.42

            STORAGE      0.08      0.10      0.12      0.15      0.18      0.21      0.24      0.28      0.32      0.36
            OUTFLOW     67.84     87.09    109.54    135.42    164.95    198.35    235.81    277.56    323.77    374.64
          ELEVATION      8.58      8.74      8.89      9.05      9.21      9.37      9.53      9.68      9.84     10.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       12. TO       375.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                        HYDROGRAPH AT STATION   RCP19A

  PEAK FLOW      TIME                              MAXIMUM AVERAGE FLOW
                                         6-HR          24-HR         72-HR       66.63-HR
 +  (CFS)        (HR)
                              (CFS)
 +      29.      4.10                      3.             1.            0.             0.
                            (INCHES)    1.887          1.897         1.897          1.897
                             (AC-FT)       2.             2.            2.             2.

 PEAK STORAGE    TIME                              MAXIMUM AVERAGE STORAGE
                                         6-HR          24-HR         72-HR       66.63-HR
 +  (AC-FT)      (HR)
         0.      4.10                      0.             0.            0.             0.

  PEAK STAGE     TIME                              MAXIMUM AVERAGE STAGE
                                         6-HR          24-HR         72-HR       66.63-HR
 +  (FEET)       (HR)
       8.14      4.10                    7.32           7.08          7.03           7.03

                           CUMULATIVE AREA =     0.02 SQ MI


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


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              *            *
 40 KK        *   WS19B    *        BASIN
              *            *
              **************

              SUBBASIN RUNOFF DATA

 41 BA          SUBBASIN CHARACTERISTICS
                     TAREA       0.00  SUBBASIN AREA

                PRECIPITATION DATA

 12 PB               STORM       2.80  BASIN TOTAL PRECIPITATION

 13 PI            INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
                    0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                    0.01      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
                    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

 42 LG          GREEN AND AMPT LOSS RATE
                     STRTL       0.25  STARTING LOSS
                       DTH       0.27  MOISTURE DEFICIT
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                     PSIF         3.29  WETTING FRONT SUCTION
                     XKSAT        0.91  HYDRAULIC CONDUCTIVITY
                     RTIMP       24.00  PERCENT IMPERVIOUS AREA

   43 UC          CLARK UNITGRAPH
                        TC        0.14  TIME OF CONCENTRATION
                         R        0.20  STORAGE COEFFICIENT

   44 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                      0.0        3.0        5.0        8.0       12.0       20.0       43.0       75.0       90.0       96.0
                    100.0

                                                     ***

                                          UNIT HYDROGRAPH PARAMETERS
                                       CLARK   TC=  0.14 HR,        R=  0.20 HR
                                      SNYDER   TP=  0.13 HR,       CP=  0.49

                                                UNIT HYDROGRAPH
                                          35 END-OF-PERIOD ORDINATES
                 0.         0.         1.         2.         2.         2.         2.         1.         1.         1.
                 1.         1.         1.         1.         0.         0.         0.         0.         0.         0.
                 0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
                 0.         0.         0.         0.         0.

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

                                   HYDROGRAPH AT STATION    WS19B

      TOTAL RAINFALL =     2.80, TOTAL LOSS =     1.48, TOTAL EXCESS =     1.32

     PEAK FLOW       TIME                        MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR        72-HR       66.63-HR
  +   (CFS)          (HR)
                                  (CFS)
  +       2.         4.07                  0.           0.           0.            0.
                               (INCHES)   1.311        1.314        1.314         1.314
                                (AC-FT)    0.           0.           0.            0.

                                  CUMULATIVE AREA =      0.00 SQ MI


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


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              *            *
   46 KK      *   RWS19B   *          ROUTE
              *            *
              **************

                 HYDROGRAPH ROUTING DATA

   47 RS          STORAGE ROUTING
                     NSTPS           2  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC        0.00  INITIAL CONDITION
                         X        0.00  WORKING R AND D COEFFICIENT

   48 RC          NORMAL DEPTH CHANNEL
                       ANL       0.055  LEFT OVERBANK N-VALUE
                      ANCH       0.040  MAIN CHANNEL N-VALUE
                       ANR       0.055  RIGHT OVERBANK N-VALUE
                     RLNTH        507.  REACH LENGTH
                       SEL      0.0237  ENERGY SLOPE
                     ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                            CROSS-SECTION DATA
                            --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
   50 RY       ELEVATION    10.00      9.00       8.00       7.00       7.00       8.00       9.00      10.00
   49 RX        DISTANCE     0.00     10.00      20.00      24.00      26.00      30.00      40.00      50.00
                                                     ***

                                      COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE       0.00       0.00       0.01       0.02       0.03       0.05       0.06       0.08       0.11       0.14
            OUTFLOW       0.00       0.60       2.18       4.87       8.85      14.29      21.34      31.59      44.90      61.02
          ELEVATION       7.00       7.16       7.32       7.47       7.63       7.79       7.95       8.11       8.26       8.42

            STORAGE       0.18       0.22       0.27       0.32       0.38       0.45       0.52       0.60       0.68       0.77
            OUTFLOW      80.33     103.13     129.72     160.37     195.34     234.88     279.25     328.69     383.41     443.66
          ELEVATION       8.58       8.74       8.89       9.05       9.21       9.37       9.53       9.68       9.84      10.00

 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        9. TO       444.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                                   HYDROGRAPH AT STATION    RWS19B

     PEAK FLOW       TIME                        MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR        72-HR       66.63-HR
  +   (CFS)          (HR)
                                  (CFS)
  +       2.         4.13                  0.           0.           0.            0.
                               (INCHES)   1.310        1.314        1.314         1.314
                                (AC-FT)    0.           0.           0.            0.

    PEAK STORAGE     TIME                       MAXIMUM AVERAGE STORAGE
                                          6-HR        24-HR        72-HR       66.63-HR
  +  (AC-FT)         (HR)
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       0.      4.03                 0.         0.         0.          0.

  PEAK STAGE    TIME                   MAXIMUM AVERAGE STAGE
                                  6-HR       24-HR       72-HR     66.63-HR
+   (FEET)      (HR)
     7.26       4.13              7.03       7.01        7.00        7.00

                     CUMULATIVE AREA =     0.00 SQ MI


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

              **************
              *            *
   51 KK      *   WS19C    *      BASIN
              *            *
              **************

              SUBBASIN RUNOFF DATA

   52 BA        SUBBASIN CHARACTERISTICS
                      TAREA        0.00  SUBBASIN AREA

                PRECIPITATION DATA

   12 PB              STORM        2.80  BASIN TOTAL PRECIPITATION

   13 PI          INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
                     0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                     0.01      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
                     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

   53 LG        GREEN AND AMPT LOSS RATE
                      STRTL        0.30  STARTING LOSS
                        DTH        0.27  MOISTURE DEFICIT
                       PSIF        3.29  WETTING FRONT SUCTION
                      XKSAT        0.77  HYDRAULIC CONDUCTIVITY
                      RTIMP        1.00  PERCENT IMPERVIOUS AREA

   54 UC        CLARK UNITGRAPH
                         TC        0.23  TIME OF CONCENTRATION
                          R        0.33  STORAGE COEFFICIENT

   55 UA        ACCUMULATED-AREA VS. TIME, 11 ORDINATES
                    0.0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                  100.0

                                                         ***

                                           UNIT HYDROGRAPH PARAMETERS
                                     CLARK    TC=  0.23 HR,       R=  0.33 HR
                                    SNYDER    TP=  0.21 HR,      CP=  0.48

                                                UNIT HYDROGRAPH
                                          58 END-OF-PERIOD ORDINATES
                0.        0.        1.        1.        3.        4.        4.        4.        4.        3.
                3.        3.        3.        2.        2.        2.        2.        2.        1.        1.
                1.        1.        1.        1.        1.        1.        1.        1.        1.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.

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

                     HYDROGRAPH AT STATION      WS19C

    TOTAL RAINFALL =     2.80, TOTAL LOSS =     1.87, TOTAL EXCESS =     0.93

  PEAK FLOW     TIME                   MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR     66.63-HR
+   (CFS)       (HR)
                       (CFS)
+       3.      4.13                0.          0.          0.          0.
                       (INCHES)   0.923       0.923       0.923       0.923
                       (AC-FT)      0.          0.          0.          0.

                     CUMULATIVE AREA =     0.00 SQ MI


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

              **************
              *            *
   57 KK      *   CP19C    *      COMBINE
              *            *
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   58 HC          HYDROGRAPH COMBINATION
                       ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                    ***

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

                         HYDROGRAPH AT STATION    CP19C

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR     66.63-HR
+   (CFS)       (HR)
                    (CFS)
+      34.      4.13                      4.           1.           0.           0.
                 (INCHES)              1.722        1.730        1.730        1.730
                  (AC-FT)                 2.           2.           2.           2.

                         CUMULATIVE AREA =    0.02 SQ MI


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


          **************
          *            *
   59 KK  *    DCP19C  *      STORAGE
          *            *
          **************

   60 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

   61 RS          STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       STOR  TYPE OF INITIAL CONDITION
                      RSVRIC       0.00  INITIAL CONDITION
                           X       0.00 WORKING R AND D COEFFICIENT

   62 SV            STORAGE        0.0       0.0       0.0       0.0       0.0       0.1       0.1       0.1       0.1

   63 SQ          DISCHARGE         0.        5.       12.       23.       34.       34.       34.       34.       34.

   64 SE          ELEVATION     1591.00   1591.50   1592.00   1592.50   1593.00   1593.20   1593.50   1594.00   1594.20
                                                                    ***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        5. TO       23.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                         HYDROGRAPH AT STATION   DCP19C

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR     66.63-HR
+   (CFS)       (HR)
                    (CFS)
+      34.      4.13                      4.           1.           0.           0.
                 (INCHES)              1.722        1.736        1.736        1.736
                  (AC-FT)                 2.           2.           2.           2.

 PEAK STORAGE   TIME                            MAXIMUM AVERAGE STORAGE
                                        6-HR        24-HR        72-HR     66.63-HR
+  (AC-FT)      (HR)
        0.      4.13                      0.           0.           0.           0.

  PEAK STAGE    TIME                              MAXIMUM AVERAGE STAGE
                                        6-HR        24-HR        72-HR     66.63-HR
+   (FEET)      (HR)
   1592.99      4.13                1591.30      1591.08      1591.03      1591.03

                         CUMULATIVE AREA =    0.02 SQ MI


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


          **************
          *            *
   65 KK  *     WS19D  *        BASIN
          *            *
          **************

              SUBBASIN RUNOFF DATA

   66 BA          SUBBASIN CHARACTERISTICS
                       TAREA       0.00  SUBBASIN AREA

              PRECIPITATION DATA

   12 PB               STORM       2.80  BASIN TOTAL PRECIPITATION

   13 PI            INCREMENTAL 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
```

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                    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      0.00      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      0.00      0.00      0.00      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                    0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                    0.01      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
                    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

 67 LG        GREEN AND AMPT LOSS RATE
                    STRTL        0.30  STARTING LOSS
                      DTH        0.27  MOISTURE DEFICIT
                     PSIF        3.29  WETTING FRONT SUCTION
                    XKSAT        0.77  HYDRAULIC CONDUCTIVITY
                    RTIMP        1.00  PERCENT IMPERVIOUS AREA

 68 UC        CLARK UNITGRAPH
                       TC        0.22  TIME OF CONCENTRATION
                        R        0.37  STORAGE COEFFICIENT

 69 UA        ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                    0.0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                  100.0

                                                        ***

                                            UNIT HYDROGRAPH PARAMETERS
                                      CLARK   TC=  0.22 HR,        R=  0.37 HR
                                     SNYDER   TP=  0.20 HR,       CP=  0.42

                                                 UNIT HYDROGRAPH
                                            63 END-OF-PERIOD ORDINATES
              0.        0.        0.        1.        2.        3.        3.        3.        2.        2.
              2.        2.        2.        1.        1.        1.        1.        1.        1.        1.
              1.        1.        1.        1.        1.        0.        0.        0.        0.        0.
              0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
              0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
              0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
              0.        0.        0.

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

                    HYDROGRAPH AT STATION      WS19D

     TOTAL RAINFALL =     2.80, TOTAL LOSS =     1.87, TOTAL EXCESS =     0.93

   PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR       66.63-HR
 +   (CFS)        (HR)
                            (CFS)
 +       2.       4.13                    0.           0.           0.           0.
                          (INCHES)    0.923        0.923        0.923        0.923
                           (AC-FT)       0.           0.           0.           0.

                       CUMULATIVE AREA =     0.00 SQ MI


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


           **************
           *            *
 71 KK     *    WS19E   *        BASIN
           *            *
           **************

              SUBBASIN RUNOFF DATA

 72 BA        SUBBASIN CHARACTERISTICS
                    TAREA        0.00  SUBBASIN AREA

              PRECIPITATION DATA

 12 PB              STORM        2.80  BASIN TOTAL PRECIPITATION

 13 PI          INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
                    0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                    0.01      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
                    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

 73 LG        GREEN AND AMPT LOSS RATE
```

```
                      STRTL          0.30  STARTING LOSS
                        DTH          0.27  MOISTURE DEFICIT
                       PSIF          3.29  WETTING FRONT SUCTION
                      XKSAT          0.78  HYDRAULIC CONDUCTIVITY
                      RTIMP          3.00  PERCENT IMPERVIOUS AREA

 74 UC          CLARK UNITGRAPH
                         TC          0.23  TIME OF CONCENTRATION
                          R          0.47  STORAGE COEFFICIENT

 75 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                    0.0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                  100.0

                                                        ***

                                          UNIT HYDROGRAPH PARAMETERS
                                     CLARK   TC=  0.23 HR,        R=  0.47 HR
                                    SNYDER   TP=  0.23 HR,       CP=  0.40

                                               UNIT HYDROGRAPH
                                          79 END-OF-PERIOD ORDINATES
                0.        0.        0.        1.        1.        2.        2.        2.        2.        2.
                2.        2.        2.        1.        1.        1.        1.        1.        1.        1.
                1.        1.        1.        1.        1.        1.        1.        1.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.

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

                         HYDROGRAPH AT STATION      WS19E

       TOTAL RAINFALL =    2.80, TOTAL LOSS =    1.84, TOTAL EXCESS =    0.96

     PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR       66.63-HR
  +   (CFS)         (HR)
                               (CFS)
  +       2.        4.17                    0.           0.           0.            0.
                             (INCHES)   0.954        0.955        0.955         0.955
                              (AC-FT)      0.           0.           0.            0.

                          CUMULATIVE AREA =     0.00 SQ MI


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


             **************
             *            *
 77 KK       *    WS20    *       BASIN
             *            *
             **************

              SUBBASIN RUNOFF DATA

 78 BA          SUBBASIN CHARACTERISTICS
                      TAREA          0.03  SUBBASIN AREA

                PRECIPITATION DATA

 12 PB                STORM          2.80  BASIN TOTAL PRECIPITATION

 13 PI            INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
                   0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                   0.01      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
                   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

 79 LG          GREEN AND AMPT LOSS RATE
                      STRTL          0.19  STARTING LOSS
                        DTH          0.27  MOISTURE DEFICIT
                       PSIF          3.29  WETTING FRONT SUCTION
                      XKSAT          0.95  HYDRAULIC CONDUCTIVITY
                      RTIMP         47.00  PERCENT IMPERVIOUS AREA

 80 UC          CLARK UNITGRAPH
                         TC          0.27  TIME OF CONCENTRATION
                          R          0.32  STORAGE COEFFICIENT

 81 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                    0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                  100.0

                                                        ***

                                          UNIT HYDROGRAPH PARAMETERS
```

CLARK TC= 0.27 HR, R= 0.32 HR
SNYDER TP= 0.18 HR, CP= 0.37

UNIT HYDROGRAPH
54 END-OF-PERIOD ORDINATES

2.	7.	18.	29.	33.	34.	33.	32.	30.	27.
24.	22.	20.	18.	16.	14.	13.	12.	10.	9.
8.	8.	7.	6.	5.	5.	4.	4.	4.	3.
3.	3.	2.	2.	2.	2.	2.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	0.	0.	0.
0.	0.	0.	0.						

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

HYDROGRAPH AT STATION WS20

TOTAL RAINFALL = 2.80, TOTAL LOSS = 1.04, TOTAL EXCESS = 1.76

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	66.63-HR
37.	4.10	(CFS)	5.	1.	0.	0.
		(INCHES)	1.746	1.756	1.756	1.756
		(AC-FT)	2.	2.	2.	2.

CUMULATIVE AREA = 0.03 SQ MI

*** ***

83 KK — RCP20 — ROUTE

HYDROGRAPH ROUTING DATA

84 RK — KINEMATIC WAVE STREAM ROUTING

L	123.	CHANNEL LENGTH
S	0.0100	SLOPE
N	0.012	CHANNEL ROUGHNESS COEFFICIENT
CA	0.00	CONTRIBUTING AREA
SHAPE	CIRC	CHANNEL SHAPE
WD	3.00	BOTTOM WIDTH OR DIAMETER
Z	0.00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS

***

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

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

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
MAIN	8.05	1.25	0.11	41.00	36.90	246.08	1.76	13.64

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2342E+01 EXCESS=0.0000E+00 OUTFLOW=0.2342E+01 BASIN STORAGE=0.5707E-18 PERCENT ERROR= 0.0

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	8.05	1.25	2.00	36.88	246.00	1.76

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

HYDROGRAPH AT STATION RCP20

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	66.63-HR
37.	4.10	(CFS)	5.	1.	0.	0.
		(INCHES)	1.746	1.756	1.756	1.756
		(AC-FT)	2.	2.	2.	2.

CUMULATIVE AREA = 0.03 SQ MI

*** ***

85 KK — WS20A — BASIN

SUBBASIN RUNOFF DATA

86 BA — SUBBASIN CHARACTERISTICS

TAREA	0.00	SUBBASIN AREA

```
                PRECIPITATION DATA

   12 PB              STORM         2.80  BASIN TOTAL PRECIPITATION

   13 PI           INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
                     0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                     0.01      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
                     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

   87 LG        GREEN AND AMPT LOSS RATE
                      STRTL         0.16  STARTING LOSS
                        DTH         0.27  MOISTURE DEFICIT
                       PSIF         3.29  WETTING FRONT SUCTION
                      XKSAT         0.99  HYDRAULIC CONDUCTIVITY
                      RTIMP        60.00  PERCENT IMPERVIOUS AREA

   88 UC        CLARK UNITGRAPH
                         TC         0.23  TIME OF CONCENTRATION
                          R         0.67  STORAGE COEFFICIENT

   89 UA        ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                     0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                   100.0

                                                       ***

                                              UNIT HYDROGRAPH PARAMETERS
                                       CLARK    TC=  0.23 HR,        R=  0.67 HR
                                      SNYDER    TP=  0.21 HR,       CP=  0.25

                                                   UNIT HYDROGRAPH
                                              109 END-OF-PERIOD ORDINATES
                0.        1.        1.        2.        2.        2.        2.        2.        2.        2.
                2.        2.        2.        2.        2.        2.        1.        1.        1.        1.
                1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
                1.        1.        1.        1.        1.        1.        1.        1.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.

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

                     HYDROGRAPH AT STATION     WS20A

      TOTAL RAINFALL =      2.80, TOTAL LOSS =     0.79, TOTAL EXCESS =     2.01

     PEAK FLOW        TIME                          MAXIMUM AVERAGE FLOW
                                         6-HR         24-HR        72-HR       66.63-HR
 +     (CFS)          (HR)
                                 (CFS)
 +        3.          4.10                  1.           0.           0.            0.
                               (INCHES)  1.963        2.004        2.004         2.004
                                (AC-FT)     0.           0.           0.            0.

                      CUMULATIVE AREA =      0.00 SQ MI


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

                ***************
                *             *
   91 KK        *    CP20A    *       COMBINE
                *             *
                ***************

   92 HC           HYDROGRAPH COMBINATION
                      ICOMP              2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                       ***

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

                     HYDROGRAPH AT STATION     CP20A

     PEAK FLOW        TIME                          MAXIMUM AVERAGE FLOW
                                         6-HR         24-HR        72-HR       66.63-HR
 +     (CFS)          (HR)
                                 (CFS)
 +       40.          4.10                  5.           1.           0.            0.
                               (INCHES)  1.767        1.783        1.783         1.783
                                (AC-FT)     3.           3.           3.            3.

                      CUMULATIVE AREA =      0.03 SQ MI
```

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	WS19	23.	4.07	3.	1.	0.	0.01		
+	ROUTED TO	RCP19	23.	4.07	3.	1.	0.	0.01		
+	ROUTED TO	RRCP19	23.	4.10	3.	1.	0.	0.01		
+									7.80	4.10
+	HYDROGRAPH AT	WS19A	7.	4.13	1.	0.	0.	0.00		
+	2 COMBINED AT	CP19A	29.	4.10	3.	1.	0.	0.02		
+	ROUTED TO	RCP19A	29.	4.10	3.	1.	0.	0.02		
+									8.14	4.10
+	HYDROGRAPH AT	WS19B	2.	4.07	0.	0.	0.	0.00		
+	ROUTED TO	RWS19B	2.	4.13	0.	0.	0.	0.00		
+									7.26	4.13
+	HYDROGRAPH AT	WS19C	3.	4.13	0.	0.	0.	0.00		
+	3 COMBINED AT	CP19C	34.	4.13	4.	1.	0.	0.02		
+	ROUTED TO	DCP19C	34.	4.13	4.	1.	0	0.02		
+									1592.99	4.13
+	HYDROGRAPH AT	WS19D	2.	4.13	0.	0.	0.	0.00		
+	HYDROGRAPH AT	WS19E	2.	4.17	0.	0.	0.	0.00		
+	HYDROGRAPH AT	WS20	37.	4.10	5.	1.	0.	0.03		
+	ROUTED TO	RCP20	37.	4.10	5.	1.	0.	0.03		
+	HYDROGRAPH AT	WS20A	3.	4.10	1.	0.	0.	0.00		
+	2 COMBINED AT	CP20A	40.	4.10	5.	1.	0.	0.03		

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
RCP19	MANE	0.10	23.45	244.13	2.14	2.00	23.44	244.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1370E+01 EXCESS=0.0000E+00 OUTFLOW=0.1370E+01 BASIN STORAGE=0.5540E-18 PERCENT ERROR= 0.0

RCP20	MANE	0.11	36.90	246.08	1.76	2.00	36.88	246.00	1.76

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2342E+01 EXCESS=0.0000E+00 OUTFLOW=0.2342E+01 BASIN STORAGE=0.5707E-18 PERCENT ERROR= 0.0

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

PROPOSED CONDITIONS HEC-1 MODEL

CITY OF SCOTTSDALE
Drainage Design Management System
LAND USE
Project Reference: 1603PR

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb
Major Basin ID: 01								
WS19	44	0.009	78.0	0.10	85	75.0	NORMAL	0.034
	UNDEVELOPED	0.003	22.0	0.30	1	30.0	NORMAL	0.068 *
		0.012	**100.0**					
WS19A	13	0.005	100.0	0.25	24	50.0	NORMAL	0.073 *
		0.005	**100.0**					
WS19B	13	0.001	100.0	0.25	24	50.0	NORMAL	0.083 *
		0.001	**100.0**					
WS19C	13	0.002	61.5	0.25	24	50.0	NORMAL	0.076 *
	UNDEVELOPED	0.001	38.5	0.30	1	30.0	NORMAL	0.076 *
		0.003	**100.0**					
WS19D	13	0.002	64.9	0.25	24	50.0	NORMAL	0.074 *
	22	0.000	10.8	0.10	85	75.0	NORMAL	0.037
	UNDEVELOPED	0.001	24.3	0.30	1	30.0	NORMAL	0.074 *
		0.004	**100.0**					
WS20	22	0.002	8.8	0.10	85	75.0	NORMAL	0.032
	44	0.012	45.8	0.10	85	75.0	NORMAL	0.032
	UNDEVELOPED	0.011	45.4	0.30	1	30.0	NORMAL	0.063 *
		0.025	**100.0**					
WS20A	13	0.000	10.3	0.25	24	50.0	NORMAL	0.076 *
	22	0.002	72.4	0.10	85	75.0	NORMAL	0.038
	UNDEVELOPED	0.001	17.2	0.30	1	30.0	NORMAL	0.076 *
		0.003	**99.9**					

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)
Major Basin ID: 01								
WS19	645	68	64568	0.012	100.00	0.63	-	100
WS19A	645	68	64568	0.005	100.00	0.63	-	100
WS19B	645	68	64568	0.001	100.00	0.63	-	100
WS19C	645	68	64568	0.003	100.00	0.63	-	100
WS19D	645	68	64568	0.004	100.00	0.63	-	100
WS20	645	68	64568	0.025	100.00	0.63	-	100
WS20A	645	68	64568	0.003	100.00	0.63	-	100

CITY OF SCOTTSDALE
Drainage Design Management System
HEC-1 STORAGE FACILITIES
Project Reference: 1603PR

Storage Basin ID: DCP19C

			1	2	3	4	5	6	7	8	9	10
Elevation Top of Dam:	1,593.30	Volume (ac-ft)			0.01	0.02	0.10	0.14	0.21	0.34	0.40	0.40
Length of Dam:	15.00	Discharge (cfs)		1	3	6	9	10	15	34	43	60
Discharge Coefficient:	3.00	Elevation (ft)	1,591.0	1,591.5	1,592.0	1,592.5	1,593.0	1,593.2	1,593.5	1,594.0	1,594.2	1,594.5
Weir Coefficient:	1.50											

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Peak Volume (ac-ft)	0.06	0.12	0.18	0.25	0.29	0.33
Peak Stage (ft)	1,592.75	1,593.08	1,593.37	1,593.65	1,593.82	1,593.98

Storage Basin ID: DT19D

			1	2	3	4	5	6	7	8	9	10
Elevation Top of Dam:	1,592.50	Volume (ac-ft)		0.05	0.10	0.12	0.22	0.31				
Length of Dam:	6.00	Discharge (cfs)				-	1	11				
Discharge Coefficient:	3.00	Elevation (ft)	1,589.5	1,590.5	1,591.2	1,591.5	1,592.5	1,593.2	-	-	-	-
Weir Coefficient:	1.50											

	11	12	13	14.	15	16	17	18	19	20
Volume (ac-ft)	-	-	-	-	-	-	-	-	-	-
Discharge (cfs)	-	-	-	-	-	-	-	-	-	-
Elevation (ft)	-	-	-	-	-	-	-	-	-	-

	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Peak Volume (ac-ft)	0.07	0.11	0.15	0.20	0.22	0.22
Peak Stage (ft)	1,590.78	1,591.35	1,591.80	1,592.30	1,592.50	1,592.50

CITY OF SCOTTSDALE
Drainage Design Management System
HEC-1 FLOW SUMMARY
Project Reference: 1603PR

7/12/2013

ID	Type	Area (sq mi)	Discharge cfs					
			2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin 01								
WS19	Hydrograph	0.010	7	10	13	17	20	23
RCP19	Routed	0.010	7	10	13	17	20	23
RRCP19	Routed	0.010	7	10	12	16	20	23
WS19A	Hydrograph		1	2	3	4	5	7
CP19A	Combined	0.020	8	11	15	20	25	29
RCP19A	Routed	0.020	8	11	15	20	24	29
WS19B	Hydrograph				1	1	1	2
RW19B	Routed				1	1	1	2
WS19C	Hydrograph			1	2	3	3	4
WS19D	Hydrograph		1	1	2	3	3	4
DT19D	Routed						1	1
CP19C	Combined	0.030	8	12	17	24	29	35
DCP19C	Routed	0.030	7	9	13	21	27	33
WS20	Hydrograph	0.030	9	13	18	25	31	37
RCP20	Routed	0.030	9	13	18	25	31	37
WS20A	Hydrograph		1	1	2	2	3	3
CP20A	Combined	0.030	10	14	19	27	33	40

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   17JUL13  TIME  18:27:47   *
*                                       *
*****************************************
```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

   1          ID        CITY OF SCOTTSDALE
   2          ID        1603PR - COCHISE MANOR
   3          ID        100 YEAR
   4          ID        6 Hour  Storm
   5          ID        Unit Hydrograph: Clark
   6          ID        07/17/2013
   7          IT      2       0       0    1000
   8          IN     15
   9          IO      3
              *DIAGRAM
              *
              *

  10          KK    WS19    BASIN
  11          BA   0.012
  12          PB   2.802
  13          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
  14          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
  15          PC   0.962   0.972   0.983   0.991   1.000
  16          LG    0.14    0.27    3.29    1.01      67
  17          UC   0.198   0.235
  18          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  19          UA     100
              *

  20          KK   RCP19   ROUTE
  21          RK     123  0.0100   0.012            CIRC   3.000
              *

  22          KK  RRCP19   ROUTE
  23          RS       1    FLOW
  24          RC   0.055   0.040   0.055     496  0.0262    0.00
  25          RX    0.00   10.00   20.00   24.00   28.00   32.00   42.00   52.00
  26          RY   10.00    9.00    8.00    7.00    7.00    8.00    9.00   10.00
              *

  27          KK   WS19A    BASIN
  28          BA   0.005
  29          LG    0.25    0.27    3.29    0.91      24
  30          UC   0.225   0.317
  31          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  32          UA     100
              *

  33          KK   CP19A  COMBINE
  34          HC       2    .0172
              *

  35          KK  RCP19A   ROUTE
  36          RS       1    FLOW
  37          RC   0.055   0.040   0.055     233  0.0169    0.00
  38          RX    0.00   10.00   20.00   24.00   26.00   30.00   40.00   50.00
  39          RY   10.00    9.00    8.00    7.00    7.00    8.00    9.00   10.00
              *
```

1 HEC-1 INPUT PAGE 2

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

  40          KK   WS19B    BASIN
  41          BA   0.001
  42          LG    0.25    0.27    3.29    0.91      24
  43          UC   0.144   0.200
  44          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  45          UA     100
              *

  46          KK   RW19B   ROUTE
```

```
47          RS       2    FLOW
48          RC   0.055   0.040   0.055     492  0.0237    0.00
49          RX    0.00   10.00   20.00   24.00   26.00   30.00   40.00   50.00
50          RY   10.00    9.00    8.00    7.00    7.00    8.00    9.00   10.00
            *

51          KK   WS19C   BASIN
52          BA   0.003
53          LG    0.27    0.27    3.29    0.86      15
54          UC   0.183   0.244
55          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
56          UA     100
            *

57          KK   WS19D   BASIN
58          BA   0.004
59          LG    0.25    0.27    3.29    0.89      25
60          UC   0.251   0.449
61          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
62          UA     100
            *

63          KK   DT19D STORAGE
64          KO
65          RS       1    STOR
66          SV            0.05    0.10    0.12    0.22    0.31
67          SQ                    0.21    0.97   10.70
68          SE  1589.5 1590.50 1591.20 1591.50 1592.50 1593.20
69          ST  1592.5     6.0     3.0     1.5
            *

70          KK   CP19C COMBINE
71          HC       4   .0243
            *

72          KK  DCP19C STORAGE
73          KO
74          RS       1    STOR
75          SV                0.01    0.02    0.10    0.14    0.21    0.34    0.40    0.40
76          SQ                1.10    3.00    5.50    8.50    9.80   15.30   33.80   43.40   59.60
77          SE  1591.0 1591.50 1592.00 1592.50 1593.00 1593.20 1593.50 1594.00 1594.20 1594.50
78          ST  1593.3    15.0     3.0     1.5
            *
```



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

79          KK    WS20   BASIN
80          BA   0.025
81          LG    0.19    0.27    3.29    0.95      47
82          UC   0.272   0.316
83          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
84          UA     100
            *

85          KK   RCP20   ROUTE
86          RK     123  0.0100   0.012            CIRC   3.000
            *

87          KK   WS20A   BASIN
88          BA   0.003
89          LG    0.15    0.27    3.29    1.01      64
90          UC   0.229   0.650
91          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
92          UA     100
            *

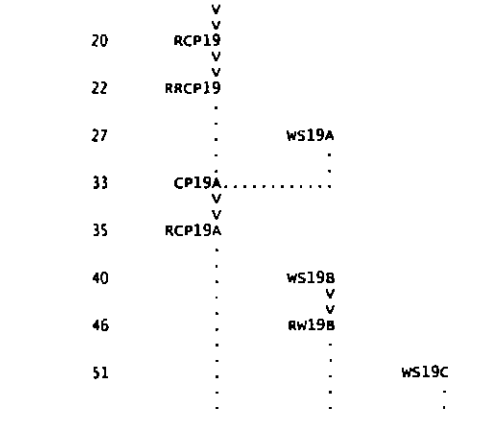
93          KK   CP20A COMBINE
94          HC       2   .0281
            *
95          ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

(V) ROUTING (---->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW



```
57              .           .           .      WS19D
                .           .           .          V
                .           .           .          V
63              .           .           .      DT19D
                .           .           .          .
                .           .           .          .
70        CP19C......  ............................
                V
                V
72       DCP19C
                .
                .
79              .        WS20
                .           V
                .           V
85              .       RCP20
                .           .
                .           .
87              .           .       WS20A
                .           .           .
                .           .           .
93              .       CP20A...........

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1***************************************                                               ***************************************
*                                      *                                               *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                               *   U.S. ARMY CORPS OF ENGINEERS      *
*              JUN   1998              *                                               *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                *                                               *       609 SECOND STREET             *
*                                      *                                               *    DAVIS, CALIFORNIA 95616          *
*  RUN DATE   17JUL13  TIME  18:27:47  *                                               *       (916) 756-1104                *
*                                      *                                               *                                     *
****************************************                                               ***************************************


                              CITY OF SCOTTSDALE
                              1603PR - COCHISE MANOR
                              100 YEAR
                              6 Hour  Storm
                              Unit Hydrograph: Clark
                              07/17/2013

 9 IO           OUTPUT CONTROL VARIABLES
                     IPRNT           3  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

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

                 COMPUTATION INTERVAL    0.03 HOURS
                      TOTAL TIME BASE   33.30 HOURS

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


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

          **************
          *            *
10 KK     *    WS19    *        BASIN
          *            *
          **************

 8 IN           TIME DATA FOR INPUT TIME SERIES
                     JXMIN          15  TIME INTERVAL IN MINUTES
                    JXDATE      1    0  STARTING DATE
                    JXTIME           0  STARTING TIME

               SUBBASIN RUNOFF DATA

11 BA           SUBBASIN CHARACTERISTICS
                     TAREA        0.01  SUBBASIN AREA

                PRECIPITATION DATA

12 PB                STORM        2.80  BASIN TOTAL PRECIPITATION

13 PI             INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
                    0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                    0.01      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
                    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

16 LG          GREEN AND AMPT LOSS RATE
                     STRTL         0.14  STARTING LOSS
                       DTH         0.27  MOISTURE DEFICIT
                      PSIF         3.29  WETTING FRONT SUCTION
                     XKSAT         1.01  HYDRAULIC CONDUCTIVITY
                     RTIMP        67.00  PERCENT IMPERVIOUS AREA

17 UC          CLARK UNITGRAPH
                        TC         0.20  TIME OF CONCENTRATION
                         R         0.23  STORAGE COEFFICIENT

18 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                     0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                   100.0

                                                         ***

                                           UNIT HYDROGRAPH PARAMETERS
                                        CLARK   TC=  0.20 HR,        R=  0.23 HR
                                       SNYDER   TP=  0.13 HR,       CP=  0.38

                                                UNIT HYDROGRAPH
                                           40 END-OF-PERIOD ORDINATES
                 2.        8.       17.       22.       22.       21.       19.       16.       14.       12.
                11.        9.        8.        7.        6.        5.        5.        4.        3.        3.
                 3.        2.        2.        2.        1.        1.        1.        1.        1.        1.
                 1.        1.        0.        0.        0.        0.        0.        0.        0.        0.

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

                     HYDROGRAPH AT STATION     WS19

     TOTAL RAINFALL =    2.80, TOTAL LOSS =    0.65, TOTAL EXCESS =    2.15

   PEAK FLOW      TIME                      MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR      33.30-HR
 +   (CFS)        (HR)
                            (CFS)
 +      23.       4.07                  3.          1.          0.          0.
                           (INCHES)   2.130       2.140       2.140       2.140
                            (AC-FT)      1.          1.          1.          1.

                      CUMULATIVE AREA =     0.01 SQ MI


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

             **************
             *            *
20 KK        *    RCP19   *         ROUTE
             *            *
             **************

                HYDROGRAPH ROUTING DATA

21 RK          KINEMATIC WAVE STREAM ROUTING
                         L         123.  CHANNEL LENGTH
                         S       0.0100  SLOPE
                         N        0.012  CHANNEL ROUGHNESS COEFFICIENT
                        CA         0.00  CONTRIBUTING AREA
                     SHAPE         CIRC  CHANNEL SHAPE
                        WD         3.00  BOTTOM WIDTH OR DIAMETER
                         Z         0.00  SIDE SLOPE
                    NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS

                                                         ***

      *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

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

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

                  MAIN        8.05      1.25      0.10     41.00     23.45    244.13      2.14      12.46

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1370E+01  EXCESS=0.0000E+00 OUTFLOW=0.1370E+01 BASIN STORAGE=0.1433E-16 PERCENT ERROR=   0.0

                                   INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

                  MAIN        8.05      1.25      2.00               23.44    244.00      2.14
    ***        ***        ***        ***        ***

                     HYDROGRAPH AT STATION    RCP19
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  PEAK FLOW     TIME                            MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR       72-HR      33.30-HR
+   (CFS)       (HR)
                           (CFS)
+       23.     4.07                     3.           1.          0.            0.
                          (INCHES)   2.130        2.140       2.140         2.140
                          (AC-FT)       1.           1.          1.            1.

                          CUMULATIVE AREA =     0.01 SQ MI


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

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              *            *
  22 KK       *   RRCP19   *        ROUTE
              *            *
              **************

             HYDROGRAPH ROUTING DATA

  23 RS        STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC       0.00  INITIAL CONDITION
                         X       0.00 WORKING R AND D COEFFICIENT

  24 RC        NORMAL DEPTH CHANNEL
                       ANL      0.055  LEFT OVERBANK N-VALUE
                      ANCH      0.040  MAIN CHANNEL N-VALUE
                       ANR      0.055  RIGHT OVERBANK N-VALUE
                     RLNTH       496.  REACH LENGTH
                       SEL     0.0262  ENERGY SLOPE
                     ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                                   CROSS-SECTION DATA
                                  --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  26 RY        ELEVATION      10.00       9.00       8.00       7.00       7.00       8.00       9.00      10.00
  25 RX        DISTANCE        0.00      10.00      20.00      24.00      28.00      32.00      42.00      52.00

                                                                ***

                                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

                  STORAGE      0.00       0.01       0.02       0.03       0.05       0.06       0.08       0.11       0.13       0.17
                  OUTFLOW      0.00       1.18       3.99       8.41      14.54      22.53      32.52      46.43      64.01      84.86
                ELEVATION      7.00       7.16       7.32       7.47       7.63       7.79       7.95       8.11       8.26       8.42

                  STORAGE      0.21       0.25       0.30       0.36       0.42       0.49       0.56       0.64       0.73       0.82
                  OUTFLOW    109.34     137.78     170.47     207.70     249.73     296.83     349.25     407.24     471.03     540.86
                ELEVATION      8.58       8.74       8.89       9.05       9.21       9.37       9.53       9.68       9.84      10.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      349. TO      541.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                               HYDROGRAPH AT STATION   RRCP19

  PEAK FLOW     TIME                            MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR       72-HR      33.30-HR
+   (CFS)       (HR)
                           (CFS)
+       23.     4.10                     3.           1.          0.            0.
                          (INCHES)   2.129        2.140       2.140         2.140
                          (AC-FT)       1.           1.          1.            1.

 PEAK STORAGE   TIME                            MAXIMUM AVERAGE STORAGE
                                       6-HR        24-HR       72-HR      33.30-HR
+  (AC-FT)      (HR)
        0.      4.07                     0.           0.          0.            0.

  PEAK STAGE    TIME                            MAXIMUM AVERAGE STAGE
                                       6-HR        24-HR       72-HR      33.30-HR
+   (FEET)      (HR)
      7.80      4.10                   7.18         7.04        7.03          7.03

                          CUMULATIVE AREA =     0.01 SQ MI


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

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              *            *
  27 KK       *   WS19A    *        BASIN
              *            *
              **************

             SUBBASIN RUNOFF DATA

  28 BA        SUBBASIN CHARACTERISTICS
                    TAREA        0.00  SUBBASIN AREA

               PRECIPITATION DATA

  12 PB              STORM       2.80  BASIN TOTAL PRECIPITATION

  13 PI          INCREMENTAL PRECIPITATION PATTERN
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```
                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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
                0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                0.01      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
                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

 29 LG          GREEN AND AMPT LOSS RATE
                      STRTL        0.25  STARTING LOSS
                        DTH        0.27  MOISTURE DEFICIT
                       PSIF        3.29  WETTING FRONT SUCTION
                      XKSAT        0.91  HYDRAULIC CONDUCTIVITY
                      RTIMP       24.00  PERCENT IMPERVIOUS AREA

 30 UC          CLARK UNITGRAPH
                         TC        0.22  TIME OF CONCENTRATION
                          R        0.32  STORAGE COEFFICIENT

 31 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                    0.0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                  100.0

                                                       ***

                                          UNIT HYDROGRAPH PARAMETERS
                                    CLARK    TC=  0.22 HR,        R=  0.32 HR
                                   SNYDER    TP=  0.21 HR,       CP=  0.49

                                               UNIT HYDROGRAPH
                                          55 END-OF-PERIOD ORDINATES
               0.        1.        1.        3.        5.        8.        8.        7.        6.        6.
               5.        5.        4.        4.        3.        3.        3.        3.        2.        2.
               2.        2.        1.        1.        1.        1.        1.        1         1         1.
               1.        1.        1.        0.        0.        0.        0.        0.        0.        0.
               0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
               0.        0.        0.        0.        0.

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

                      HYDROGRAPH AT STATION     WS19A

    TOTAL RAINFALL =     2.80, TOTAL LOSS =     1.48, TOTAL EXCESS =     1.32

  PEAK FLOW      TIME                       MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR      33.30-HR
+   (CFS)        (HR)
                          (CFS)
+       7.       4.13                  1.          0.          0.           0.
                        (INCHES)    1.308       1.313       1.313        1.313
                         (AC-FT)       0.          0.          0.           0.

                     CUMULATIVE AREA =     0.00 SQ MI


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

          **************
          *            *
 33 KK    *    CP19A   *      COMBINE
          *            *
          **************

 34 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                       ***

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

                      HYDROGRAPH AT STATION     CP19A

  PEAK FLOW      TIME                       MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR      33.30-HR
+   (CFS)        (HR)
                          (CFS)
+      29.       4.10                  3.          1.          1.           1.
                        (INCHES)    1.887       1.897       1.897        1.897
                         (AC-FT)       2.          2.          2.           2.

                     CUMULATIVE AREA =     0.02 SQ MI


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

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          *            *
 35 KK    *   RCP19A   *        ROUTE
          *            *
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            HYDROGRAPH ROUTING DATA

 36 RS        STORAGE ROUTING
                    NSTPS          1  NUMBER OF SUBREACHES
                     ITYP       FLOW  TYPE OF INITIAL CONDITION
                   RSVRIC       0.00  INITIAL CONDITION
                        X       0.00 WORKING R AND D COEFFICIENT

 37 RC        NORMAL DEPTH CHANNEL
                      ANL      0.055  LEFT OVERBANK N-VALUE
                     ANCH      0.040  MAIN CHANNEL N-VALUE
                      ANR      0.055  RIGHT OVERBANK N-VALUE
                    RLNTH       233.  REACH LENGTH
                      SEL     0.0169  ENERGY SLOPE
                    ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                 CROSS-SECTION DATA
                      --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 39 RY      ELEVATION    10.00      9.00      8.00      7.00      7.00      8.00      9.00     10.00
 38 RX      DISTANCE      0.00     10.00     20.00     24.00     26.00     30.00     40.00     50.00

                                              ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE      0.00      0.00      0.01      0.01      0.02      0.02      0.03      0.04      0.05      0.06
            OUTFLOW      0.00      0.51      1.84      4.11      7.47     12.06     18.02     26.68     37.91     51.53
          ELEVATION      7.00      7.16      7.32      7.47      7.63      7.79      7.95      8.11      8.26      8.42

            STORAGE      0.08      0.10      0.12      0.15      0.18      0.21      0.24      0.27      0.31      0.35
            OUTFLOW     67.84     87.09    109.54    135.42    164.95    198.35    235.81    277.56    323.77    374.64
          ELEVATION      8.58      8.74      8.89      9.05      9.21      9.37      9.53      9.68      9.84     10.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       12. TO       375.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                    HYDROGRAPH AT STATION   RCP19A

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR       33.30-HR
+   (CFS)       (HR)
                           (CFS)
+      29.      4.10                    3.           1.          1.            1.
                         (INCHES)    1.887        1.897       1.897         1.897
                          (AC-FT)       2.           2.          2.            2.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR       72-HR       33.30-HR
+  (AC-FT)      (HR)
         0.     4.10                    0.           0.          0.            0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR       72-HR       33.30-HR
+   (FEET)      (HR)
      8.14      4.10                  7.32         7.08        7.06          7.06

                       CUMULATIVE AREA =     0.02 SQ MI


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

          **************
          *            *
 40 KK    *   WS19B    *        BASIN
          *            *
          **************

            SUBBASIN RUNOFF DATA

 41 BA        SUBBASIN CHARACTERISTICS
                    TAREA       0.00  SUBBASIN AREA

              PRECIPITATION DATA

 12 PB              STORM       2.80  BASIN TOTAL PRECIPITATION

 13 PI           INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
                    0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                    0.01      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
                    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

 42 LG        GREEN AND AMPT LOSS RATE
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                    STRTL         0.25  STARTING LOSS
                      DTH         0.27  MOISTURE DEFICIT
                     PSIF         3.29  WETTING FRONT SUCTION
                    XKSAT         0.91  HYDRAULIC CONDUCTIVITY
                    RTIMP        24.00  PERCENT IMPERVIOUS AREA

 43 UC          CLARK UNITGRAPH
                       TC         0.14  TIME OF CONCENTRATION
                        R         0.20  STORAGE COEFFICIENT

 44 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                   0.0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                 100.0

                                                         ***

                                         UNIT HYDROGRAPH PARAMETERS
                                   CLARK   TC=  0.14 HR,       R=  0.20 HR
                                  SNYDER   TP=  0.13 HR,      CP=  0.49

                                              UNIT HYDROGRAPH
                                          35 END-OF-PERIOD ORDINATES
                0.        0.        1.        2.        2.        2.        2.        1.        1.        1.
                1.        1.        1.        1.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                0.        0.        0.        0.        0.

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

                            HYDROGRAPH AT STATION     WS19B

   TOTAL RAINFALL =     2.80, TOTAL LOSS =     1.48, TOTAL EXCESS =     1.32

  PEAK FLOW     TIME                                MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR      33.30-HR
+   (CFS)       (HR)
                            (CFS)
+       2.      4.07                       0.           0.           0.           0.
                          (INCHES)      1.311        1.314        1.314        1.314
                           (AC-FT)         0.           0.           0.           0.

                           CUMULATIVE AREA =     0.00 SQ MI


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

            **************
            *            *
 46 KK      *    RW19B   *         ROUTE
            *            *
            **************

              HYDROGRAPH ROUTING DATA

 47 RS          STORAGE ROUTING
                    NSTPS            2  NUMBER OF SUBREACHES
                     ITYP         FLOW  TYPE OF INITIAL CONDITION
                   RSVRIC         0.00  INITIAL CONDITION
                        X         0.00 WORKING R AND D COEFFICIENT

 48 RC          NORMAL DEPTH CHANNEL
                      ANL        0.055  LEFT OVERBANK N-VALUE
                     ANCH        0.040  MAIN CHANNEL N-VALUE
                      ANR        0.055  RIGHT OVERBANK N-VALUE
                    RLNTH         492.  REACH LENGTH
                      SEL       0.0237  ENERGY SLOPE
                    ELMAX          0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                            CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 50 RY        ELEVATION      10.00      9.00      8.00      7.00      7.00      8.00      9.00     10.00
 49 RX        DISTANCE        0.00     10.00     20.00     24.00     26.00     30.00     40.00     50.00

                                                         ***

                                      COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

             STORAGE      0.00      0.00      0.01      0.02      0.03      0.05      0.06      0.08      0.11      0.14
             OUTFLOW      0.00      0.60      2.18      4.87      8.85     14.29     21.34     31.59     44.90     61.02
           ELEVATION      7.00      7.16      7.32      7.47      7.63      7.79      7.95      8.11      8.26      8.42

             STORAGE      0.17      0.21      0.26      0.31      0.37      0.43      0.50      0.58      0.66      0.75
             OUTFLOW     80.33    103.13    129.72    160.37    195.34    234.88    279.25    328.69    383.41    443.66
           ELEVATION      8.58      8.74      8.89      9.05      9.21      9.37      9.53      9.68      9.84     10.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        9. TO       444.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

                            HYDROGRAPH AT STATION     RW19B

  PEAK FLOW     TIME                                MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR      33.30-HR
+   (CFS)       (HR)
                            (CFS)
+       2.      4.13                       0.           0.           0.           0.
                          (INCHES)      1.310        1.314        1.314        1.314
                           (AC-FT)         0.           0.           0.           0.

 PEAK STORAGE   TIME                               MAXIMUM AVERAGE STORAGE
```

```
                                                    6-HR        24-HR       72-HR     33.30-HR
 +  (AC-FT)        (HR)
         0.        4.03                              0.          0.          0.           0.

    PEAK STAGE     TIME                                    MAXIMUM AVERAGE STAGE
                                                    6-HR        24-HR       72-HR     33.30-HR
 +    (FEET)       (HR)
        7.26       4.13                             7.03        7.01        7.01         7.01

                          CUMULATIVE AREA =     0.00 SQ MI


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

                **************
                *            *
     51 KK      *    WS19C   *        BASIN
                *            *
                **************

                SUBBASIN RUNOFF DATA

     52 BA        SUBBASIN CHARACTERISTICS
                        TAREA          0.00  SUBBASIN AREA

                  PRECIPITATION DATA

     12 PB              STORM          2.80  BASIN TOTAL PRECIPITATION

     13 PI          INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
                        0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                        0.01      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
                        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

     53 LG        GREEN AND AMPT LOSS RATE
                        STRTL          0.27  STARTING LOSS
                          DTH          0.27  MOISTURE DEFICIT
                         PSIF          3.29  WETTING FRONT SUCTION
                        XKSAT          0.86  HYDRAULIC CONDUCTIVITY
                        RTIMP         15.00  PERCENT IMPERVIOUS AREA

     54 UC        CLARK UNITGRAPH
                           TC          0.18  TIME OF CONCENTRATION
                            R          0.24  STORAGE COEFFICIENT

     55 UA        ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                        0.0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
                      100.0

                                                           ***

                                                 UNIT HYDROGRAPH PARAMETERS
                                           CLARK   TC=  0.18 HR,        R=  0.24 HR
                                          SNYDER   TP=  0.17 HR,       CP=  0.50

                                                       UNIT HYDROGRAPH
                                                 43 END-OF-PERIOD ORDINATES
                 0.        1.        1.        4.        6.        6.        5.        5.        4.        3.
                 3.        3.        2.        2.        2.        2.        1.        1.        1.        1.
                 1.        1.        1.        1.        0.        0.        0.        0.        0.        0.
                 0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                 0.        0.        0.

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

                             HYDROGRAPH AT STATION     WS19C

       TOTAL RAINFALL =     2.80, TOTAL LOSS =     1.64, TOTAL EXCESS =     1.16

    PEAK FLOW      TIME                                    MAXIMUM AVERAGE FLOW
                                                    6-HR        24-HR       72-HR     33.30-HR
 +    (CFS)        (HR)
                                  (CFS)
 +         4.      4.10                              0.          0.          0.           0.
                                (INCHES)          1.153       1.155       1.155        1.155
                                 (AC-FT)            0.          0.          0.           0.

                          CUMULATIVE AREA =     0.00 SQ MI


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

                **************
                *            *
     57 KK      *    WS19D   *        BASIN
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              *           *
              *************

                SUBBASIN RUNOFF DATA

   58 BA          SUBBASIN CHARACTERISTICS
                        TAREA          0.00  SUBBASIN AREA

                  PRECIPITATION DATA

   12 PB                STORM          2.80  BASIN TOTAL PRECIPITATION

   13 PI            INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
                      0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                      0.01      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
                      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

   59 LG          GREEN AND AMPT LOSS RATE
                        STRTL          0.25  STARTING LOSS
                          DTH          0.27  MOISTURE DEFICIT
                         PSIF          3.29  WETTING FRONT SUCTION
                        XKSAT          0.89  HYDRAULIC CONDUCTIVITY
                        RTIMP         25.00  PERCENT IMPERVIOUS AREA

   60 UC          CLARK UNITGRAPH
                           TC          0.25  TIME OF CONCENTRATION
                            R          0.45  STORAGE COEFFICIENT

   61 UA          ACCUMULATED-AREA VS. TIME, 11 ORDINATES
                      0.0       3.0       5.0       8.0      12.0      20 0      43.0      75.0      90.0      96.0
                    100.0

                                                            ***

                                                  UNIT HYDROGRAPH PARAMETERS
                                              CLARK   TC=  0.25 HR,        R=  0.45 HR
                                             SNYDER   TP=  0.23 HR,       CP=  0.41

                                                       UNIT HYDROGRAPH
                                                 76 END-OF-PERIOD ORDINATES
                 0.        0.        0.        1.        2.        4.        5.        5.        4.        4.
                 4.        3.        3.        3.        3.        3.        2.        2.        2.        2.
                 2.        2.        2.        1.        1.        1.        1.        1.        1.        1.
                 1.        1.        1.        1.        1.        1.        1.        0.        0.        0.
                 0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                 0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                 0.        0.        0.        0.        0.        0.        0.        0         0.        0.
                 0.        0.        0.        0.        0.        0.

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

                          HYDROGRAPH AT STATION      WS19D

          TOTAL RAINFALL =     2.80, TOTAL LOSS =     1.46, TOTAL EXCESS =     1.35

        PEAK FLOW      TIME                       MAXIMUM AVERAGE FLOW
                                          6-HR          24-HR         72-HR       33.30-HR
   +     (CFS)         (HR)
                                 (CFS)
   +         4.         4.17                   1.            0.            0.           0.
                                (INCHES)     1.332         1.339         1.339        1.339
                                (AC-FT)         0.            0.            0.           0.

                                CUMULATIVE AREA =     0.00 SQ MI


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

              *************
              *           *
   63 KK      *   DT19D   *       STORAGE
              *           *
              *************

   64 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             3  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

   65 RS          STORAGE ROUTING
                        NSTPS             1  NUMBER OF SUBREACHES
                         ITYP          STOR  TYPE OF INITIAL CONDITION
                       RSVRIC          0.00  INITIAL CONDITION
                            X          0.00  WORKING R AND D COEFFICIENT

   66 SV            STORAGE          0.0       0.1       0.1       0.1       0.2       0.3
```

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  67 SQ          DISCHARGE          0.         0.         0.         0.         1.        11.

  68 SE          ELEVATION     1589.50    1590.50    1591.20    1591.50    1592.50    1593.20

  69 ST          TOP OF DAM
                       TOPEL     1592.50  ELEVATION AT TOP OF DAM
                      DAMWID        6.00  DAM WIDTH
                        COQD        3.00  WEIR COEFFICIENT
                        EXPD        1.50  EXPONENT OF HEAD
                                                            ***

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

                  HYDROGRAPH AT STATION    DT19D

 PEAK OUTFLOW IS        1. AT TIME   5.03 HOURS

   PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                       6-HR       24-HR       72-HR      33.30-HR
 +   (CFS)       (HR)
                              (CFS)
 +       1.      5.00                   0.          0.          0.          0.
                            (INCHES)  0.863       0.897       0.901       0.901
                             (AC-FT)    0.          0.          0.          0.

  PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                       6-HR       24-HR       72-HR      33.30-HR
 +  (AC-FT)      (HR)
        0.       4.93                   0.          0.          0.          0.

   PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                       6-HR       24-HR       72-HR      33.30-HR
 +   (FEET)      (HR)
    1592.29      5.03                1591.71     1591.34     1591.12     1591.12

                      CUMULATIVE AREA =     0.00 SQ MI


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

                *************
                *           *
  70 KK         *   CP19C   *     COMBINE
                *           *
                *************

  71 HC          HYDROGRAPH COMBINATION
                       ICOMP           4  NUMBER OF HYDROGRAPHS TO COMBINE
                                                            ***

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

                  HYDROGRAPH AT STATION    CP19C

   PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                       6-HR       24-HR       72-HR      33.30-HR
 +   (CFS)       (HR)
                              (CFS)
 +      35.      4.10                   4.          1.          1.          1.
                            (INCHES)  1.569       1.624       1.625       1.625
                             (AC-FT)    2.          2.          2.          2.

                      CUMULATIVE AREA =     0.03 SQ MI


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

                *************
                *           *
  72 KK         *  DCP19C   *     STORAGE
                *           *
                *************

  73 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

  74 RS          STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES
                        ITYP        STOR  TYPE OF INITIAL CONDITION
                      RSVRIC        0.00  INITIAL CONDITION
                           X        0.00 WORKING R AND D COEFFICIENT

  75 SV            STORAGE        0.0        0.0        0.0        0.0        0.1        0.1        0.2        0.3        0.4        0.4

  76 SQ          DISCHARGE         0.         1.         3.         6.         9.        10.        15.        34.        43.        60.

  77 SE          ELEVATION    1591.00    1591.50    1592.00    1592.50    1593.00    1593.20    1593.50    1594.00    1594.20    1594.50

  78 ST          TOP OF DAM
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                          TOPEL      1593.30  ELEVATION AT TOP OF DAM
                         DAMWID        15.00  DAM WIDTH
                           COQD         3.00  WEIR COEFFICIENT
                           EXPD         1.50  EXPONENT OF HEAD

                                                                ***

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

                              HYDROGRAPH AT STATION    DCP19C

  PEAK OUTFLOW IS          33.  AT TIME     4.17 HOURS

   PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                            6-HR         24-HR        72-HR        33.30-HR
+    (CFS)        (HR)
                               (CFS)
+       33.       4.17                        4.            1.           1.           1.
                             (INCHES)     1.570         1.626        1.627        1.627
                              (AC-FT)        2.            2.           2.           2.

  PEAK STORAGE    TIME                             MAXIMUM AVERAGE STORAGE
                                            6-HR         24-HR        72-HR        33.30-HR
+   (AC-FT)       (HR)
          0.      4.17                        0.            0.           0.           0.

   PEAK STAGE     TIME                              MAXIMUM AVERAGE STAGE
                                            6-HR         24-HR        72-HR        33.30-HR
+    (FEET)       (HR)
    1593.69       4.17                   1591.86       1591.23      1591.17      1591.17

                             CUMULATIVE AREA =       0.03 SQ MI


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

              **************
              *            *
   79 KK      *    WS20    *        BASIN
              *            *
              **************

                 SUBBASIN RUNOFF DATA

   80 BA           SUBBASIN CHARACTERISTICS
                          TAREA          0.03  SUBBASIN AREA

                   PRECIPITATION DATA

   12 PB                  STORM          2.80  BASIN TOTAL PRECIPITATION

   13 PI             INCREMENTAL 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       0.00       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       0.00       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       0.01       0.02       0.02       0.02       0.02       0.02
                       0.02       0.02       0.04       0.06       0.06       0.06       0.06       0.06       0.06       0.06
                       0.01       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
                       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

   81 LG           GREEN AND AMPT LOSS RATE
                          STRTL          0.19  STARTING LOSS
                            DTH          0.27  MOISTURE DEFICIT
                           PSIF          3.29  WETTING FRONT SUCTION
                          XKSAT          0.95  HYDRAULIC CONDUCTIVITY
                          RTIMP         47.00  PERCENT IMPERVIOUS AREA

   82 UC           CLARK UNITGRAPH
                             TC          0.27  TIME OF CONCENTRATION
                              R          0.32  STORAGE COEFFICIENT

   83 UA           ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                        0.0        5.0       16.0       30.0       65.0       77.0       84.0       90.0       94.0       97.0
                      100.0

                                                                ***

                                                    UNIT HYDROGRAPH PARAMETERS
                                               CLARK    TC=  0.27 HR,          R=  0.32 HR
                                              SNYDER    TP=  0.18 HR,         CP=  0.37

                                                         UNIT HYDROGRAPH
                                                    54 END-OF-PERIOD ORDINATES
                   2.         7.        18.        29.        33.        34.        33.        32.        30.        27.
                  24.        22.        20.        18.        16.        14.        13.        12.        10.         9.
                   8.         8.         7.         6.         5.         5.         4.         4.         4.         3.
                   3.         3.         2.         2.         2.         2.         2.         1.         1.         1.
                   1.         1.         1.         1.         1.         1.         1.         0.         0.         0.
                   0.         0.         0.         0.

      ***              ***              ***              ***              ***
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HYDROGRAPH AT STATION WS20

TOTAL RAINFALL = 2.80, TOTAL LOSS = 1.04, TOTAL EXCESS = 1.76

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	33.30-HR
+ (CFS)	(HR)					
		(CFS)				
+ 37.	4.10		5.	1.	1.	1.
		(INCHES)	1.746	1.756	1.756	1.756
		(AC-FT)	2.	2.	2.	2.

CUMULATIVE AREA = 0.03 SQ MI

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           **************
           *            *
85 KK      *   RCP20    *        ROUTE
           *            *
           **************
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HYDROGRAPH ROUTING DATA

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86 RK         KINEMATIC WAVE STREAM ROUTING
                       L      123.   CHANNEL LENGTH
                       S    0.0100   SLOPE
                       N     0.012   CHANNEL ROUGHNESS COEFFICIENT
                      CA      0.00   CONTRIBUTING AREA
                   SHAPE      CIRC   CHANNEL SHAPE
                      WD      3.00   BOTTOM WIDTH OR DIAMETER
                       Z      0.00   SIDE SLOPE
                  NDXMIN         2   MINIMUM NUMBER OF DX INTERVALS
```

***

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

*** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION= 1

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

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

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
MAIN	8.05	1.25	0.11	41.00	36.90	246.08	1.76	13.64

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2342E+01 EXCESS=0.0000E+00 OUTFLOW=0.2342E+01 BASIN STORAGE=0.1533E-16 PERCENT ERROR= 0.0

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
MAIN	8.05	1.25	2.00		36.88	246.00	1.76

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

HYDROGRAPH AT STATION RCP20

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	33.30-HR
+ (CFS)	(HR)					
		(CFS)				
+ 37.	4.10		5.	1.	1.	1.
		(INCHES)	1.746	1.756	1.756	1.756
		(AC-FT)	2.	2.	2.	2.

CUMULATIVE AREA = 0.03 SQ MI

*** ***

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           **************
           *            *
87 KK      *   WS20A    *        BASIN
           *            *
           **************
```

SUBBASIN RUNOFF DATA

```
88 BA         SUBBASIN CHARACTERISTICS
                 TAREA      0.00   SUBBASIN AREA
```

PRECIPITATION DATA

```
12 PB            STORM      2.80   BASIN TOTAL PRECIPITATION
```

```
13 PI          INCREMENTAL 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      0.00      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      0.00      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      0.01      0.02      0.02      0.02      0.02      0.02
                  0.02      0.02      0.04      0.06      0.06      0.06      0.06      0.06      0.06      0.06
                  0.01      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
                  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

89 LG         GREEN AND AMPT LOSS RATE
                    STRTL        0.15  STARTING LOSS
                      DTH        0.27  MOISTURE DEFICIT
                     PSIF        3.29  WETTING FRONT SUCTION
                    XKSAT        1.01  HYDRAULIC CONDUCTIVITY
                    RTIMP       64.00  PERCENT IMPERVIOUS AREA

90 UC         CLARK UNITGRAPH
                       TC        0.23  TIME OF CONCENTRATION
                        R        0.65  STORAGE COEFFICIENT

91 UA         ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                 0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
               100.0

                                                       ***

                                           UNIT HYDROGRAPH PARAMETERS
                                     CLARK    TC=  0.23 HR,        R=  0.65 HR
                                    SNYDER    TP=  0.20 HR,       CP=  0.25

                                                UNIT HYDROGRAPH
                                           107 END-OF-PERIOD ORDINATES
              0.        1.        1.        2.        2.        2.        2.        2.        2.        2.
              2.        2.        2.        2.        2.        2.        1.        1.        1.        1.
              1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
              1.        1.        1.        1.        1.        1.        1.        1.        0.        0.
              0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
              0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
              0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
              0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
              0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
              0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
              0.        0.        0.        0.        0.        0.        0.

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

                       HYDROGRAPH AT STATION     WS20A

     TOTAL RAINFALL =    2.80, TOTAL LOSS =    0.71, TOTAL EXCESS =    2.09

    PEAK FLOW      TIME                         MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      33.30-HR
 +    (CFS)        (HR)
                              (CFS)
 +        3.       4.10                   1.           0.           0.           0.
                           (INCHES)    2.039        2.081        2.081        2.081
                            (AC-FT)       0.           0.           0.           0.

                          CUMULATIVE AREA =    0.00 SQ MI


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

             ***************
             *             *
  93 KK      *    CP20A    *      COMBINE
             *             *
             ***************

  94 HC        HYDROGRAPH COMBINATION
                    ICOMP            2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                              ***

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

                       HYDROGRAPH AT STATION     CP20A

    PEAK FLOW      TIME                         MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      33.30-HR
 +    (CFS)        (HR)
                              (CFS)
 +       40.       4.10                   5.           1.           1.           1.
                           (INCHES)    1.776        1.791        1.791        1.791
                            (AC-FT)       3.           3.           3.           3.

                          CUMULATIVE AREA =    0.03 SQ MI

1
                                                RUNOFF SUMMARY
                                         FLOW IN CUBIC FEET PER SECOND
```

TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	WS19	23.	4.07	3.	1.	0.	0.01		
+	ROUTED TO	RCP19	23.	4.07	3.	1.	0.	0.01		
+	ROUTED TO	RRCP19	23.	4.10	3.	1.	0.	0.01	7.80	4.10
+	HYDROGRAPH AT	WS19A	7.	4.13	1.	0.	0.	0.00		
+	2 COMBINED AT	CP19A	29.	4.10	3.	1.	1.	0.02		
+	ROUTED TO	RCP19A	29.	4.10	3.	1.	1.	0.02	8.14	4.10
+	HYDROGRAPH AT	WS19B	2.	4.07	0.	0.	0.	0.00		
+	ROUTED TO	RW19B	2.	4.13	0.	0.	0.	0.00	7.26	4.13
+	HYDROGRAPH AT	WS19C	4.	4.10	0.	0.	0.	0.00		
+	HYDROGRAPH AT	WS19D	4.	4.17	1.	0.	0.	0.00		
+	ROUTED TO	DT19D	1.	5.00	0.	0.	0.	0.00	1592.29	5.03
+	4 COMBINED AT	CP19C	35.	4.10	4.	1.	1.	0.03		
+	ROUTED TO	DCP19C	33.	4.17	4.	1.	1.	0.03	1593.69	4.17
+	HYDROGRAPH AT	WS20	37.	4.10	5.	1.	1.	0.03		
+	ROUTED TO	RCP20	37.	4.10	5.	1.	1.	0.03		
+	HYDROGRAPH AT	WS20A	3.	4.10	1.	0.	0.	0.00		
+	2 COMBINED AT	CP20A	40.	4.10	5.	1.	1.	0.03		

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
RCP19	MANE	0.10	23.45	244.13	2.14	2.00	23.44	244.00	2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1370E+01 EXCESS=0.0000E+00 OUTFLOW=0.1370E+01 BASIN STORAGE=0.1433E-16 PERCENT ERROR= 0.0

RCP20	MANE	0.11	36.90	246.08	1.76	2.00	36.88	246.00	1.76

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2342E+01 EXCESS=0.0000E+00 OUTFLOW=0.2342E+01 BASIN STORAGE=0.1533E-16 PERCENT ERROR= 0.0

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DT19D
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1589.50	1592.50	1592.50
STORAGE	0.	0.	0.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1592.29	0.00	0.	1.	0.00	5.03	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DCP19C
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1591.50	1593.30	1593.30
STORAGE	0.	0.	0.
OUTFLOW	1.	12.	12.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1593.69	0.39	0.	33.	0.60	4.17	0.00

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

APPENDIX D

HYDRAULIC CALCULATIONS

Shea Gutter Capacity (1603.fm8) Report

Label	Solve For	Channel Slope (ft/ft)	Discharge (ft³/s)	Gutter Width (ft)	Gutter Cross Slope (ft/ft)
Shea Gutter Capacity	Discharge	0.01100	16.53	1.41	0.06

Road Cross Slope (ft/ft)	Spread (ft)	Manning Coefficient	Flow Area (ft²)	Depth (ft)	Gutter Depression (ft)	Velocity (ft/s)
0.03	16.50	0.016	3.77	0.50	0.04	4.38

Shea Curb Inlets In Sag (1603.fm8) Report

Label	Solve For	Discharge (ft³/s)	Spread (ft)	Gutter Width (ft)	Gutter Cross Slope (ft/ft)
Shea 4-Cell Curb Inlet	Spread	45.00	12.49	1.41	0.06
Shea 3-Cell Curb Inlet	Spread	35.30	12.04	1.41	0.06

Road Cross Slope (ft/ft)	Curb Opening Length (ft)	Opening Height (ft)	Curb Throat Type	Local Depression (in)	Local Depression Width (ft)	Throat Incline Angle (degrees)
0.03	25.50	0.42	Horizontal	2.00	22.00	90.00
0.03	20.00	0.42	Horizontal	2.00	16.50	90.00

Depth (ft)	Gutter Depression (ft)	Total Depression (ft)
0.66	0.04	0.21
0.66	0.04	0.21

Irregular Section Wash 19A (1603.fm8) Report

Label	Solve For	Friction Method	Roughness Coefficient	Channel Slope (ft/ft)	Water Surface Elevation (ft)
Wash 19A	Normal Depth	Manning Formula	0.047	0.02610	1594.69

Elevation Range	Discharge (ft^3/s)	Flow Area (ft^2)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Top Width (ft)	Normal Depth (ft)
1593.71 to 1595.00 ft	31.00	9.86	20.70	0.48	20.57	0.98

Critical Depth (ft)	Critical Slope (ft/ft)	Velocity (ft/s)	Velocity Head (ft)	Specific Energy (ft)	Froude Number	Flow Type
0.89	0.04174	3.14	0.15	1.13	0.80	Subcritical

Detention Bleed Off Circular Orifice (1603_Rev.fm8) Report

Label	Solve For	Discharge (ft³/s)	Headwater Elevation (ft)
Bleed Off - High Water Basin	Discharge	0.97	1592.50
Bleed Off - High Water Weir	Discharge	1.25	1593.20

Centroid Elevation (ft)	Tailwater Elevation (ft)	Discharge Coefficient	Diameter (ft)
1591.45	1591.00	0.60	0.50
1591.45	1591.00	0.60	0.50

Headwater Height Above Centroid (ft)	Tailwater Height Above Centroid (ft)	Flow Area (ft²)	Velocity (ft/s)
1.05	-0.45	0.20	4.93
1.75	-0.45	0.20	6.37

Notes	Messages

Slotted Weir Discharges - Cochise Ave

Discharge from Opening and Weir are directed towards 2-30" CMP

	$Q = C*L*H^{1.5}$, C=coefficient; L=length; H=head		
	Weir Coefficient (C) =		3.0
WSEL (ft)	Opening #1 (1'x2.2') & Overflow Weir #1		Total Discharge Opening #1 & Weir #1
	L (in) =	12	134.4
	Crest Elev (ft)=	1591.00	1593.20
	H_{open1}, (ft)	Q_{Open1_WSEL}(cfs)	$Q_{weir1\_overflow}$ (cfs)
1591.00	0.00	0.0	0.0	0.0
1591.50	0.50	1.1	0.0	1.1
1592.00	1.00	3.0	0.0	3.0
1592.50	1.50	5.5	0.0	5.5
1592.96	1.96	8.2	0.0	8.2
1593.00	2.00	8.5	0.0	8.5
1593.20	2.20	9.8	0.0	9.8
1593.50	2.50	9.8	5.5	15.3
1593.70	2.70	9.8	11.9	21.7
1594.00	3.00	9.8	24.0	33.8
1594.20	3.20	9.8	33.6	43.4
1594.25	3.25	9.8	36.2	45.9
1594.50	3.50	9.8	49.8	59.6

Notes:

1. A maximum discharge of 9.8 cfs is directed toward Opening #1. After 2.2' ft depth of flow through the opening, excess flow overtops as a weir (Weir #1, crest elev=1593.20 ft) and enters the 2-30" CMP's.

APPENDIX E

404 CERTIFICATION FORM
WARNING & DISCLAIMER OF LIABILITY

Section 404 Certification

Before the City issues development permits for a project, the developer's Engineer or the property owner must certify that it complies with, or is exempt from, Section 404 of the Clean Water Act of the United States. Section 404, administered by the U.S. Army Corps of Engineers (COE), regulates the discharge of dredged or fill material into a wetland, lake, (including dry lakes), river, stream (including intermittent streams, ephemeral washes, and arroyos), or other waters of the United States.

Prior to submittal of improvement plans to Project Review the form below must be completed (and submitted with the improvement plans) as evidence of compliance

Certification of Section 404 Permit Status

Owner's Name: Intravest Development, LLC Phone No. (623) 521-6899

Project Name/Description: Cochise Manor Case No. _____

Project Location/Address: 13102 East Cochise Avenue, Scottsdale, AZ

A registered Engineer or the property Owner must check the applicable condition and certify by signing below that:

1. **Section 404 <u>does</u> apply to the project because there will be a discharge of dredged or fill material to waters of the U.S., and:**

   ☐ A Section 404 Permit has already been obtained for this project.

   -or-

   ☐ This project qualifies for a "Nationwide Permit," and this project will meet all terms and conditions of the applicable nationwide permit.

2. **Section 404 <u>does not</u> apply to the project because:**

   ☐ No watercourses or other waters of the U.S. exist on the property.

   ☐ No jurisdictional waters of the U.S. exist on the property. Attached is a copy of the COE's Jurisdictional Determination.

   ☒ Watercourses or other waters of the U.S. do exist on the property, but the project will not involve the discharge of dredged or fill material into any of these waters.

I certify that the above statement is true.

Registered Professional Engineer (Civil) CERTIFICATE NO. 37306 SCOTT LORENTZEN Date Signed 7/17/13 ARIZONA U.S.A. Expires 3/31/14

Engineer's Signature and Seal, or Owner's Signature Date

President - Southwest Land Consulting, P.C.

Title Company

Planning & Development Services Department

7447 E Indian School Road, Suite 100, Scottsdale, AZ 85251 • Phone: 480-312-2500 • Fax: 480-312-7088

Appendix 4-1C

WARNING & DISCLAIMER OF LIABILITY

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

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

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

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

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

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

30-PP-2012		7/8/13	
Plan Check No.	Owner or Agent	Date	

APPENDIX F

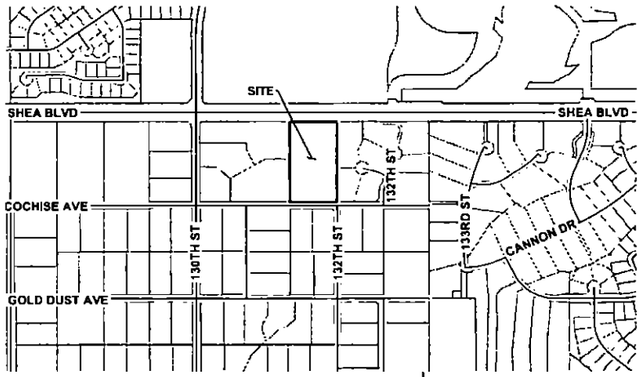
SWPPP & NOI FORM

COCHISE MANOR
STORMWATER POLLUTION PREVENTION PLAN
SCOTTSDALE, ARIZONA

LOCATED IN A PORTION OF SECTION 25, TOWNSHIP 3 NORTH, RANGE 5 EAST
OF THE SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

NOTES FOR STORMWATER POLLUTION PREVENTION PLAN:

1. A COPY OF THE APPROVED GRADING AND DRAINAGE PLAN FOR THIS PROJECT, TOGETHER WITH A COPY OF THE NOTICE OF INTENT (N.O.I) AND THIS STORMWATER MANAGEMENT PLAN (SWMP), SHALL BE MAINTAINED ON THE SITE DURING CONSTRUCTION AND BE AVAILABLE FOR REVIEW. THOSE ELEMENTS OF GRADING AND DRAINAGE PLAN PERTINENT TO OR REFERENCED ON THE SWMP SHALL BE CONSIDERED AS PART OF THE SWMP..
2. PLANNING AND DEVELOPMENT DEPARTMENT'S CIVIL/SITE INSPECTION GROUP SHALL BE NOTIFIED 48 HOURS BEFORE ANY ON-SITE AND/OR OFF-SITE CONSTRUCTION BEGINS, AT (602) 262-7811.
3. ALL WORK SHALL CONFORM TO THE MOST CURRENT UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION PUBLISHED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS (MAG), TOGETHER WITH THE MCDOT SUPPLEMENT TO THE MAG STANDARD SPECIFICATIONS AND THE PROJECT SPECIAL PROVISIONS. ALL WORK MUST ALSO COMPLY WITH RESOLUTION 2001-01 MARICOPA COUNTY RESOLUTION FOR PERMITS TO WORK IN DEDICATED RIGHT-OF-WAY AND RESOLUTION 2001-02 MARICOPA COUNTY RESOLUTION FOR STREET IMPROVEMENTS, INSTALLATION OF UTILITIES AND TRAFFIC CONTROL. ANY EXCEPTIONS MUST RECEIVE EXPLICIT APPROVAL FROM MCDOT AND SHALL BE IDENTIFIED ON THE PLANS AS HAVING EXPLICIT APPROVAL FROM MCDOT.
4. THE OPERATOR SHALL OBTAIN A DUST CONTROL PERMIT FROM MARICOPA COUNTY HEALTH DEPARTMENT AND PERFORM MEASURES AS REQUIRED BY THE PERMIT TO PREVENT EXCESS DUST.
5. PRIOR TO MOVING OR DESTROYING PROTECTED NATIVE PLANT SPECIES, THE CONTRACTOR SHALL FILE A FORMAL NOTICE OF INTENT WITH THE ARIZONA DEPARTMENT OF AGRICULTURE NATIVE PLANTS (602) 542-6408.
6. THE OPERATOR SHALL PERFORM, AT A MINIMUM, A VISUAL INSPECTION OF THE CONSTRUCTION SITE ONCE EVERY WEEK AND WITHIN 24 HOURS OF RAINFALL GREATER THAN OR EQUAL TO A HALF OF AN INCH OR MORE. THE OPERATOR SHALL PREPARE A REPORT DOCUMENTING HIS/HER FINDINGS ON THE CONDITIONS OF THE SWMP CONTROLS AND NOTE ANY EROSION PROBLEM AREAS. THE OPERATOR'S REPORT IS TO BE SUBMITTED TO THE PLANNING AND DEVELOPMENT DEPARTMENT CIVIL/SITE INSPECTOR . FOR REVIEW AND APPROVAL. FACILITIES SHALL BE MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING IN ADDITION, ALL TEMPORARY SITUATION CONTROLS SHALL BE MAINTAINED IN A SATISFACTORY CONDITION UNTIL SUCH TIME THAT CLEARING AND/OR CONSTRUCTION IS COMPLETED. PERMANENT DRAINAGE FACILITIES ARE OPERATIONAL, AND THE POTENTIAL FOR EROSION HAS PASSED
7. THE OPERATOR SHALL AMEND THIS PLAN AS NECESSARY DURING THE COURSE OF CONSTRUCTION TO RESOLVE ANY PROBLEM AREAS, WHICH BECOME EVIDENT DURING THE CONSTRUCTION AND/OR DURING RAINFALLS.
8. THE PERMITTEE SHALL FILE A NOTICE OF TERMINATION (N.O.T) AFTER COMPLETION OF CONSTRUCTION AND PLACEMENT OF FINAL LANDSCAPE MATERIALS. THE N.O.T IS TO BE SUBMITTED TO THE THE PLANNING AND DEVELOPMENT DEPARTMENT CIVIL/SITE INSPECTOR TO FINAL THE SWMP PERMIT.
9. THE PERMITTEE SHALL SAVE ALL RECORDS, INCLUDING THE N.O.I, SWMP, N.O.T, AND INSPECTION REPORTS, ON FILE FOR A MINIMUM OF THREE YEARS FROM THE DATE OF FILING THE N.O.T.
10. THE IMPLEMENTATION OF THESE PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE FACILITIES IS THE RESPONSIBILITY OF THE PERMITTEE/CONTRACTOR UNTIL ALL CONSTRUCTION IS APPROVED AND THE N.O.T SUBMITTED TO THE PLANNING AND DEVELOPMENT DEPARTMENT CIVIL/SITE INSPECTOR..
11. THE FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES IN SUCH A MANNER AS TO INSURE THAT SEDIMENT-LADEN WATER DOES NOT ENTER THE DRAINAGE SYSTEM OR VIOLATE APPLICABLE WATER STANDARDS, AND MUST BE INSTALLED AND IN OPERATION PRIOR TO ANY GRADING OR LAND CLEARING. WHENEVER POSSIBLE, MAINTAIN NATURAL VEGETATION FOR SILT CONTROL.
12. THE CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS WITHIN THE RIGHT-OF-WAY TO A CONDITION EQUAL TO OR BETTER THAN EXISTING IMPROVEMENTS PER MAG 107.9. DISPOSAL OF ALL WASTE MATERIAL WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.
13. THE CONTRACTORS N.O.I. MUST BE RECEIVED PRIOR TO THE SWMP PERMIT BEING ISSUED. THE CONTRACTOR THAT WILL BE PULLING THE GRADING AND DRAINAGE PERMIT MUST HAVE THE SWMP PERMIT ISSUED IN THEIR NAME.
14. PLAN APPROVAL IS VALID FOR 180 DAYS. PRIOR TO PLAN APPROVAL EXPIRATION, ALL ASSOCIATED PERMITS SHALL BE PURCHASED OR THE PLANS SHALL BE RESUBMITTED FOR EXTENSION OF PLAN APPROVAL. THE EXPIRATION, EXTENSION, AND REINSTATEMENT OF CIVIL ENGINEERING PLANS AND PERMITS SHALL FOLLOW THE SAME GUIDELINES AS THOSE INDICATED IN THE PHOENIX BUILDING CONSTRUCTION CODE ADMINISTRATIVE PROVISIONS SECTION 105.3 FOR BUILDING PERMITS.

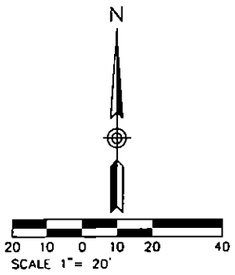


VICINITY MAP
N.T.S.

SHEET INDEX

LEGEND:

- DIRECTION OF SURFACE DRAINAGE
- STRAW WATTLE BARRIER
- STABILIZED CONSTRUCTION ENTRANCE
- TEMPORARY DIVERSION DIKE
- SILT FENCE
- DESIGNATED WASHOUT AREA
- 30 / 29 — PROPOSED CONTOUR AND ELEVATION
- 1230 / 1220 — EXISTING CONTOUR AND ELEVATION



OWNER/BUILDER:

INTRAVEST DEVELOPMENT, L.L.C.
5830 WEST THUNDERBIRD ROAD, SUITE B8
GLENDALE, AZ 85036
PHONE: (623) 521-6899
CONTACT: MASON CAVE
EMAIL: mason@masoncave.com

ENGINEER:

SOUTHWEST LAND CONSULTING, P.C.
PMB 132
8711 E. PINNACLE PEAK RD, STE F-211
SCOTTSDALE, AZ 85255
PHONE: (480) 585-7521
FAX: (480) 585-7523
EMAIL: slorentzen@azlc.com
CONTACT: SCOTT LORENTZEN, P.E.

BENCHMARK:

BRASS CAP FLUSH AT THE INTERSECTION OF 136TH STREET AND SHEA BOULEVARD
ELEV. = 1568.48 (CITY OF SCOTTSDALE, NAVD 88 DATUM)

I HEREBY CERTIFY THAT ALL ELEVATIONS REPRESENTED ON THIS PLAN ARE BASED ON THE ELEVATION DATUM FOR THE CITY OF SCOTTSDALE BENCHMARK PROVIDED ABOVE.

LEGAL DESCRIPTION:

GLO LOT 6,THE WEST HALF OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 25, TOWNSHIP 3 NORTH, RANGE 5 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

FLOOD INFORMATION:

ALL AREAS OF SUBJECT PARCEL LIE IN ZONE "X" (SHADED) WHICH IS DEFINED TO BE OUTSIDE THE 100 YEAR FLOOD, ACCORDING TO CURRENT FLOOD INSURANCE RATE MAP NUMBER 04013C1710F, ENCOMPASSING COMMUNITY NUMBER 045012, PANEL 1710 OF 4350, DATED SEPTEMBER 30, 2005.

UNDERGROUND UTILITY NOTE:

THE UTILITIES DEPICTED HEREON ARE BASED UPON AVAILABLE ASBUILT INFORMATION. CONTRACTOR TO CONTACT BLUE STAKE 48 HOURS PRIOR TO ANY ON-SITE CONSTRUCTION AND FIELD VERIFY EXACT LOCATIONS OF ALL UTILITIES. IF DISCREPANCIES EXIST CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY.

SITE DATA:

APN:	217-31-010
GROSS AREA:	217,990 SF OR 5.00 ACRES
NET AREA:	188,284 SF OR 4.32 ACRES
DISTURBED AREA:	58,876 SF OR 1.31 ACRES
NAOS REQUIRED	48,355 SF OR 1.11 ACRES
NAOS PROVIDED (NATURAL):	44,712 SF 1.03 ACRES
NAOS PROVIDED (REVEG).	17,853 SF OR 0.41 ACRES
NAOS PROVIDED (TOTAL):	68,032 SF OR 1.56 ACRES
ZONING:	R1-43
O.S.:	28-58

PMB 132
8711 E PINNACLE PEAK RD
SUITE F-211
SCOTTSDALE, AZ 85255
PHONE: (480) 585-7521
FAX: (480) 585-7523
WWW.AZLC.COM

SOUTHWEST LAND CONSULTING, P.C.
CIVIL ENGINEERING • PLANNING

COCHISE MANOR
13102 EAST COCHISE ROAD
SCOTTSDALE, ARIZONA

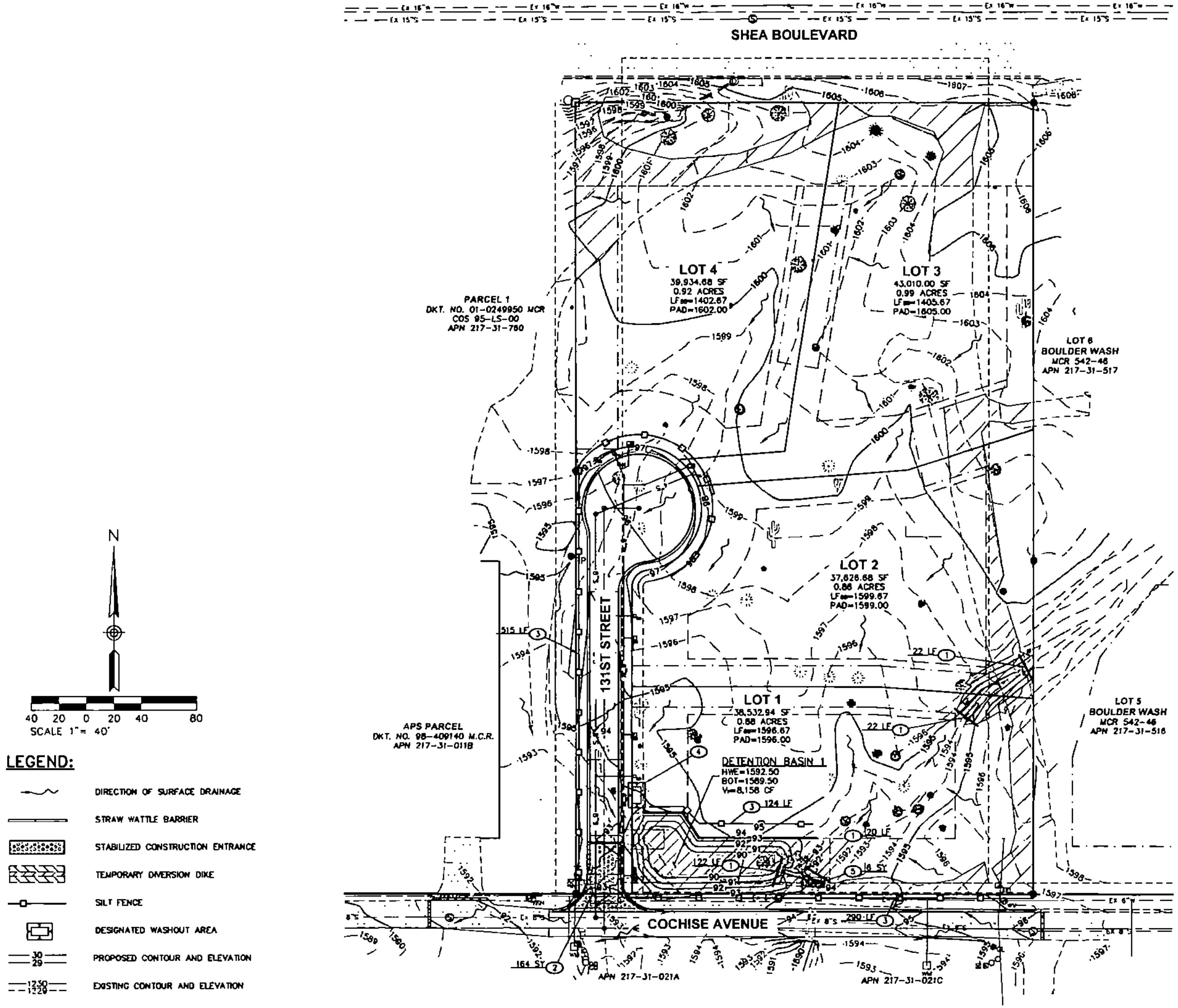
COVER SHEET

SLC PROJ#: 1603 | DATE: 7/17/13 | SCALE: NTS
DESIGNED: DSH | DRAWN: DSH | APPROVED: SAL
REV.

DWG. NO. SWP01
SHT. 1 OF 3

30-PP-2012 5209-12

1-800-STAKE-IT



STORM WATER POLLUTION PROTECTION PLAN

CONSTRUCTION NOTES

1. INSTALL 9" DIA. STRAW WATTLE BARRIER PER BMP DETAIL ON SHT. SWMP-03, AND SECTION SPC-1 OF THE EROSION CONTROL VOLUME OF THE DRAINAGE DESIGN MANUAL FOR MARICOPA COUNTY DATED NOVEMBER 2012. — 88 LF
2. CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE PER BMP DETAIL ON SHT. SWMP-03, AND SECTION EC-5 OF THE EROSION CONTROL VOLUME OF THE DRAINAGE DESIGN MANUAL FOR MARICOPA COUNTY DATED NOVEMBER 2012. — 164 SY
3. INSTALL SILT FENCE PER BMP DETAIL ON SHT. SWMP-03, AND SECTION SPC-5 OF THE EROSION CONTROL VOLUME OF THE DRAINAGE DESIGN MANUAL FOR MARICOPA COUNTY DATED NOVEMBER 2012 — 929 LF
4. CONSTRUCT DESIGNATED WASHOUT AREA PER BMP DETAIL ON SHT. SWMP-03, AND SECTION GH-4 OF THE EROSION CONTROL VOLUME OF THE DRAINAGE DESIGN MANUAL FOR MARICOPA COUNTY DATED NOVEMBER 2012. — 1 EA
5. INSTALL ROCK OUTLET PROTECTION PER BMP DETAIL ON SHT. SWMP-03, AND SECTION EC-11 OF THE EROSION CONTROL VOLUME OF THE DRAINAGE DESIGN MANUAL FOR MARICOPA COUNTY DATED NOVEMBER 2012. — 6 SY

1-800-STAKE-IT

SOUTHWEST LAND CONSULTING, P.C.
CIVIL ENGINEERING • PLANNING

COCHISE MANOR

13102 EAST COCHISE ROAD
SCOTTSDALE, ARIZONA

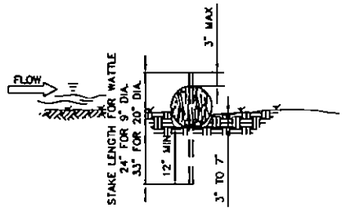
STORMWATER POLLUTION PREVENTION PLAN

DWG. NO. SWP02 | SLC PROJ: 1603 | DATE: 7/17/13 | SCALE: 1"=40'
DESIGNED: DSH | DRAWN: DSH | APPROVED: SAL
REV.
SHT. 2 OF 3

30-PP-2012 5209-12

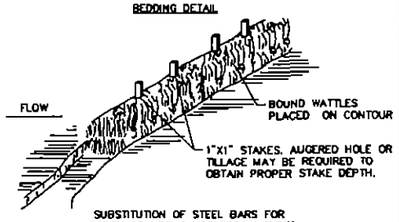
STRAW WATTLE BARRIERS

SYMBOL: S.W.B.



* PROMOTES ON SITE SEDIMENTATION BY CREATING A TEMPORARY POND.

BEDDING DETAIL



SUBSTITUTION OF STEEL BARS FOR WOODEN STAKES IS NOT RECOMMENDED DUE TO POTENTIAL FOR DAMAGING CONSTRUCTION EQUIPMENT

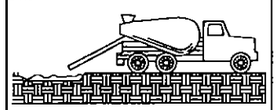
ANCHORING DETAIL

STRAW WATTLE BARRIERS

DESIGNATED WASHOUT AREA

SYMBOL:

DIAGRAM



CONDITIONS WHERE PRACTICE APPLIES

- PERIMETER CONTROL
- SLOPE PROTECTION
- SEDIMENT TRAPPING
- DRAINAGEWAY & STREAM PROTECTION
- TEMPORARY STABILIZATION
- PERMANENT STABILIZATION & EXPOSURE LIMITS
- * NON-SEDIMENT POLLUTION CONTROL

DEFINITION

A TEMPORARY PIT OR BERMED AREA FOR WASHOUT OF CONCRETE TRUCKS, TOOLS, MORTAR MIXERS, ETC.

PURPOSE

IMPROPER WASHOUT OF CONCRETE TRUCKS, TOOLS, ETC. MAY ALLOW FRESH CONCRETE OR CEMENT LADEN MORTAR TO ENTER A STORM DRAINAGE SYSTEM.

APPROPRIATE APPLICATIONS

EFFECTIVE WHEN VEHICLES, TOOLS AND MIXERS CAM BE MOVED TO THE PIT LOCATION. WHERE THIS IS NOT PRACTICAL, TEMPORARY PONDS MAY BE CONSTRUCTED TO ALLOW FOR SETTLING AND HARDENING OF CEMENT AND AGGREGATES. WASHOUT AREA/PITS ARE APPROPRIATE FOR MINOR AMOUNTS OF WASH WATER, WHICH RESULT FROM CLEANING OF AGGREGATE MATERIALS OR CONCRETE TRUCKS, TOOLS, ETC.

PLANNING CONSIDERATIONS

1. WASH OUT INTO A SLURRY PIT, WHICH WILL LATER BE BACKFILLED. DO THIS ONLY WITH APPROVAL OF THE PROPERTY OWNER.

2. WASH OUT INTO A TEMPORARY PIT WHERE THE CONCRETE WASH CAN HARDEN, BE BROKEN UP, AND THEN PROPERLY DISPOSED OF OFF-SITE.

DESIGN & SIZING CRITERIA

1. LOCATE WASH OUT PITS AWAY FROM STORM DRAINS, OPEN DITCHES OR STORMWATER RECEIVING WATERS.

2. DO NOT WASH OUT CONCRETE TRUCKS INTO STORM DRAINS, SANITARY SEWERS, STREET GUTTERS, OR STORMWATER CHANNELS.

MAINTENANCE REQUIREMENTS

PROPERLY DISPOSE OF HARDENED CONCRETE PRODUCTS ON A ROUTINE BASIS TO PREVENT THE BUILDUP OF WASTE MATERIALS TO AN UNMANAGEABLE SIZE AND TO MAINTAIN PERCOLATION OF WATER.

STABILIZED CONSTRUCTION ENTRANCE

SYMBOL: S.C.E.

DIAGRAM

CONDITIONS WHERE PRACTICE APPLIES

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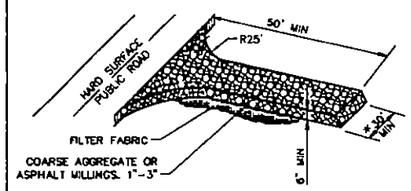
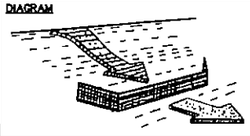


STABILIZED CONSTRUCTION ENTRANCE

SILT FENCE

SYMBOL: S.F.

DIAGRAM



CONDITIONS WHERE PRACTICE APPLIES

- * PERIMETER CONTROL
- SLOPE PROTECTION
- SEDIMENT TRAPPING
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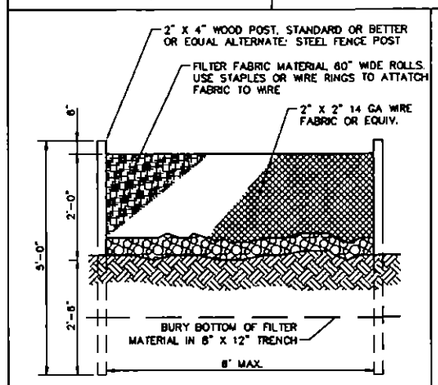
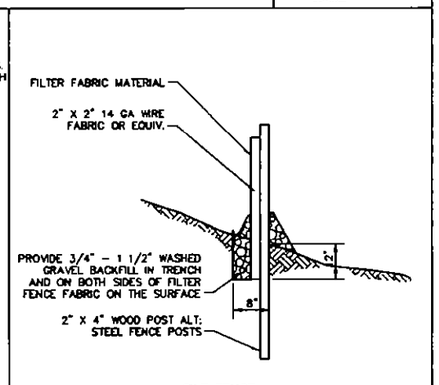


SILT FENCE

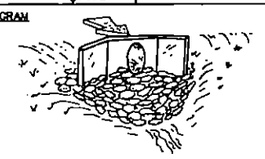


SILT FENCE

ROCK OUTLET PROTECTION

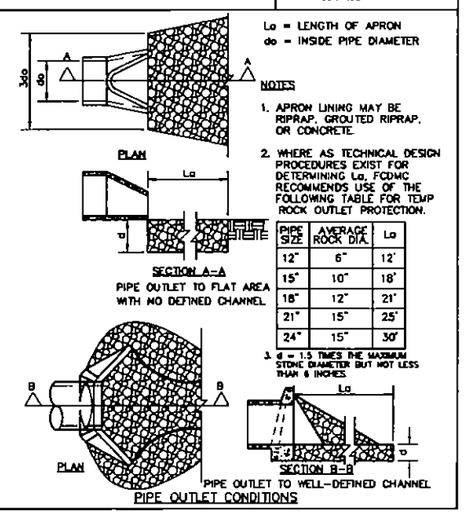
SYMBOL:

DIAGRAM



CONDITIONS WHERE PRACTICE APPLIES

- PERIMETER CONTROL
- * SLOPE PROTECTION
- SEDIMENT TRAPPING
- * DRAINAGEWAY & STREAM PROTECTION
- * TEMPORARY STABILIZATION
- PERMANENT STABILIZATION & EXPOSURE LIMITS
- NON-SEDIMENT POLLUTION CONTROL



La = LENGTH OF APRON
do = INSIDE PIPE DIAMETER

NOTES

1. APRON LINING MAY BE RIPRAP, GROUTED RIPRAP, OR CONCRETE.

2. WHERE AS TECHNICAL DESIGN PROCEDURES EXIST FOR DETERMINING La, FCDMC RECOMMENDS USE OF THE FOLLOWING TABLE FOR TEMP ROCK OUTLET PROTECTION.

PIPE SIZE	AVERAGE ROCK DIA.	La
12"	6"	12'
15"	10"	18'
18"	12"	21'
21"	15"	25'
24"	15"	30'

3. d = 1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NOT LESS THAN 6 INCHES.

PIPE OUTLET CONDITIONS

PHD 139
8711 E PINNACLE PEAK RD
SUITE F-211
SCOTTSDALE, AZ 85255
PHONE: (480) 585-7121
FAX: (480) 585-7253
WWW.AZSLC.COM

SOUTHWEST LAND CONSULTING, P.C.
CIVIL ENGINEERING • PLANNING

COCHISE MANOR
13102 EAST COCHISE ROAD
SCOTTSDALE, ARIZONA

BMP DETAILS

SLC PROJ: 1603 | DATE: 7/17/13 | SCALE: NTS
DESIGNED: DSH | DRAWN: DSH | APPROVED: SAL
REV.

DWG. NO. SWP03
SHT. 3 OF 3

30-PP-2012 5209-12

ADEQ Arizona Department of Environmental Quality

NOTICE OF INTENT (NOI)

for Construction Activity Discharges

to Waters of the United States under the AZPDES Stormwater Construction General Permit (AZG2008-001)

FOR COVERAGE, A COMPLETE AND ACCURATE NOI (INCLUDING REQUIRED FEE) MUST BE SUBMITTED TO:
Arizona Department of Environmental Quality, Surface Water Section / Stormwater and General Permits Unit
1110 West Washington Street, 5415A-1, Phoenix, Arizona 85007

Is this NOI a revision to a project filed under the 2008 AZPDES Stormwater Construction General Permit? _____YES ✓ NO If Yes, complete the following:

- Provide your current authorization number: AZCON - _____
- Provide the name of the project / site in Part II below. You do not need to complete the entire form. Provide only the information that is being changed from the original NOI.
- Complete the certification in Part VI (including signature of authorized signer).

Is the site located on Indian Country Lands?

_____ YES ✓ NO

I. OPERATOR (Applicant) INFORMATION:

- Contact Name: Mason Cave
- Phone Number: (623) 521-6899 Fax Number: _____
- Operator's Business Name: Intravest Development, L.L.C.
- Operator's Mailing Address: 5830 W. Thunderbird Rd., Suite 88
- City: Glendale State: AZ Zip Code: 85036
- Business Status: Federal:_____ State: _____ Other Public: _____ Private: ✓

II. CONSTRUCTION SITE INFORMATION:

- Project/Site Name: Cochise Manor
- County Parcel No. (at main entrance): 217-31-010 Phone Number: _____
- Type of Project (subdivision, commercial, road, pipeline, utility, ADOT project, etc.): Subdivision

  If a subdivision, has state or local subdivision approval been obtained? _____YES ✓ NO

  If yes, provide the Subdivision Certificate of Approval Number: _____
- Is the project part of a larger common plan of development? _____YES ✓ NO

Name of Project: Cochise Manor

II. CONSTRUCTION SITE INFORMATION *(continued)*

- Does the project have/need other environmental permits or approvals? If so, list them and provide the permit/approval number for each: No

- Site physical location (Provide address. If no address, provide driving directions from nearest municipality): 13102 E. Cochise Ave.

- City: Scottsdale State: AZ Zip Code: 85259 County: Maricopa

- Estimated Project Start Date: 10/01/2013 (Month/Day/Year) Estimated Project Completion Date: 01/01/2014 (Month/Day/Year)

- Estimate of total acres (to nearest whole acre) to be disturbed by the entire construction activity: 1

- Estimate of total acres (to nearest whole acre, round up if < 1) to be disturbed by your operations: 1

- **Select the non-stormwater discharges expected to be associated with your construction-related activities:**

____ None	____ Foundation or footing drains – uncontaminated
____ Discharges from emergency fire-fighting activities	____ Potable water well flushing – ephemeral receiving waters only
✓ Fire hydrant flushing – ephemeral receiving waters only	✓ Waters used for compacting soil – no reclaimed or other wastewaters
✓ Waters used to control dust – no reclaimed or other wastewaters	____ Water used for drilling and coring (e.g., for evaluation of foundation materials) uncontaminated
✓ Potable waterline flushing – ephemeral receiving waters only	____ Uncontaminated water from dewatering operations or foundations
____ Routine external building wash down (no detergents)	____ Other (specify) ____
✓ Pavement wash waters – no spills or leaks of toxic or hazardous materials and no detergents	
____ Uncontaminated air conditioning or compressor condensate	
✓ Uncontaminated groundwater	

Name of Project: Cochise Manor

III. DISCHARGE LOCATION

- Provide the latitude and longitude of the construction site at the point nearest the receiving water (natural water course):

  Latitude: 33° 34' 56.14" (Degrees, minutes, seconds) Longitude: 111° 48' 12.1" (Degrees, minutes, seconds)

- Identify the closest receiving water to the construction site (e.g., dry washes, named and unnamed waterbodies, etc.):
  Salt River

- Is there a potential for any discharges from the site to enter a municipal separate storm sewer system (MS4), canal, or a privately owned conveyance? ____YES ✓ NO

  If yes, enter the name of the MS4, canal, or conveyance owner: ____

IV. STORMWATER POLLUTION PREVENTION PLAN (SWPPP) – A SWPPP must be developed in accordance with the terms of the general permit before completing and submitting this NOI.

- ✓ I confirm that a SWPPP meeting the requirements of the Stormwater Construction General Permit (No. AZG2008-001) has been developed and will be implemented prior to commencing construction activities at this site. The SWPPP will be located at the site during construction activities. If this is a late NOI, a SWPPP has been developed and implemented prior to submitting this NOI. NOTE: ADEQ retains the authority to take enforcement action(s) for any unpermitted discharge or other non-compliance that occurs between the time construction commenced and discharge authorization is issued.

- When construction activities are not actively underway, the SWPPP will be available at the following location:
  5830 W. Thunderbird Rd., Suite 88

- Name of SWPPP Contact Person: Mason Cave

- Telephone Number of SWPPP Contact Person: (623) 521-6899

- This project may discharge within 1/4 mile of an Impaired or Outstanding Arizona Water: ____ YES ✓ NO

  ____ If yes, a copy of my SWPPP is included with this NOI for review by ADEQ.

Name of Project: Cochise Manor

V. FEES

✓ I confirm that the correct fee payment is included with the NOI:

____ Less than or equal to I acre: $250.00 *

✓ Greater than 1 acre, but less than or equal to 50 acres: $350.00

____ Greater than 50 acres: $500.00

____ Review of SWPPP by ADEQ, if required (see section IV above): add $1,000.00

Total fee payment included: $ 350.00

____ No fee is required. The signer below represents an Arizona state agency (exempt from AZPDES fees).

____ No fee is required. This is an amendment of an NOI previously filed under the 2008 Stormwater Construction General Permit, for which the fee was paid or not required.

* *(If the project will disturb less than one acre, Stormwater Construction General Permit coverage is required only if the project is part of a larger common plan of development or sale that will ultimately disturb one acre or more.)*

VI. CERTIFICATION BY AUTHORIZED SIGNATORY (see Part VIII.J.1 of the General Permit for requirements)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision, in accordance with a system designed to ensure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, I believe the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, as the operator, I certify that I have reviewed and will comply with all the terms and conditions stipulated in the Stormwater Construction General Permit (AZG2008-001)."

- Printed Name: _____ Title: _____
- Signature: _____ Date: _____
- Business Name: _____
- Address: _____
- City: _____ State: _____ Zip Code: _____ Phone: _____