CITY OF SCOTTSDALE

Drainage Reports

PRELIMINARY DRAINAGE REPORT

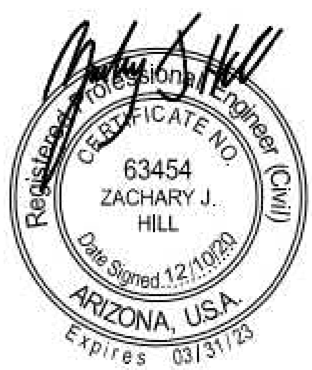
Solitude

Southeast of Happy Valley Road and Pima Road
Scottsdale, Arizona

Plan # ____________
Case # 5-PP-2020
Q-S # ____________
☒ Accepted
☐ Corrections
N.Baronas 1/12/2021
Reviewed By Date

Prepared for:

Sonora West Development INC.
8937 East Bell Road
Suite 100
Scottsdale, Arizona 85260



Prepared by:

Kimley-Horn and Associates
1001 West Southern Avenue, Suite 131
Mesa, Arizona 85210
291203002
December 2020

5-PP-2020_V2
12/29/20

PRELIMINARY DRAINAGE REPORT

SOLITUDE

SOUTHEAST OF HAPPY VALLEY ROAD AND PIMA ROAD

SCOTTSDALE, ARIZONA

DECEMBER 2020

Prepared By:

Kimley»Horn

5-PP-2020_V2
12/29/20

Contents

Figures

5-PP-2020_V2
12/29/20

Tables

Appendices

5-PP-2020_V2
12/29/20

INTRODUCTION

PROJECT DESCRIPTION

This Preliminary Drainage report has been prepared for the proposed Solitude residential development. Solitude is is a proposed 20-acre single family residential subdivision consisting of 17 single family residential units. The development will be combined with the adjacent 20-acre subdivision previously called HV91 which is currently under construction. The combined development is intended to be called Solitude would consist of 34 lots on 40-acres.

The zoning case (24-ZN-2017) and preliminary plat (5-PP-2018) for HV91 were approved in 2018. Infrastructure plans for the roadway and drainage facilities (310-19) were approved in 2019 and are currently under construction.

The proposed zoning for the project is R1-43 ESL. The proposed site is located within the City of Scottsdale and falls under the City's Environmentally Sensitive Lands Ordinance (ESLO).

PROJECT LOCATION AND DESCRIPTION

Solitude is located within Section 7 of Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The development is bound to the west by the existing HV91 development, to the east by the 92st Street to the north by Happy Valley Road, and to the south by by an undeveloped parcel of land. (See **Figure 1: Vicinity Map**).

The development is located within one flood zone as shown on Flood Insurance Rate Map (FIRM) panel number 04013C1310L, dated October 16, 2013 (see **Appendix A** for FIRM). The flood zones that pertain to the site are as follows:

> "Other Flood Areas" Zone X – "Area 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; areas protected by levees from 1% annual chance flood"

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

SCOPE OF DRAINAGE REPORT

The HV91 project is permitted and under construction. This report specifically covers the new 20 acres of development for the Solitude project.

This drainage report established the general drainage parameter and criteria for preliminary design. This report provides a hydrologic plan for the development of the site as well as preliminary hydraulic analysis for the washes crossing the site.

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

5-PP-2020_V2
12/29/20

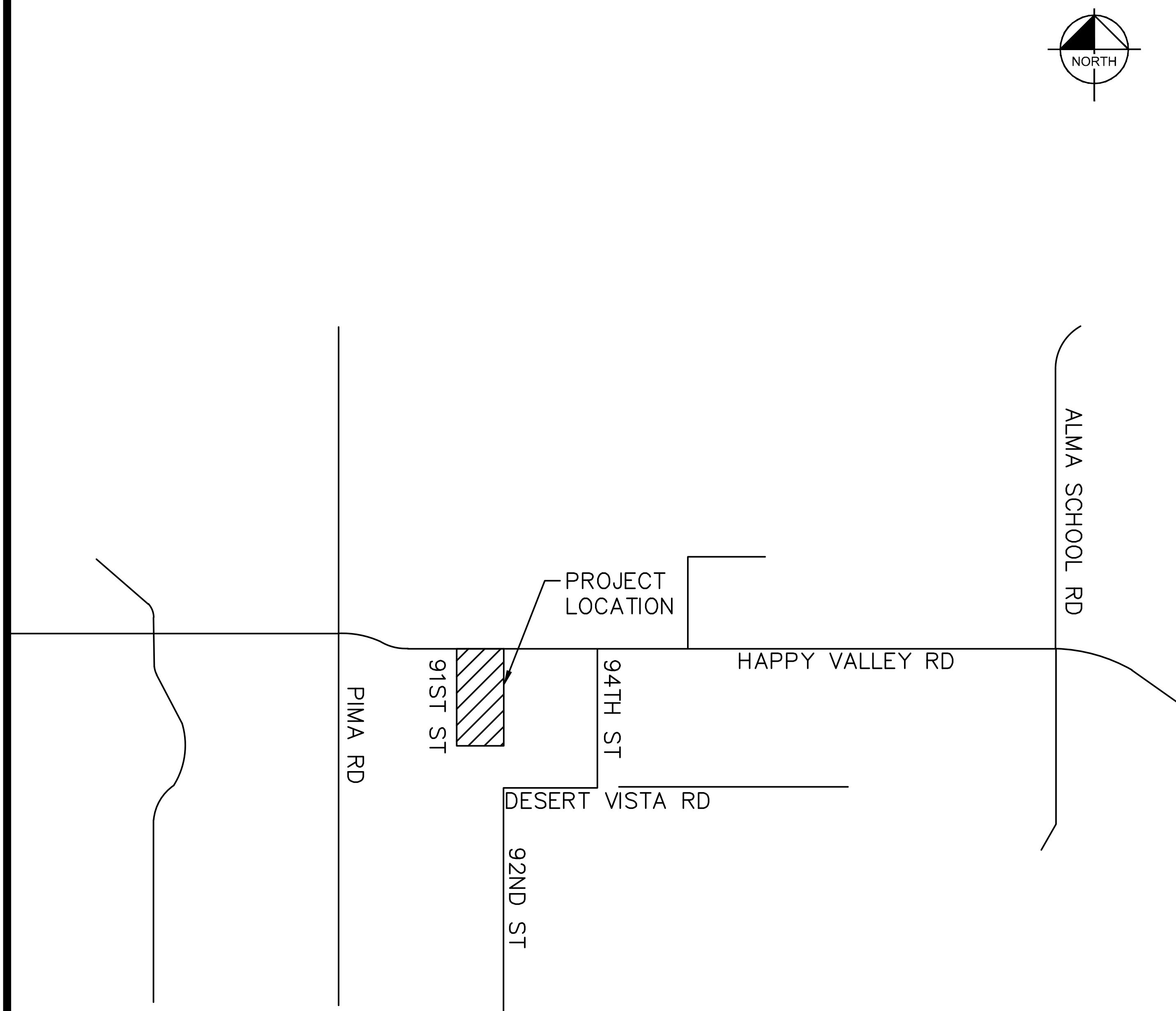


FIGURE 1
VICINITY MAP

Kimley»Horn

K:\EAV_Civil\291203001 – HV92\Reports\WaterBOD\Figures\V-MAP.dwg Sep 24, 2019 dan.recker
XREFS:

5-PP-2020_V2
12/29/20

DESCRIPTION OF EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

EXISTING SITE CONDITIONS

The site is characterized by many washes of varying sizes. The on-site washes vary in size and depth, but generally flow from the northeast to southwest through the site. Storm water runoff impacts the site from the east and north, and is conveyed through the site in existing washes.

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

EXISTING OFF-SITE DRAINAGE CONDITIONS

Off-site flows impact the site from the east, and north. Off-site sub-basins north of Happy Valley generally consist of low density residential sub-divisions with some golf course and resort uses. South of Happy Valley Road the sub-basins consist of very low density residential and undeveloped desert uses. The Happy Valley Road section varies between a 2-lane road with shoulder, and a 2-lane road with a median and curb and gutter. Along the north project frontage Happy Valley Road consists of a median divided roadway with curb and gutter.

This report utilized the offsite drainage analysis established with the HV91 drainage report. The existing condition HEC-1 hydraulic model was updated to provide new concentrations points at the eastern boundary of the project along the 92nd Street alignment.

Refer to **Figure 2: Offsite Drainage Map.**

Significant washes are defined as having a 100-year flow of 50 cfs or more. There are no washes with 100-year peak flows of 750 cfs or greater, which indicates that no Vista Corridors exist within the project area. Significant washes have been identified on **Figure 3: Existing Drainage Condition.** Hydrologic results can be found in **Appendix B**.

EXISTING ON-SITE DRAINAGE CONDITIONS

Multiple washes of various sizes and depth cross the site from northeast to southwest. Two of the washes, located at the southeast corner and the north portion of the site, are identified as significant washes with a flow over 50 cfs. Refer to **Figure 3: Existing Drainage Condition**.

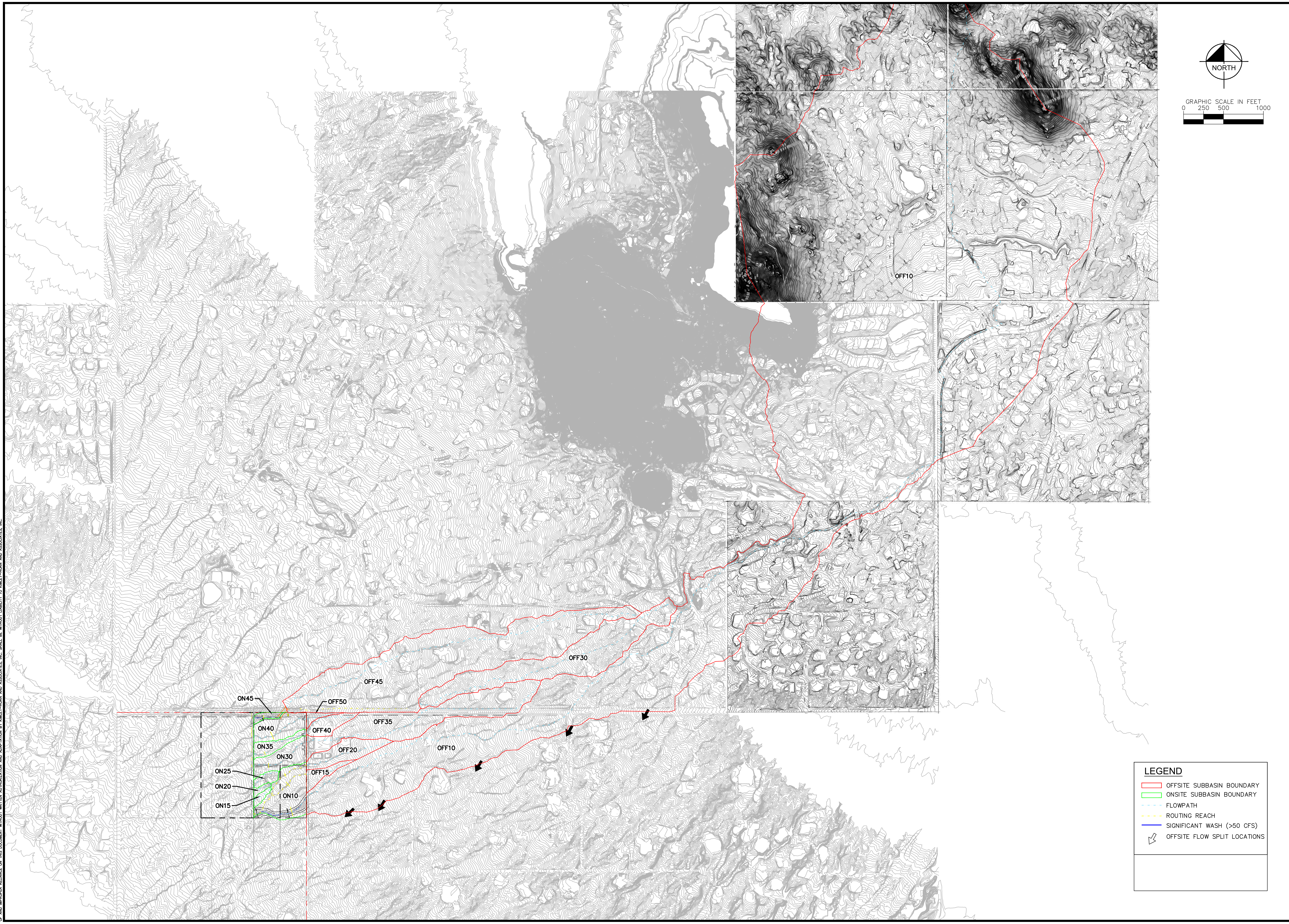
An existing conditions hydrologic model was completed to determine the peak stormwater discharges leaving the site. The existing condition discharges will be compared to the proposed condition discharges in a "pre-vs-post" analysis. The concentration points of this pre-vs-post analysis are located on the boundary the eastern boundary of the original HV91 project. While the intent is for Solitude to be one community, the

5-PP-2020_V2
12/29/20

initial portion of HV91 is under construction, and the drainage facilities have been sized to accommodate the existing flows.

Two significant washes have been identified with Wash A just south of Happy Valley Road, and Wash C located on the southernmost portion of the site. Hydraulic analysis was performed at key cross sections on the significant washes to determine the base flood elevation (BFE).

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



NO.	REVISION	BY	DATE	APPR.

Kimley»Horn

7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

SCALE (H): 1"=500'
SCALE (V): NONE

DESIGNED BY: ZJH
DRAWN BY: ZJH
CHECKED BY: JMB

DATE: SEP 2019

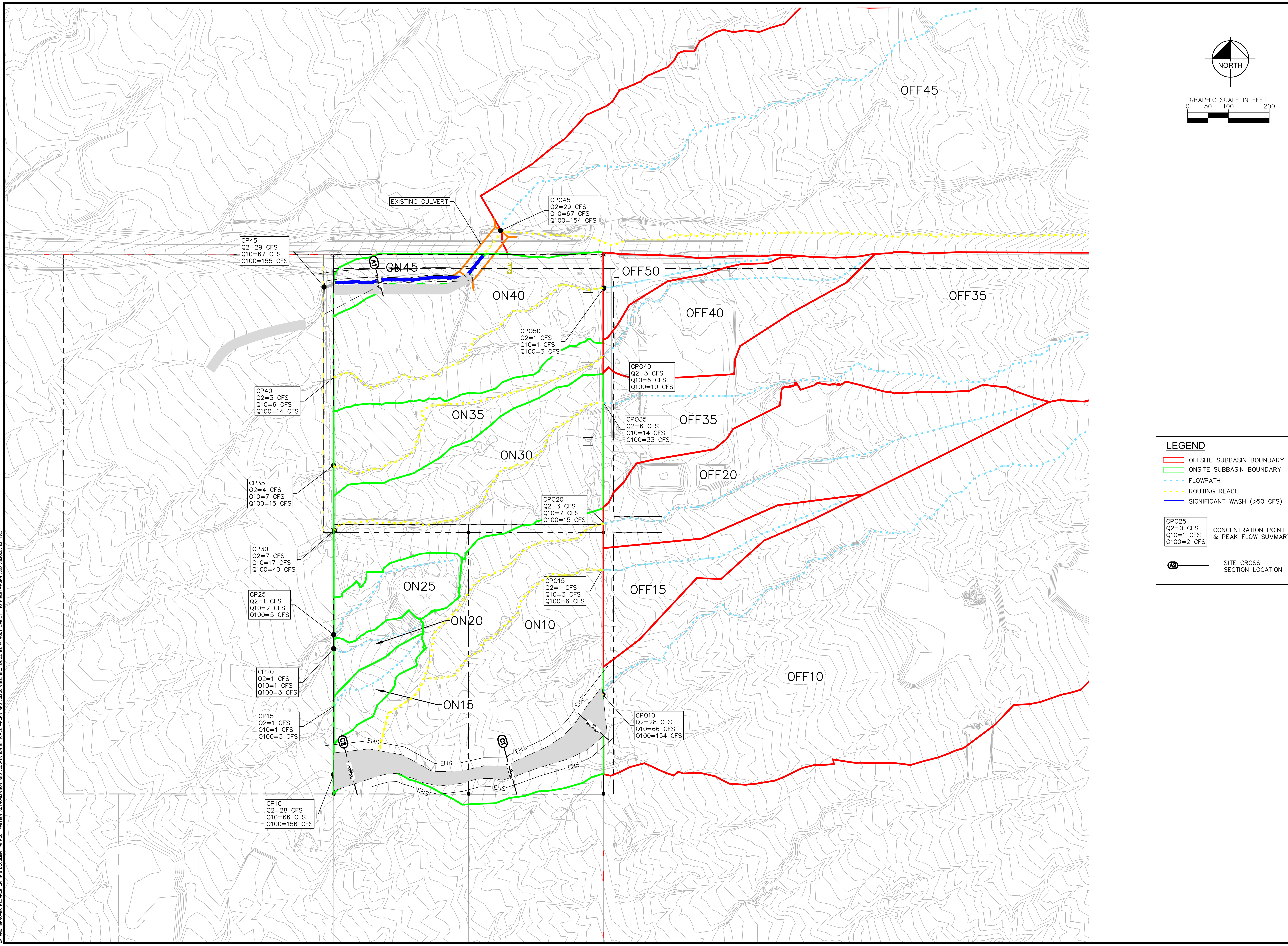
SOLUTIDE
FIGURE 2
OFFSITE DRAINAGE MAP
SCOTTSDALE, ARIZONA

PROJECT NO.
291203001

DRAWING NAME

1 OF 1

K:\EAV_Civil\291203001 – HV92\Drainage\Preliminary\Figures\Existing Drainage Conditions.dwg Sep 23, 2019 zach.hill
XREFS: x03000VS x03000BM–PP x03000TP xContours x03001vs x03000ws x03001bm–pp x03001ws



K:\EAV_Civil\291203001 – HV92\Drainage\Preliminary\Figures\Existing Drainage Conditions.dwg Jul 29, 2020 zach.hill

NO.	REVISION	DATE	BY	APPR.

Kimley»Horn

© 2020 KIMLEY-HORN AND ASSOCIATES, INC.
7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

SCALE (H): 1"=100'
SCALE (V): NONE
DESIGNED BY: ZJH
DRAWN BY: ZJH
CHECKED BY: JMB
DATE: SEP 2019

SOLITUDE
FIGURE 3
EXISTING DRAINAGE CONDITION
SCOTTSDALE, ARIZONA

PROJECT NO.
291203001

DRAWING NAME

1 OF 1

5-PP-2020_V2
12/29/20

PROPOSED PRELIMINARY DRAINAGE PLAN

PROPOSED ON-SITE DRAINAGE PLAN

The proposed solitude development consists of an additional 17 single family residential units. Lots located along the washes will have finished floor elevations a minimum of one foot above the 100-year base flood elevation (BFE). In general, lots on the high side of the road (east side) will drain to the street system and runoff will be conveyed in the streets to proposed detention basins. Due to the steep and undulating terrain, lots on the low side of the road will rear or side yard drain into adjacent washes or drainage swales within the development in order to minimize impacts to environmental features, existing natural area open space, and meet design criteria as required with the Environmentally Sensitive Lands Ordinance for the project. Detention basins will be located adjacent to the roadway tract and outside of on-lot building envelopes within designated drainage easements and detain runoff before discharging into the existing washes and will be sized to meet first flush criteria. Post development flows exiting the site will be attenuated though detention basins to a level equal to or less than pre-development flows. See **Figure 4: Proposed Conditions Drainage Map.**

The proposed development is R1-43 ESL zoning. Per this zoning, the development will be constructed in two phases. The first phase consists of the roadway, utilities and infrastructure need to serve the development, include the drainage infrastructure such as the detention basins, channels and culverts. The second phase will be the individual lots and homes. Each lot will require an individual single lot grading plan.

PROPOSED OFF-SITE DRAINAGE PLAN

Off-site flows impact the site from the north and east. Flows will be conveyed through the site and will discharge at their historic locations on the west and south side of the Site. In most cases, off-site flows are conveyed within the existing washes. In some locations, a proposed channel is used to convey the flows through the development. The proposed drainage channels will be designed to maintain a natural appearance as much as possible. Wash C is maintained in the existing natural drainage corridor. Wash A impacts the proposed roadway and must be conveyed in a proposed channel. The proposed channel will connect with the existing channel and culvert designed with HV91. A wash modification will be submitted for the relocation of Wash A.

PROPOSED ON-SITE HYDROLOGY

On-site runoff from the proposed development maintains post-development flows at or below pre-development conditions at each of the concentration points into HV91, for the three design storms (2-year, 10-year, and 100-year). With the exception of one point, CP40, where ths 100-year flow is increased by 1 cfs. This is within the level of accuracy of the analysis, and should be considered incidental and in conformance with the design. A summary of pre- and post-development peak discharges is provided in **Table 1.** Multiple detention basins are used to attenuate peak discharge from on-site runoff. Each basin utilizes a bleed-off pipe with orifice plate with the intent to control post-development runoff exiting the development, with a spillway for larger storm events. The total drain time for all basins is less than 36 hours. Refer to **Appendix B** for the detailed hydrologic model results.

Table 1: Peak Discharge Summary

Concentration Point	Prop. Cond. 2-Year (cfs)	Ex. Cond. 2-Year (cfs)	Prop. Cond. 10-Year (cfs)	Ex. Cond. 10-Year (cfs)	Prop. Cond. 100-Year (cfs)	Ex. Cond. 100-Year (cfs)
CP10	30	30	72	72	168	172
CP15	1	1	1	1	2	3
CP20	1	1	1	1	2	3
CP25	1	1	1	2	3	5
CP30	7	7	17	17	38	40
CP35	3	4	7	7	14	15
CP40	2	3	4	6	7	14
CP45	29	29	67	67	156*	155

PROPOSED ON-SITE HYDRAULICS

On-site runoff will be conveyed in the local streets, swales, storm drains, and culverts to the detention basins. Per the DS&PM, all interior streets will be designed to convey the peak discharge from the 10-year storm event at or below the top of curb elevation. Additionally, the streets will convey the 100-year runoff within the proposed tracts and maintain a maximum flow depth of eight inches above the gutter flow line. Catch basins with storm drains or scuppers will capture pavement runoff and outfall to the proposed detention basins. The scupper, catch basins and storm drains will be designed per the DS&PM and FCDMC's Drainage Policies and Standards. Detailed catch basin and street capacity analysis is beyond the scope of this preliminary drainage report and will be completed as part of the final design.

The existing hydraulic cross sections were revised for the proposed condition to determine the 100-year BFE through the property. Development of the site, including roadway, culverts and lots encroach into the existing BFE. The proposed hydraulic model includes these encroachments and modifications to calculate the proposed BFE, which are used to set the adjacent building pads.

Preliminary roadway culverts were designed. The proposed culverts are designed to convey the 100-year storm within the culvert without any roadway overtopping. The two proposed drainage channels were preliminarily designed.

Refer to **Appendix B** for preliminary hydraulic calculations.

Minor flows impact the proposed lots. These flows will be routed around the lots in smaller drainage swales, and at times require culvert driveway crossings. These lot drainage facilities will be included on the single lot grading plans and are not covered in the scope of this report.

SPECIAL CONDITIONS

404 PERMIT/JURISDICTIONAL WASHES

An Approved Jurisdictional Delineation stating no potential water of the US existing on the site was approved with the Army Corp of Engineers (File No. SPL-2019-00519) dated May 29, 2019. No additional analysis or approval is required for the site. **Refer to Appendix D**

EROSION SETBACK ANALYSIS

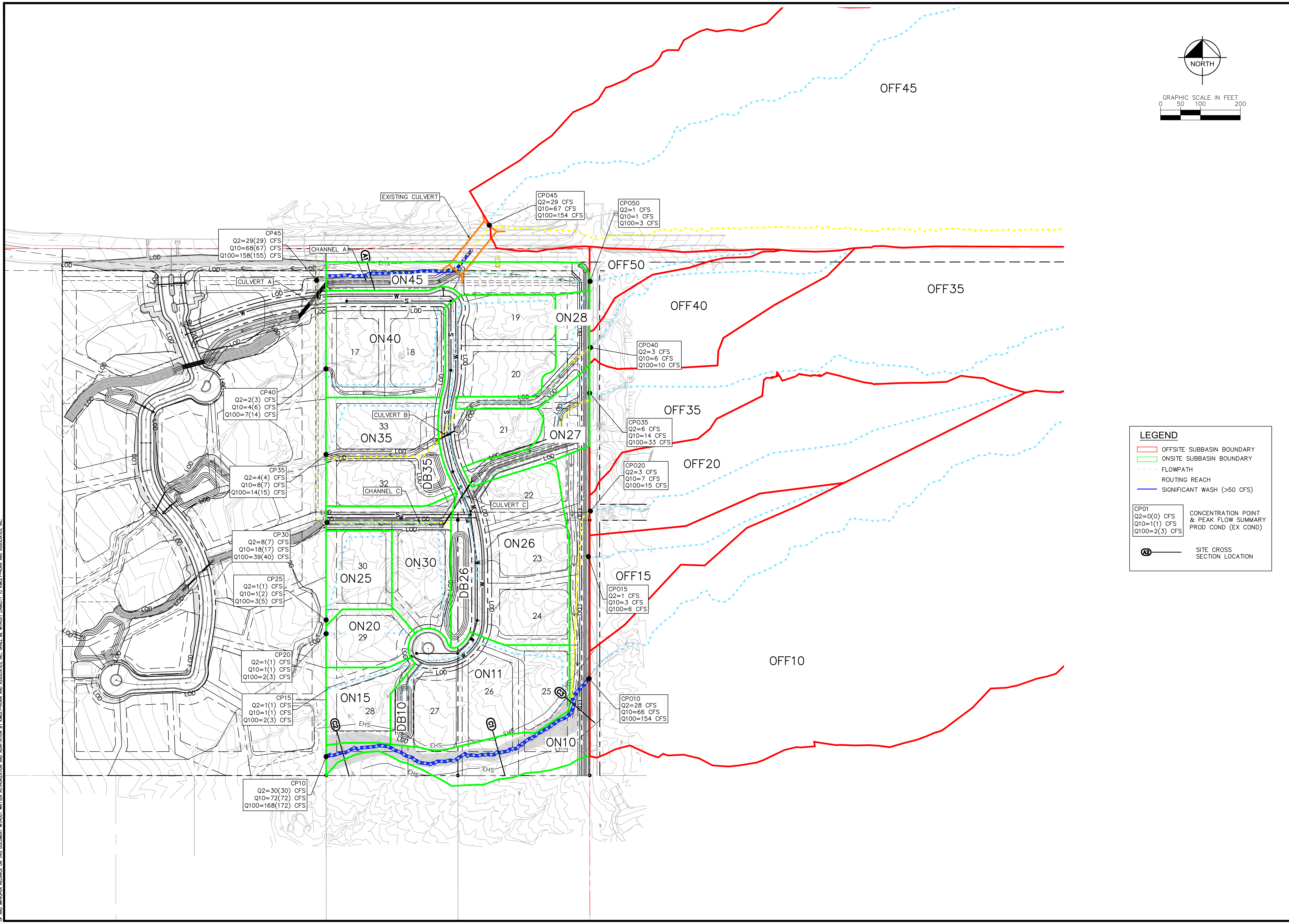
Erosion Setback Analysis will be performed on the significant washes at the time of preliminary plat and preliminary drainage report. Lots or improvements which encroach into the Erosion Hazard Setback will require a form of erosion protection such as concrete scour wall or launchable rip-rap. The standard minimum 20 foot setback is shown on the Grading and Drainage Plan.

ADEQ WATER QUALITY REQUIEMENTS

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

CULVERT SEDIMENTATION

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



NO. | REVISION | BY | DATE | APPR.

Kimley»Horn

© 2020 KIMLEY-HORN AND ASSOCIATES, INC.
7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

SCALE (H): 1"=100'
SCALE (V): NONE
DESIGNED BY: ZJH
DRAWN BY: ZJH
CHECKED BY: JMB
DATE: SEP 2019

SOLITUDE
FIGURE 4
PROPOSED DRAINAGE CONDITION
SCOTTSDALE, ARIZONA

PROJECT NO.
291203001

DRAWING NAME

1 OF 1

5-PP-2020_V2
12/29/20

DATA ANALYSIS METHODS

GENERAL DISCUSSION

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

HYDROLOGY

The U.S. Army Corps of Engineers HEC-1 hydrologic computer program was used to determine the 2-, 10-, and 100-year peak discharges for off-site and on-site flows. HEC-1 models were prepared for the existing and proposed development conditions. The Drainage Design Management System for Windows (DDMSW) program was used to develop the hydrologic parameters for the on-site drainage areas and off-site drainage areas west of the site. Green and Ampt rainfall loss parameters were estimated using DDMSW, the City of Scottsdale parameters, and the Flood Control District of Maricopa County (FCDMC) Drainage Design Manual – Hydrology (Hydrology Manual). Time of Concentration calculations were calculated using DDMSW. Values that show non-default values or out-of-range results are due to the NMIN parameter selected for the HEC-1 Model. Because of the varying sub-basin sizes, the selected NMIN parameter will not meet the time of concentration requirements specified in the FCDMC Drainage Design Manual - Hydrology for each sub-basin. The HEC-1 models were run with varying NMIN parameters to confirm that the hydrograph shape and peaks were valid. The HEC-1 models were prepared using the Clark Unit Hydrograph. Rainfall depth were estimated for the site from the National Oceanic and Atmospheric Administration Atlas 14 (NOAA14).

Six different soil types were identified for the on-site and off-site sub-basins using the web soil survey from the National Resource Conservation Service (NRCS). Web soil survey results are included within **Appendix B**.

Land Use parameters were established for the existing and proposed HEC-1 models. The FCDMC standard land use parameters were used as a basis for the parameters, as well as other recent project is the area. Vegetation cover was set based on a review of aerial photography of the of existing drainage area, taking a typical coverage of a specific land use. A conservative value of 0 percent was used for mountain terrain (UND). Vegetation cover of developed land varies from property to property, a conservative average was used for the overall land use. Vegetation cover is for pervious areas only. RTIMP represents the effective impervious area which is hydraulically connected. RTIMP values for developed land used are based on conservative estimates of connected impervious areas on a typical lot and roadway within the specific land use. Land uses of the existing off-site developments is based on the zoning of the properties and review of existing development as available from aerial photography. See **Table 2** below for complete Land Use Parameters. RTIMP calculations for R1-18 and R1-43 are provided in **Appendix B.** Land use maps for the existing and proposed development conditions are provided in **Appendix B**.

Table 2 Land Use Parameters

Land Use Code	Description	IA	RTIMP	Vegetation Cover
R1-18	Min Lot Size = 13,500 Sq Ft	0.30	27	50.0
R1-43	Min Lot Size = 32,250 Sq Ft	0.30	17	20.0
GOLF	Golf Course	0.44	0	60.0
DESERT	Natural Desert	0.15	0	25.0
UND	Natural Desert S>10%	0.25	0	0

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

HYDRAULICS

100-year BFEs for the significant washes were established using the Bentley Flowmaster V8i computer program. Cross sections were cut for the existing washes at key locations. The cross sections were updated in the proposed condition if they are encroached by a proposed lot. Manning n-value for the channels we estimated from *Chapter 7* of the FCDMC Hydraulics Manual.

Culvert crossing of the significant washes were sized using the Federal Highway Administration HY-8 version 7.30 computer program. Culverts were preliminarily sized to convey the 100-year storm through the structure.

Refer to **Appendix C** for the results of the hydraulic modeling for the existing and proposed condition.

STORMWATER STORAGE METHOD

Stormwater run-off generated by the site is routed to proposed detention basins, located adjacent to the roadway tract and outside of building envelopes on-lot for the development. These detention basins will be located within a designated drainage easement and will attenuate the peak flows leaving the property. Additionally, the basins have been sized to meet first flush requirements of the first half inch of run-off. The existing property is a part of the ESLO. Refer to **Appendix B** for the pre- and post-development hydrologic model results.

CONCLUSIONS

- Hydrologic models were prepared for the on-site and off-site areas for the pre- and post-development conditions. On-site detention basins were sized to ensure that the post-development runoff exiting the site are equal or less than pre-development conditions. Additionally, detention based are sized to meet first flush requirements. Basins are designed to drain within 36 hours and are located within designated drainage easements on-lot and outside of building envelopes proposed with the development.

- Multiple significant washes cross the development. The proposed development will encroach on the washes. Hydraulic models for the existing and proposed conditions were prepared to determine the BFE. The BFE was used to set the finished floor elevations for each lot.

- Significant washes are maintained in their existing corridors or modified with a wash modification application.

- On-site runoff will be conveyed through the local streets and storm drains to the detention basins and wash corridors. Culverts will convey the flow under the new roads. The conveyance facilities will be sized during final design.

5-PP-2020_V2
12/29/20

REFERENCES

City of Scottsdale, *Design Standards and Policies Manual,* January 2018.

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

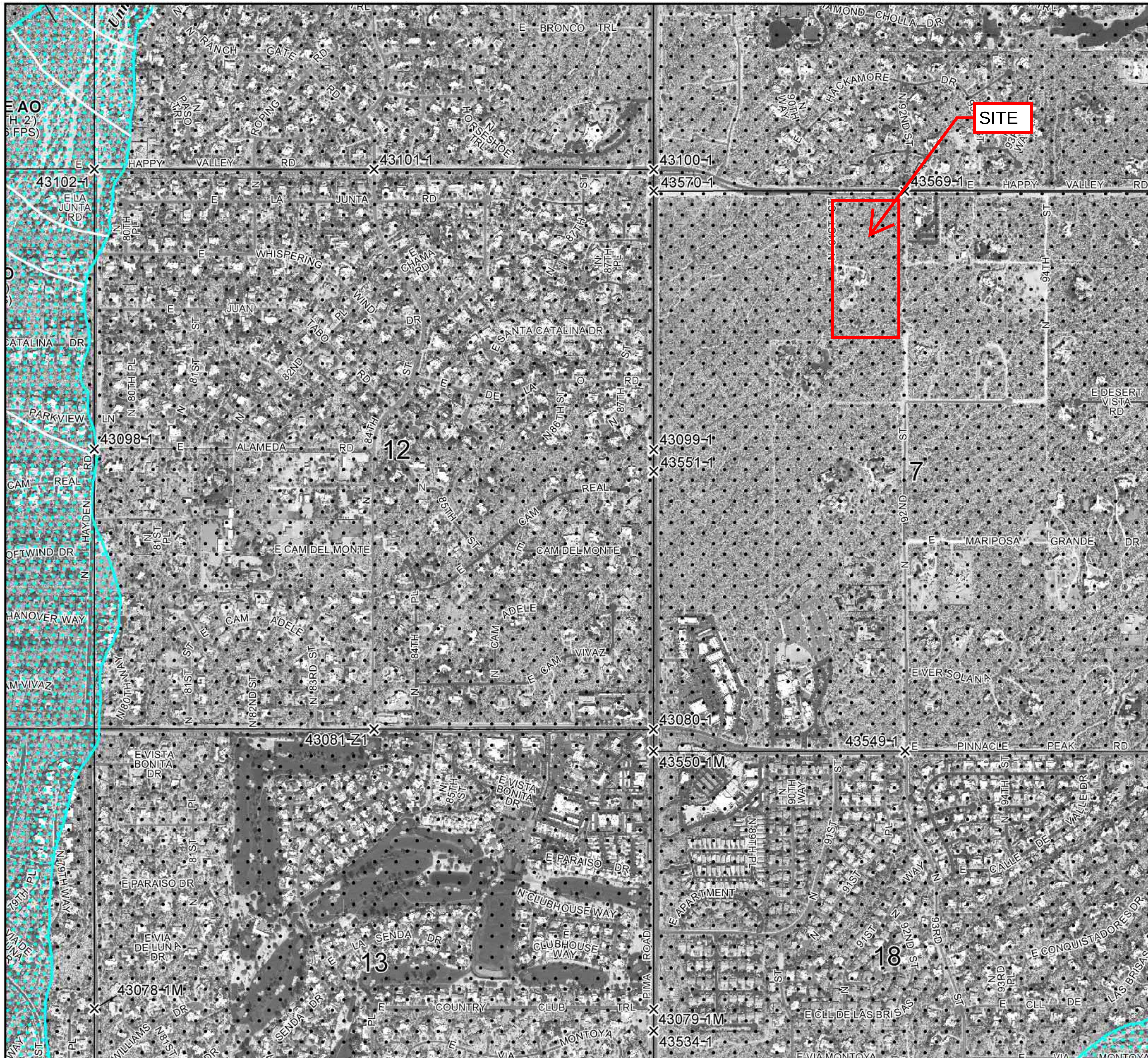
Federal Emergency Management Agency, Flood Insurance Rate Map Panel No04013C1331M, dated November 4, 2015

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

City of Scottsdale Topography Quarter Section Maps.

Final Drainage Report for HV91 dated 05/14/2019, prepared by Kimley-Horn and Associates.

Appendix A – Flood Insurance Rate Map



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1310L

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA

AND INCORPORATED AREAS

PANEL 1310 OF 4425

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1310	L
PHOENIX, CITY OF	040051	1310	L
SCOTTSDALE, CITY OF	045012	1310	L

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

MAP NUMBER 04013C1310L

MAP REVISED OCTOBER 16, 2013

Federal Emergency Management Agency

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

5-PP-2020_V2
12/29/20

Appendix B – Hydrology

HEC-1 Exhibits (Existing and Proposed Conditions)

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

DDSMW Output: (Existing and Proposed Conditions)

- Rainfall
- Land use
- Soils
- Storage
- Routing

HEC-1 Output

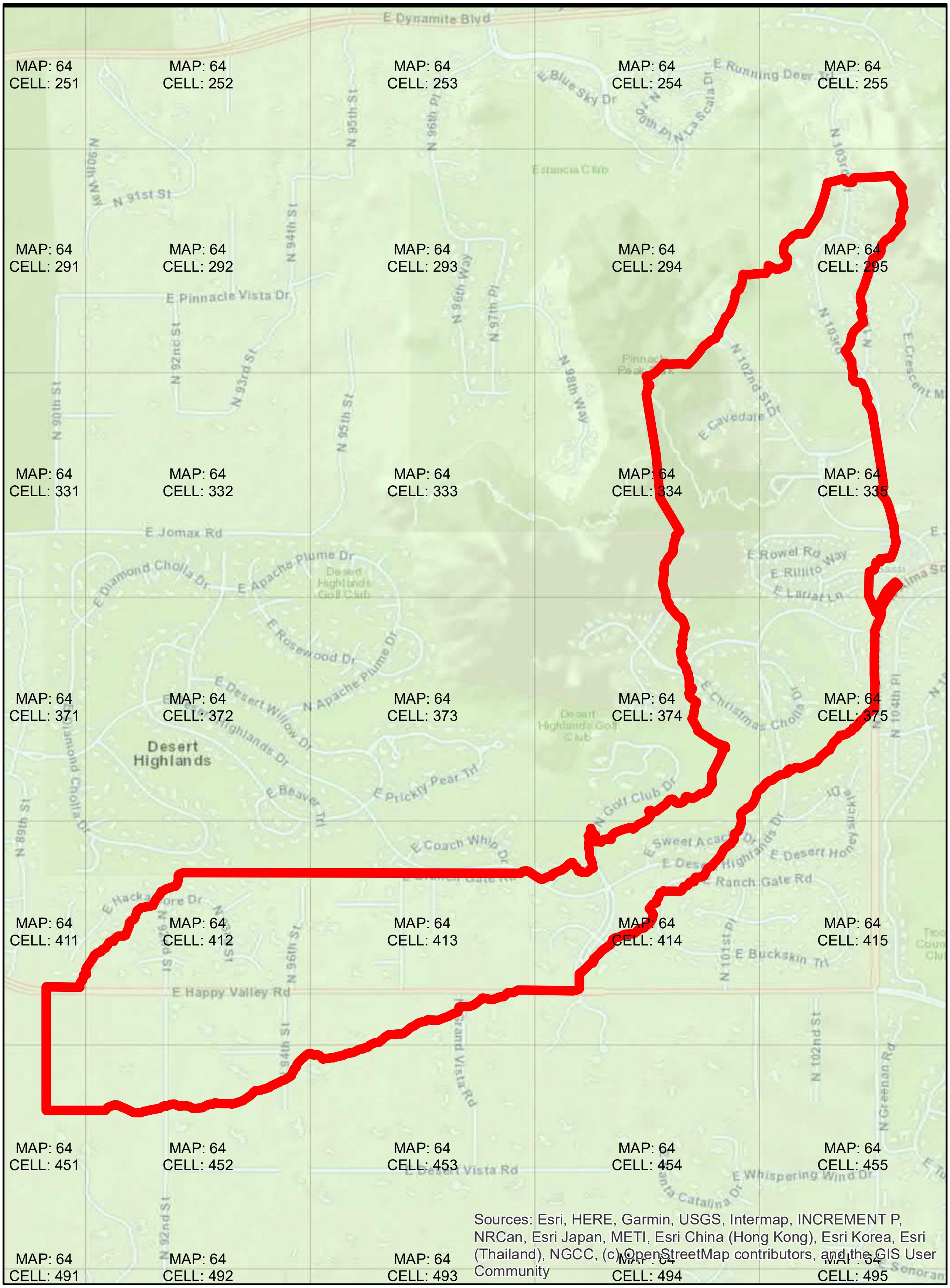
- Existing Condition
- Proposed Condition

Existing Condition

RAINFALL DATA

Project Reference: SOLITUDE EX

ID	Method	Duration	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
DEFAULT	NOAA14	5 MIN	0.295	0.398	0.476	0.579	0.657	0.735
	NOAA14	10 MIN	0.450	0.606	0.724	0.881	0.999	1.119
	NOAA14	15 MIN	0.558	0.751	0.898	1.092	1.239	1.387
	NOAA14	30 MIN	0.751	1.012	1.209	1.471	1.669	1.868
	NOAA14	1 HOUR	0.929	1.252	1.496	1.820	2.065	2.312
	NOAA14	2 HOUR	1.067	1.416	1.683	2.044	2.317	2.598
	NOAA14	3 HOUR	1.137	1.481	1.756	2.137	2.438	2.750
	NOAA14	6 HOUR	1.342	1.705	1.995	2.392	2.703	3.024
	NOAA14	12 HOUR	1.587	1.995	2.319	2.758	3.094	3.441
	NOAA14	24 HOUR	1.919	2.497	2.963	3.622	4.153	4.715



5-PP-2020_V2
12/29/20

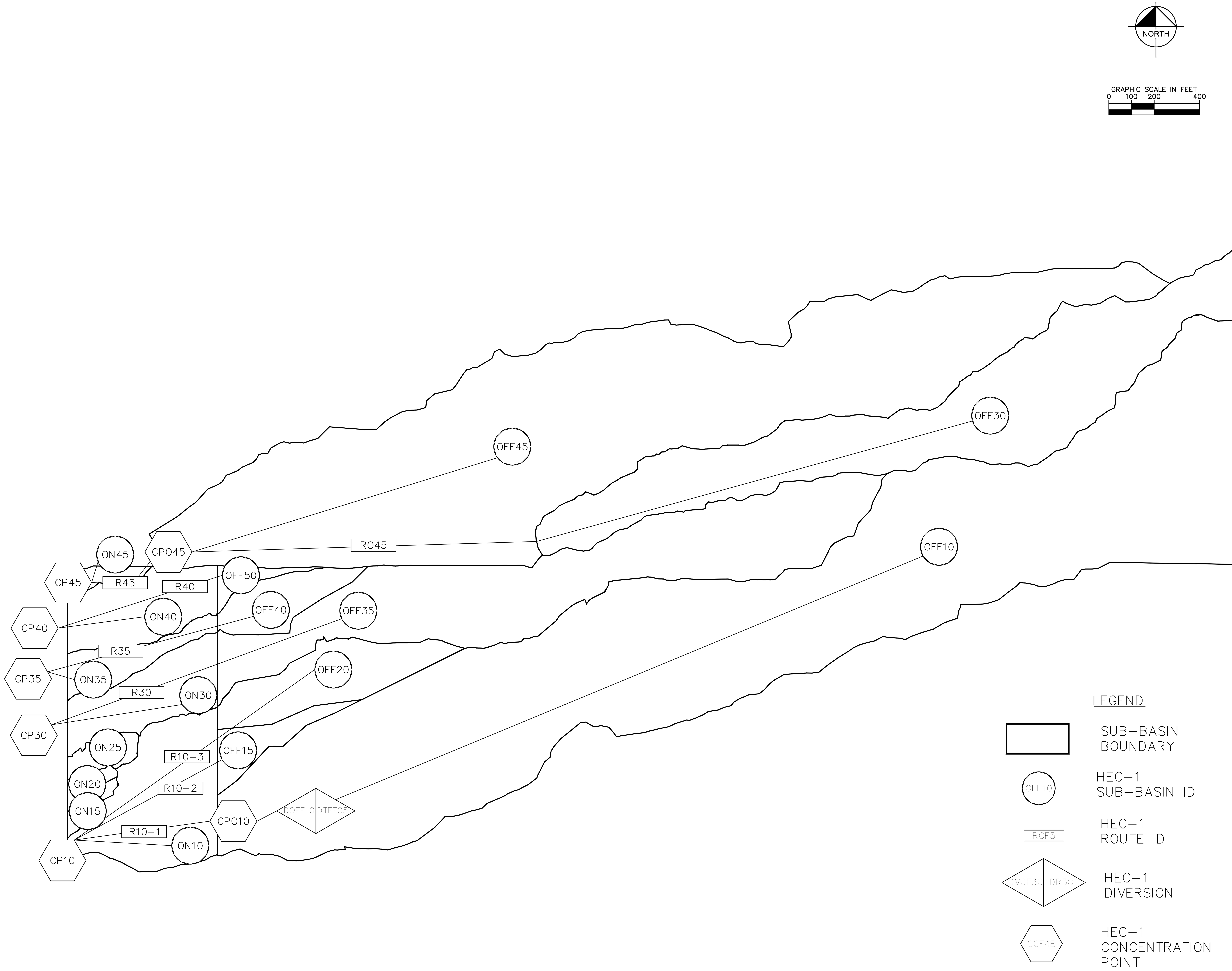
Major Basin ID: 01

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
OFF10	0.900	3.21	245.5	237.0	Natural	0.034	0.30	0.28	5.58	0.231	21	**Tc (Hrs)**	0.766*	0.749*	0.671*	0.594*	0.550*	0.515 *
												Vel (f/s)	6.15	6.29	7.02	7.93	8.56	9.14
												R (Hrs)	0.743	0.724	0.642	0.560	0.514	0.478
OFF15	0.003	0.12	176.5	176.5	Natural	0.076	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.238	0.233	0.209	0.185	0.171	0.161
												Vel (f/s)	0.74	0.76	0.84	0.95	1.03	1.09
												R (Hrs)	0.379	0.369	0.327	0.285	0.262	0.244
OFF20	0.008	0.21	184.0	184.0	Natural	0.070	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.298	0.291	0.261	0.231	0.214	0.201
												Vel (f/s)	1.03	1.06	1.18	1.33	1.44	1.53
												R (Hrs)	0.435	0.423	0.375	0.327	0.301	0.281
OFF30	0.036	0.71	204.2	204.0	Natural	0.054	0.19	0.32	6.54	0.138	4	**Tc (Hrs)**	0.453*	0.443*	0.398	0.354	0.329	0.309
												Vel (f/s)	2.30	2.35	2.62	2.94	3.17	3.37
												R (Hrs)	0.778	0.758	0.672	0.590	0.545	0.509
OFF35	0.031	0.80	147.5	147.5	Natural	0.052	0.20	0.31	6.54	0.138	5	**Tc (Hrs)**	0.519*	0.508*	0.456*	0.406	0.378	0.355
												Vel (f/s)	2.26	2.31	2.57	2.89	3.10	3.31
												R (Hrs)	1.084	1.056	0.937	0.824	0.761	0.711
OFF40	0.004	0.15	179.3	179.3	Natural	0.037	0.30	0.19	6.54	0.133	17	**Tc (Hrs)**	0.166	0.163	0.147	0.133	0.125	0.118
												Vel (f/s)	1.33	1.35	1.50	1.65	1.76	1.86
												R (Hrs)	0.258	0.251	0.226	0.201	0.187	0.176
OFF45	0.081	0.95	194.1	194.1	Natural	0.037	0.26	0.29	5.46	0.212	12	**Tc (Hrs)**	0.442*	0.432*	0.392	0.349	0.324	0.303
												Vel (f/s)	3.15	3.23	3.55	3.99	4.30	4.60
												R (Hrs)	0.601	0.586	0.526	0.463	0.425	0.396
OFF50	0.001	0.08	187.5	187.5	Natural	0.041	0.30	0.19	6.54	0.133	17	**Tc (Hrs)**	0.126	0.124	0.112	0.101	0.095*	0.090 *
												Vel (f/s)	0.93	0.95	1.05	1.16	1.24	1.30
												R (Hrs)	0.253	0.247	0.222	0.198	0.184	0.173
ON10	0.011	0.15	145.7	145.7	Natural	0.068	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.267	0.261	0.234	0.207	0.192	0.180
												Vel (f/s)	0.82	0.84	0.94	1.06	1.15	1.22
												R (Hrs)	0.245	0.238	0.211	0.184	0.170	0.158

* Non default value or value out of range

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
Major Basin ID: 01																		
ON15	0.001	0.05	434.0	294.1	Natural	0.083	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.138	0.134	0.120	0.106	0.099*	0.093 *
												Vel (f/s)	0.53	0.55	0.61	0.69	0.74	0.79
												R (Hrs)	0.191	0.186	0.165	0.144	0.132	0.123
ON20	0.001	0.05	434.8	294.2	NATURAL	0.083	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.138	0.134	0.120	0.106	0.099*	0.093 *
												Vel (f/s)	0.53	0.55	0.61	0.69	0.74	0.79
												R (Hrs)	0.191	0.186	0.165	0.144	0.132	0.123
ON25	0.002	0.07	219.2	217.5	NATURAL	0.079	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.174	0.170	0.152	0.135	0.125	0.117
												Vel (f/s)	0.59	0.60	0.68	0.76	0.82	0.88
												R (Hrs)	0.219	0.213	0.189	0.165	0.152	0.141
ON30	0.006	0.16	147.4	147.4	Natural	0.072	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.283	0.276	0.248	0.219	0.203	0.191
												Vel (f/s)	0.83	0.85	0.95	1.07	1.16	1.23
												R (Hrs)	0.389	0.378	0.335	0.292	0.269	0.251
ON35	0.003	0.15	138.2	138.2	Natural	0.076	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.288	0.281	0.252	0.223	0.207	0.194
												Vel (f/s)	0.76	0.78	0.87	0.99	1.06	1.13
												R (Hrs)	0.558	0.543	0.481	0.420	0.386	0.360
ON40	0.006	0.15	140.0	140.0	NATURAL	0.072	0.15	0.39	5.85	0.185		**Tc (Hrs)**	0.289	0.282	0.253	0.223	0.206	0.192
												Vel (f/s)	0.76	0.78	0.87	0.99	1.07	1.15
												R (Hrs)	0.378	0.367	0.326	0.283	0.259	0.240
ON45	0.001	0.08	171.1	171.1	NATURAL	0.083	0.15	0.35	3.29	0.725		**Tc (Hrs)**	0.274	0.262	0.222	0.193	0.177	0.164
												Vel (f/s)	0.43	0.45	0.53	0.61	0.66	0.72
												R (Hrs)	0.598	0.568	0.474	0.405	0.368	0.339

* Non default value or value out of range



NO.	REVISION	BY	DATE	APPR.

Kimley»Horn

7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

SCALE (H): 1"=200'
SCALE (V): NONE

DESIGNED BY: ZJH
DRAWN BY: ZJH
CHECKED BY: JMB

DATE: SEP 2019

SOLITUDE
EXISTING CONDITION HEC-1 MAP
SCOTTSDALE, ARIZONA

PROJECT NO.
291203001

DRAWING NAME

1 OF 1

K:\EAV_Civil\291203001 - HV92\Drainage\Preliminary\Figures\Ex HEC1.dwg Sep 23, 2019 zach.hill

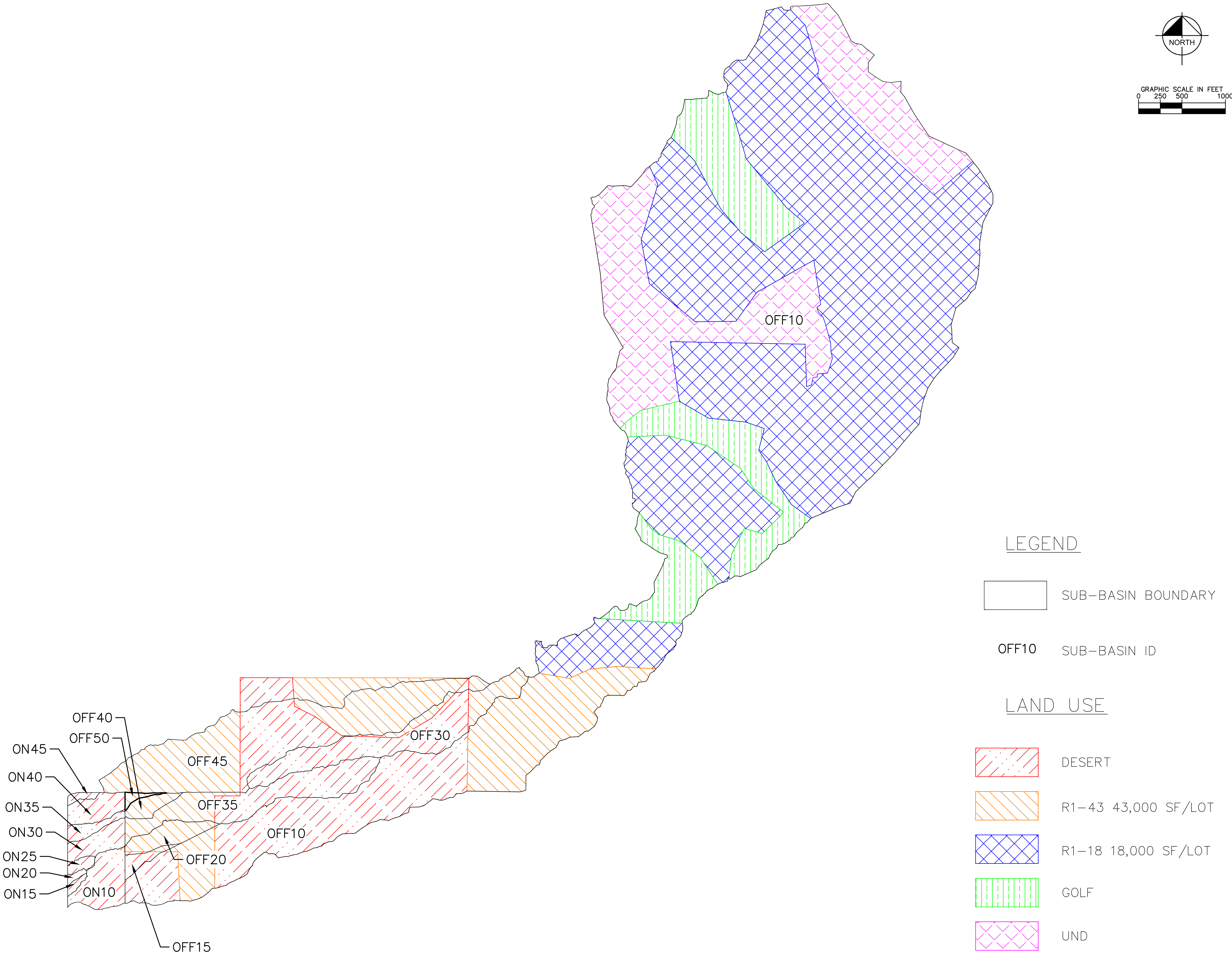
5-PP-2020_V2
12/29/20

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
Major Basin ID: 01									
OFF10	DESERT	0.0740	8.2	0.15	0	25.0	DRY	0.042	Desert
	GOLF	0.1020	11.3	0.44	0	60.0	NORMAL	0.023	Golf Course
	R1-18	0.5110	56.8	0.30	27	50.0	NORMAL	0.023	Residential 18,000 sq-ft lots
	R1-43	0.0650	7.2	0.30	17	20.0	NORMAL	0.023	Residential 43,000 sq-ft lots
	UND	0.1480	16.4	0.25	0	0.0	DRY	0.081	Undisturbed natural desert or desert landscaping (no impervi
		0.9000	**99.9**						
OFF15	DESERT	0.0020	100.0	0.15	0	25.0	DRY	0.076	Desert
		0.0020	**100.0**						
OFF20	DESERT	0.0080	100.0	0.15	0	25.0	DRY	0.070	Desert
		0.0080	**100.0**						
OFF30	DESERT	0.0260	74.3	0.15	0	25.0	DRY	0.061	Desert
	R1-43	0.0090	25.7	0.30	17	20.0	NORMAL	0.031	Residential 43,000 sq-ft lots
		0.0350	**100.0**						
OFF35	DESERT	0.0210	67.7	0.15	0	25.0	DRY	0.062	Desert
	R1-43	0.0100	32.3	0.30	17	20.0	NORMAL	0.032	Residential 43,000 sq-ft lots
		0.0310	**100.0**						
OFF40	R1-43	0.0040	100.0	0.30	17	20.0	NORMAL	0.037	Residential 43,000 sq-ft lots
		0.0040	**100.0**						
OFF45	DESERT	0.0220	27.2	0.15	0	25.0	DRY	0.056	Desert
	R1-43	0.0590	72.8	0.30	17	20.0	NORMAL	0.029	Residential 43,000 sq-ft lots

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description

Major Basin ID: 01

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
		0.0810	**100.0**						
OFF50	R1-43	0.0010	100.0	0.30	17	20.0	NORMAL	0.041	Residential 43,000 sq-ft lots
		0.0010	**100.0**						
ON10	DESERT	0.0110	100.0	0.15	0	25.0	DRY	0.068	Desert
		0.0110	**100.0**						
ON15	DESERT	0.0010	100.0	0.15	0	25.0	DRY	0.083	Desert
		0.0010	**100.0**						
ON20	DESERT	0.0010	100.0	0.15	0	25.0	DRY	0.083	Desert
		0.0010	**100.0**						
ON25	DESERT	0.0010	100.0	0.15	0	25.0	DRY	0.083	Desert
		0.0010	**100.0**						
ON30	DESERT	0.0060	100.0	0.15	0	25.0	DRY	0.072	Desert
		0.0060	**100.0**						
ON35	DESERT	0.0030	100.0	0.15	0	25.0	DRY	0.076	Desert
		0.0030	**100.0**						
ON40	DESERT	0.0060	100.0	0.15	0	25.0	DRY	0.072	Desert
		0.0060	**100.0**						
ON45	DESERT	0.0010	100.0	0.15	0	25.0	DRY	0.083	Desert
		0.0010	**100.0**						



LEGEND

[box]	SUB-BASIN BOUNDARY
OFF10	SUB-BASIN ID

LAND USE

[pattern]	DESERT
[pattern]	R1-43 43,000 SF/LOT
[pattern]	R1-18 18,000 SF/LOT
[pattern]	GOLF
[pattern]	UND

NO. | REVISION | BY | DATE | APPR.

Kimley»Horn

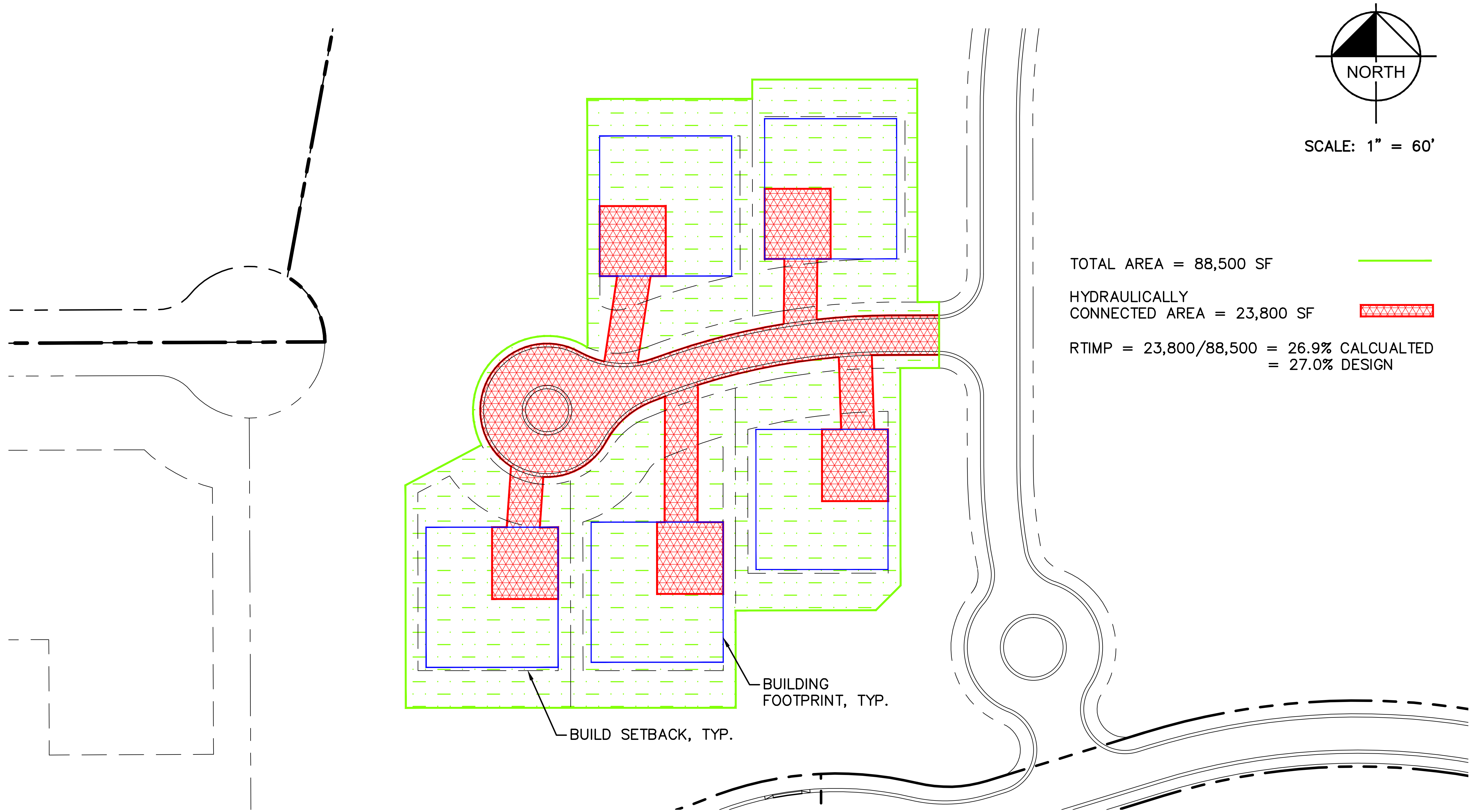
7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

SCALE (H): 1"=500'
SCALE (V): NONE
DESIGNED BY: ZJH
DRAWN BY: ZJH
CHECKED BY: JMN
DATE: SEP 2019

SOLITUDE
EXISTING CONDITION HEC 1 - LAND USE MAP
SCOTTSDALE, ARIZONA

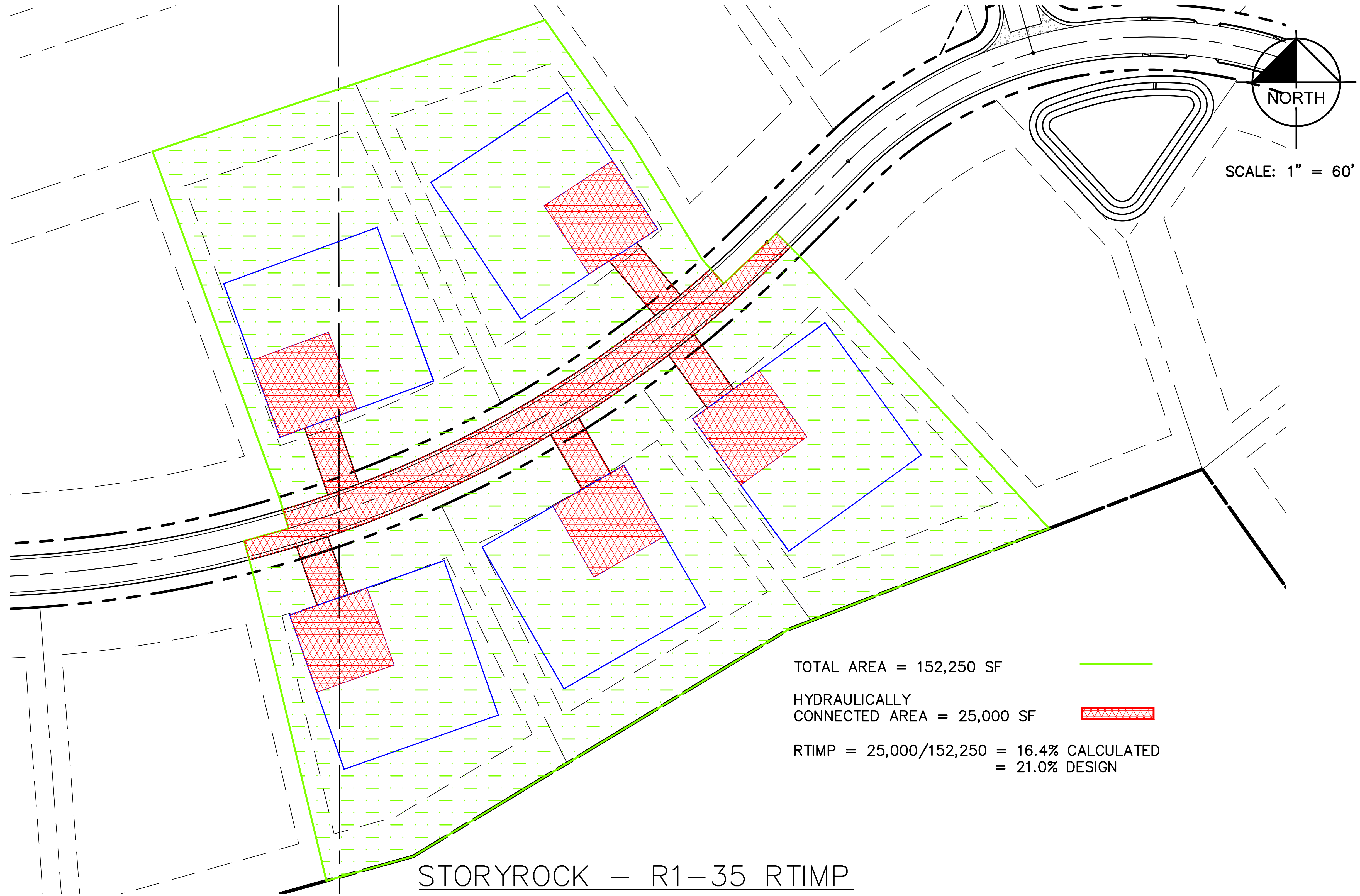
PROJECT NO. 291203001
DRAWING NAME
1 OF 1

5-PP-2020_V2
12/29/20



STORYROCK – R1–18 RTIMP DETERMINATION

Kimley»Horn



STORYROCK – R1–35 RTIMP DETERMINATION

Kimley»Horn

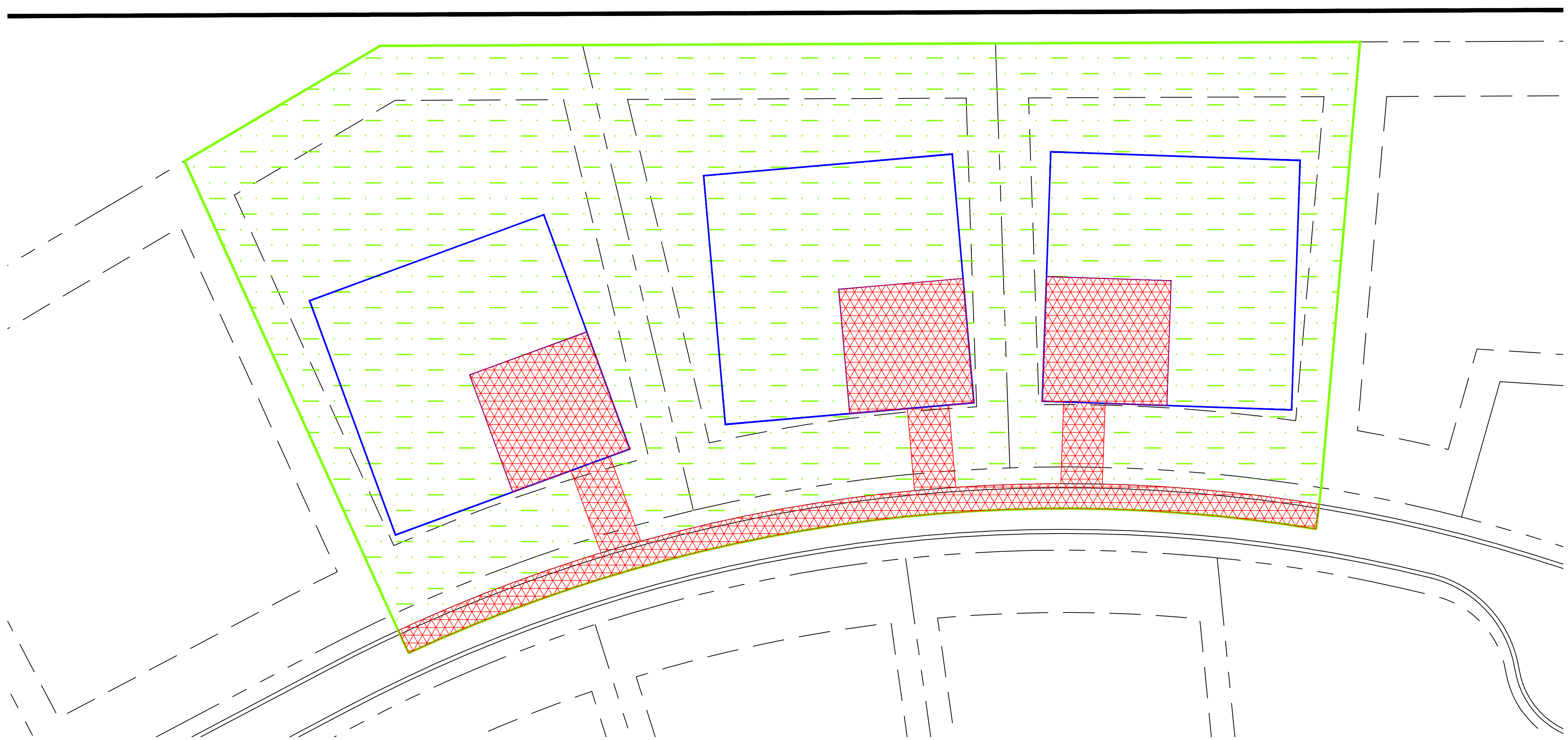
NORTH

SCALE: 1" = 60'

TOTAL AREA = 123,750 SF

HYDRAULICALLY
CONNECTED AREA = 19,000 SF

RTIMP = 19,000/123,750 = 15.4% CALCULATED
17.0% DESIGN

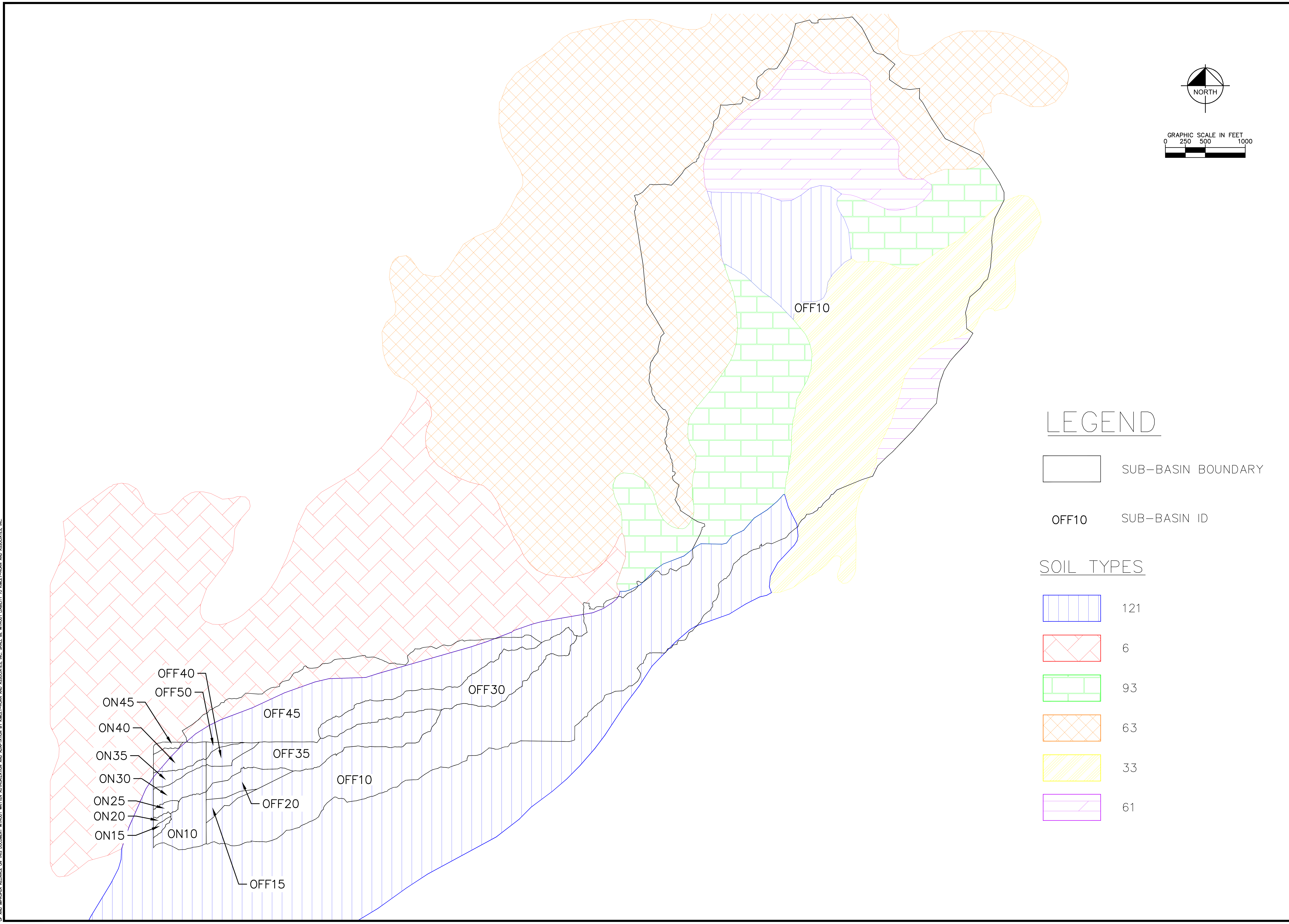


STORYROCK – R1–43 RTIMP
DETERMINATION

Kimley»Horn

Major Basin ID: 01

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
OFF10	645	33	64533	0.165	18.30	0.230	-	100	
	645	61	64561	0.135	15.00	0.150	-	100	
	645	93	64593	0.168	18.60	0.330	-	100	
	645	121	645121	0.259	28.70	0.120	-	100	
	645	63	64563	0.174	19.30	0.140	25.00	100	
OFF15	645	121	645121	0.003	100.00	0.120	-	100	
OFF20	645	121	645121	0.008	100.00	0.120	-	100	
OFF30	645	121	645121	0.036	100.00	0.120	-	100	
OFF35	645	121	645121	0.031	100.00	0.120	-	100	
OFF40	645	121	645121	0.004	100.00	0.120	-	100	
OFF45	645	121	645121	0.059	72.80	0.120	-	100	
	645	6	6456	0.022	27.20	0.620	-	100	
OFF50	645	121	645121	0.001	100.00	0.120	-	100	
ON10	645	121	645121	0.011	100.00	0.120	-	100	
ON15	645	121	645121	0.001	100.00	0.120	-	100	
ON20	645	121	645121	0.001	100.00	0.120	-	100	
ON25	645	121	645121	0.001	100.00	0.120	-	100	
ON30	645	121	645121	0.006	100.00	0.120	-	100	
ON35	645	121	645121	0.003	100.00	0.120	-	100	
ON40	645	121	645121	0.005	83.30	0.120	-	100	
	645	6	6456	0.001	16.70	0.620	-	100	
ON45	645	6	6456	0.001	100.00	0.620	-	100	



LEGEND

(box)	SUB-BASIN BOUNDARY
OFF10	SUB-BASIN ID

SOIL TYPES

- 121
- 6
- 93
- 63
- 33
- 61

REVISION | NO. | BY | DATE | APPR.

Kimley»Horn

7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

SCALE (H): 1"=500'
SCALE (V): NONE
DESIGNED BY: ZJH
DRAWN BY: ZJH
CHECKED BY: JMB
DATE: SEP 2019

SOLITUDE
EXISTING CONDITION
HEC 1 - SOILS MAP
SCOTTSDALE, ARIZONA

PROJECT NO.
291203001

DRAWING NAME

1 OF 1

5-PP-2020_V2
12/29/20

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)		1.	2.	3.	4.	5.	6.	7.	8.
NORMAL DEPTH															
Major Basin 01															
R10-1	0.045	0.045	0.045	800.00	0.0275	-	X:	-	30.00	60.00	65.00	90.00	95.00	110.00	130.00
							Y:	10.20	10.10	10.00	9.00	9.00	10.00	10.10	10.20
R10-2	0.045	0.045	0.045	930.00	0.0300	-	X:	-	10.00	38.00	40.00	42.00	50.00	60.00	70.00
							Y:	10.00	9.90	9.80	9.00	9.80	9.90	10.00	10.00
R10-3	0.045	0.045	0.045	1,000.00	0.0350	-	X:	-	20.00	23.00	26.00	30.00	40.00	50.00	60.00
							Y:	10.20	10.00	10.00	8.00	10.00	10.10	10.20	10.30
R30	0.045	0.045	0.045	825.00	0.0250	-	X:	-	10.00	20.00	23.00	29.00	33.00	40.00	50.00
							Y:	10.20	10.10	10.00	7.00	7.00	10.00	10.10	10.20
R35	0.045	0.045	0.045	805.00	0.0220	-	X:	-	30.00	35.00	38.00	38.50	41.00	45.00	50.00
							Y:	10.10	10.00	9.90	8.70	9.00	9.90	10.00	10.10
R40	0.045	0.045	0.045	780.00	0.0250	-	X:	-	30.00	48.00	52.00	58.00	60.00	70.00	80.00
							Y:	10.10	10.00	9.90	9.20	9.20	9.90	10.00	10.10
R45	0.045	0.045	0.045	395.00	0.0250	-	X:	-	15.00	20.00	25.00	30.00	35.00	40.00	45.00
							Y:	10.10	10.00	9.00	7.50	8.00	8.50	9.00	9.20
RO45	0.045	0.045	0.045	1,773.00	0.0300	-	X:	610.00	620.00	637.00	650.00	663.00	679.00	689.00	697.00
							Y:	139.00	138.70	138.30	138.50	138.80	139.00	138.90	138.90

Diversion ID/ DT Card ID	Maximum Volume (ac-ft)	Maximum Diversion (cfs)		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
DOFF10			**Inflow (cfs)**		100	200	500	1,000	2,000	4,000	10,000	20,000	50,000
			Diversion (cfs)		85	170	425	850	1,700	3,400	8,500	17,000	42,500

```
1****************************************                                                   ********************************
 *                                      *                                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                                   *    U.S. ARMY CORPS OF ENGINEER
 *             JUN   1998               *                                                   *    HYDROLOGIC ENGINEERING CENT
 *          VERSION 4.1                 *                                                   *          609 SECOND STREET
 *                                      *                                                   *       DAVIS, CALIFORNIA 95616
 *  RUN DATE   29JUL20  TIME  10:49:42  *                                                   *          (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        SOLITUDE EX - Solitude Existing Conditions Hydrology
             3           ID        2 YEAR
             4           ID        6 Hour  Storm
             5           ID        Unit Hydrograph: Clark
             6           ID        Storm: Multiple
             7           ID        07/29/2020
                         *DIAGRAM
             8           IT       2  1JAN99       0    2000
             9           IO       5
            10           IN      15
                         *
            11           JD   1.342  0.0001
            12           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            13           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            14           PC   0.962   0.972   0.983   0.991   1.000
            15           JD   1.334  0.5000
            16           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            17           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            18           PC   0.962   0.972   0.983   0.991   1.000
            19           JD   1.308     2.8
            20           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
            21           PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
            22           PC   0.950   0.963   0.975   0.988   1.000
                         *

            23           KK   OFF10   BASIN
            24           BA   0.900
            25           LG    0.30    0.28    5.58    0.23      21
            26           UC   0.766   0.743
            27           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
            28           UA     100
                         *

            29           KK  DOFF10  DIVERT
            30           DT  DTFF10     0.0     0.0
            31           DI     0.0   100.0   200.0   500.0  1000.0  2000.0  4000.0 10000.0 20000.0 50000.0
```

5-PP-2020_V2
12/29/20

```
          32           DQ     0.0    85.0   170.0   425.0   850.0  1700.0  3400.0  8500.0 17000.0 42500.0
                       *

          33           KK   R10-1   ROUTE
          34           RS       1    FLOW
          35           RC   0.045   0.045   0.045     800  0.0275    0.00
          36           RX    0.00   30.00   60.00   65.00   90.00   95.00  110.00  130.00
          37           RY   10.20   10.10   10.00    9.00    9.00   10.00   10.10   10.20
                       *

          38           KK   OFF15   BASIN
          39           BA   0.003
          40           LG    0.15    0.37    6.54    0.14       0
          41           UC   0.238   0.379
          42           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          43           UA     100
                       *
1                                          HEC-1 INPUT                                             PAGE  2

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


          44           KK   R10-2   ROUTE
          45           RS       1    FLOW
          46           RC   0.045   0.045   0.045     930  0.0300    0.00
          47           RX    0.00   10.00   38.00   40.00   42.00   50.00   60.00   70.00
          48           RY   10.00    9.90    9.80    9.00    9.80    9.90   10.00   10.00
                       *

          49           KK   OFF20   BASIN
          50           BA   0.008
          51           LG    0.15    0.37    6.54    0.14       0
          52           UC   0.298   0.435
          53           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          54           UA     100
                       *

          55           KK   R10-3   ROUTE
          56           RS       1    FLOW
          57           RC   0.045   0.045   0.045    1000  0.0350    0.00
          58           RX    0.00   20.00   23.00   26.00   30.00   40.00   50.00   60.00
          59           RY   10.20   10.00   10.00    8.00   10.00   10.10   10.20   10.30
                       *

          60           KK    ON10   BASIN
          61           BA   0.011
          62           LG    0.15    0.37    6.54    0.14       0
          63           UC   0.267   0.245
          64           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          65           UA     100
                       *

          66           KK    CP10 COMBINE
          67           HC       4
                       *

          68           KK    ON15   BASIN
          69           BA   0.001
          70           LG    0.15    0.37    6.54    0.14       0
          71           UC   0.138   0.191
          72           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          73           UA     100
                       *

          74           KK    ON20   BASIN
          75           BA   0.001
          76           LG    0.15    0.37    6.54    0.14       0
          77           UC   0.138   0.191
          78           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          79           UA     100
                       *
1                                          HEC-1 INPUT                                             PAGE  3

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

```
           80          KK     ON25    BASIN
           81          BA    0.002
           82          LG     0.15     0.37     6.54     0.14        0
           83          UC    0.174    0.219
           84          UA        0      3.0      5.0      8.0     12.0     20.0     43.0     75.0     90.0     96.0
           85          UA      100
                       *

           86          KK    OFF35    BASIN
           87          BA    0.031
           88          LG     0.20     0.31     6.54     0.14        5
           89          UC    0.519    1.084
           90          UA        0      3.0      5.0      8.0     12.0     20.0     43.0     75.0     90.0     96.0
           91          UA      100
                       *

           92          KK      R30    ROUTE
           93          RS        1     FLOW
           94          RC    0.045    0.045    0.045      825   0.0250     0.00
           95          RX     0.00    10.00    20.00    23.00    29.00    33.00    40.00    50.00
           96          RY    10.20    10.10    10.00     7.00     7.00    10.00    10.10    10.20
                       *

           97          KK     ON30    BASIN
           98          BA    0.006
           99          LG     0.15     0.37     6.54     0.14        0
          100          UC    0.283    0.389
          101          UA        0      3.0      5.0      8.0     12.0     20.0     43.0     75.0     90.0     96.0
          102          UA      100
                       *

          103          KK     CP30  COMBINE
          104          HC        2
                       *

          105          KK    OFF40    BASIN
          106          BA    0.004
          107          LG     0.30     0.19     6.54     0.13       17
          108          UC    0.166    0.258
          109          UA        0      3.0      5.0      8.0     12.0     20.0     43.0     75.0     90.0     96.0
          110          UA      100
                       *

          111          KK      R35    ROUTE
          112          RS        1     FLOW
          113          RC    0.045    0.045    0.045      805   0.0220     0.00
          114          RX     0.00    30.00    35.00    38.00    38.50    41.00    45.00    50.00
          115          RY    10.10    10.00     9.90     8.70     9.00     9.90    10.00    10.10
                       *
1                                                        HEC-1 INPUT                                              PAGE  4

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


          116          KK     ON35    BASIN
          117          BA    0.003
          118          LG     0.15     0.37     6.54     0.14        0
          119          UC    0.288    0.558
          120          UA        0      3.0      5.0      8.0     12.0     20.0     43.0     75.0     90.0     96.0
          121          UA      100
                       *

          122          KK     CP35  COMBINE
          123          HC        2
                       *

          124          KK    OFF50    BASIN
          125          BA    0.001
          126          LG     0.30     0.19     6.54     0.13       17
          127          UC    0.126    0.253
          128          UA        0      3.0      5.0      8.0     12.0     20.0     43.0     75.0     90.0     96.0
          129          UA      100
                       *
```

```
           130           KK     R40   ROUTE
           131           RS       1    FLOW
           132           RC   0.045   0.045   0.045     780  0.0250    0.00
           133           RX    0.00   30.00   48.00   52.00   58.00   60.00   70.00   80.00
           134           RY   10.10   10.00    9.90    9.20    9.20    9.90   10.00   10.10
                         *

           135           KK    ON40   BASIN
           136           BA   0.006
           137           LG    0.15    0.39    5.85    0.19       0
           138           UC   0.289   0.378
           139           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           140           UA     100
                         *

           141           KK    CP40 COMBINE
           142           HC       2
                         *

           143           KK   OFF30   BASIN
           144           BA   0.036
           145           LG    0.19    0.32    6.54    0.14       4
           146           UC   0.453   0.778
           147           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           148           UA     100
                         *

           149           KK    RO45   ROUTE
           150           RS       1    FLOW
           151           RC   0.045   0.045   0.045    1773  0.0300    0.00
           152           RX  610.00  620.00  637.00  650.00  663.00  679.00  689.00  697.00
           153           RY  139.00  138.70  138.30  138.50  138.80  139.00  138.90  138.90
                         *
1                                                        HEC-1 INPUT                                        PAGE  5

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


           154           KK   OFF45   BASIN
           155           BA   0.081
           156           LG    0.26    0.29    5.46    0.21      12
           157           UC   0.442   0.601
           158           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           159           UA     100
                         *

           160           KK   CPO45 COMBINE
           161           HC       2
                         *

           162           KK     R45   ROUTE
           163           RS       1    FLOW
           164           RC   0.045   0.045   0.045     395  0.0250    0.00
           165           RX    0.00   15.00   20.00   25.00   30.00   35.00   40.00   45.00
           166           RY   10.10   10.00    9.00    7.50    8.00    8.50    9.00    9.20
                         *

           167           KK    ON45   BASIN
           168           BA   0.001
           169           LG    0.15    0.35    3.29    0.73       0
           170           UC   0.274   0.598
           171           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           172           UA     100
                         *

           173           KK    CP45 COMBINE
           174           HC       2
                         *
           175           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

```
    23       OFF10
                 .
                 .
    30           .------->  DTFF10
    29      DOFF10
                 V
                 V
    33       R10-1
                 .
                 .
    38           .       OFF15
                 .           V
                 .           V
    44           .       R10-2
                 .           .
                 .           .
    49           .           .       OFF20
                 .           .           V
                 .           .           V
    55           .           .       R10-3
                 .           .           .
                 .           .           .
    60           .           .           .        ON10
                 .           .           .           .
                 .           .           .           .
    66        CP10....................................
                 .
                 .
    68           .        ON15
                 .           .
                 .           .
    74           .           .        ON20
                 .           .           .
                 .           .           .
    80           .           .           .        ON25
                 .           .           .           .
                 .           .           .           .
    86           .           .           .           .       OFF35
                 .           .           .           .           V
                 .           .           .           .           V
    92           .           .           .           .         R30
                 .           .           .           .           .
                 .           .           .           .           .
    97           .           .           .           .           .        ON30
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   103           .           .           .           .        CP30............
                 .           .           .           .           .
                 .           .           .           .           .
   105           .           .           .           .           .       OFF40
                 .           .           .           .           .           V
                 .           .           .           .           .           V
   111           .           .           .           .           .         R35
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   116           .           .           .           .           .           .        ON35
                 .           .           .           .           .           .           .
                 .           .           .           .           .           .           .
   122           .           .           .           .           .        CP35............
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   124           .           .           .           .           .           .       OFF50
                 .           .           .           .           .           .           V
                 .           .           .           .           .           .           V
   130           .           .           .           .           .           .         R40
                 .           .           .           .           .           .           .
                 .           .           .           .           .           .           .
   135           .           .           .           .           .           .           .        ON40
                 .           .           .           .           .           .           .           .
                 .           .           .           .           .           .           .           .
   141           .           .           .           .           .           .        CP40............
                 .           .           .           .           .           .           .
                 .           .           .           .           .           .           .
   143           .           .           .           .           .           .           .       OFF30
```

```
                .           .           .           .           .           .           .            V
                .           .           .           .           .           .           .            V
  149           .           .           .           .           .           .           .         RO45
                .           .           .           .           .           .           .            .
                .           .           .           .           .           .           .            .
  154           .           .           .           .           .           .           .            .         OFF45
                .           .           .           .           .           .           .            .             .
                .           .           .           .           .           .           .            .             .
  160           .           .           .           .           .           .           .        CPO45............
                .           .           .           .           .           .           .            V
                .           .           .           .           .           .           .            V
  162           .           .           .           .           .           .           .          R45
                .           .           .           .           .           .           .            .
                .           .           .           .           .           .           .            .
  167           .           .           .           .           .           .           .            .          ON45
                .           .           .           .           .           .           .            .             .
                .           .           .           .           .           .           .            .             .
  173           .           .           .           .           .           .           .         CP45............

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                                 *******************************
 *                                       *                                                 *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                 *    U.S. ARMY CORPS OF ENGINEER
 *              JUN   1998               *                                                 *    HYDROLOGIC ENGINEERING CENT
 *           VERSION 4.1                 *                                                 *          609 SECOND STREET
 *                                       *                                                 *       DAVIS, CALIFORNIA 95616
 *  RUN DATE   29JUL20  TIME  10:49:42   *                                                 *           (916) 756-1104
 *                                       *                                                 *
 *****************************************                                                 *******************************



                                 City of Scottsdale
                                 SOLITUDE EX - Solitude Existing Conditions Hydrology
                                 2 YEAR
                                 6 Hour  Storm
                                 Unit Hydrograph: Clark
                                 Storm: Multiple
                                 07/29/2020

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

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

                    COMPUTATION INTERVAL      .03 HOURS
                         TOTAL TIME BASE   66.63 HOURS

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

   11 JD          INDEX STORM NO. 1
                         STRM        1.34  PRECIPITATION DEPTH
                         TRDA         .00  TRANSPOSITION DRAINAGE AREA

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

5-PP-2020_V2
12/29/20

```
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                    .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                    .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                    .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  15 JD        INDEX STORM NO. 2
                     STRM       1.33  PRECIPITATION DEPTH
                     TRDA        .50  TRANSPOSITION DRAINAGE AREA

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

  19 JD        INDEX STORM NO. 3
                     STRM       1.31  PRECIPITATION DEPTH
                     TRDA       2.80  TRANSPOSITION DRAINAGE AREA

  20 PI          PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                    .03       .03       .03       .03       .03       .03       .03       .03       .03       .03
                    .02       .02       .02       .02       .02       .02       .02       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
1
                                              RUNOFF SUMMARY
                                         FLOW IN CUBIC FEET PER SECOND
                                       TIME IN HOURS,  AREA IN SQUARE MILES

                                        PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN    MAXIMUM    TIME OF
         OPERATION       STATION        FLOW     PEAK                                          AREA      STAGE    MAX STAGE
+                                                            6-HOUR     24-HOUR     72-HOUR

         HYDROGRAPH AT
+                          OFF10        186.    4.57          42.         11.          4.        .90
```

5-PP-2020_V2
12/29/20

	DIVERSION TO							
+		DTFF10	158.	4.57	36.	9.	3.	.90
	HYDROGRAPH AT							
+		DOFF10	28.	4.57	6.	2.	1.	.90
	ROUTED TO							
+		R10-1	27.	4.63	6.	2.	1.	.90
	HYDROGRAPH AT							
+		OFF15	1.	4.17	0.	0.	0.	.00
	ROUTED TO							
+		R10-2	1.	4.27	0.	0.	0.	.00
	HYDROGRAPH AT							
+		OFF20	3.	4.20	0.	0.	0.	.01
	ROUTED TO							
+		R10-3	3.	4.27	0.	0.	0.	.01
	HYDROGRAPH AT							
+		ON10	6.	4.17	0.	0.	0.	.01
	4 COMBINED AT							
+		CP10	30.	4.60	7.	2.	1.	.92
	HYDROGRAPH AT							
+		ON15	1.	4.07	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON20	1.	4.07	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON25	1.	4.10	0.	0.	0.	.00
	HYDROGRAPH AT							
+		OFF35	6.	4.40	1.	0.	0.	.03
	ROUTED TO							
+		R30	6.	4.47	1.	0.	0.	.03
	HYDROGRAPH AT							
+		ON30	3.	4.20	0.	0.	0.	.01
	2 COMBINED AT							
+		CP30	7.	4.43	2.	0.	0.	.04
	HYDROGRAPH AT							
+		OFF40	3.	4.10	0.	0.	0.	.00
	ROUTED TO							
+		R35	3.	4.17	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON35	1.	4.20	0.	0.	0.	.00
	2 COMBINED AT							
+		CP35	4.	4.17	0.	0.	0.	.01
	HYDROGRAPH AT							
+		OFF50	1.	4.07	0.	0.	0.	.00
	ROUTED TO							
+		R40	1.	4.20	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON40	2.	4.20	0.	0.	0.	.01
	2 COMBINED AT							
+		CP40	3.	4.20	0.	0.	0.	.01
	HYDROGRAPH AT							
+		OFF30	9.	4.33	2.	0.	0.	.04

	ROUTED TO							
+		RO45	7.	4.60	2.	0.	0.	.04
	HYDROGRAPH AT							
+		OFF45	25.	4.30	4.	1.	0.	.08
	2 COMBINED AT							
+		CPO45	29.	4.33	5.	1.	1.	.12
	ROUTED TO							
+		R45	29.	4.37	5.	1.	1.	.12
	HYDROGRAPH AT							
+		ON45	0.	4.20	0.	0.	0.	.00
	2 COMBINED AT							
+		CP45	29.	4.37	6.	1.	1.	.12

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

```
1****************************************                                                    *******************************
 *                                      *                                                    *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *    U.S. ARMY CORPS OF ENGINEER
 *              JUN   1998               *                                                   *    HYDROLOGIC ENGINEERING CENT
 *           VERSION 4.1                 *                                                   *         609 SECOND STREET
 *                                       *                                                   *       DAVIS, CALIFORNIA 95616
 *  RUN DATE   29JUL20  TIME  10:49:59   *                                                   *           (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        SOLITUDE EX - Solitude Existing Conditions Hydrology
             3           ID        10 YEAR
             4           ID        6 Hour  Storm
             5           ID        Unit Hydrograph: Clark
             6           ID        Storm: Multiple
             7           ID        07/29/2020
                         *DIAGRAM
             8           IT       2  1JAN99       0    2000
             9           IO       5
            10           IN      15
                         *
            11           JD   1.995  0.0001
            12           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            13           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            14           PC   0.962   0.972   0.983   0.991   1.000
            15           JD   1.983  0.5000
            16           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            17           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            18           PC   0.962   0.972   0.983   0.991   1.000
            19           JD   1.945     2.8
            20           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
            21           PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
            22           PC   0.950   0.963   0.975   0.988   1.000
                         *

            23           KK   OFF10   BASIN
            24           BA   0.900
            25           LG    0.30    0.28    5.58    0.23      21
            26           UC   0.671   0.642
            27           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
            28           UA     100
                         *

            29           KK  DOFF10  DIVERT
            30           DT  DTFF10     0.0     0.0
            31           DI     0.0   100.0   200.0   500.0  1000.0  2000.0  4000.0 10000.0 20000.0 50000.0
```

```
          32           DQ     0.0    85.0   170.0   425.0   850.0  1700.0  3400.0  8500.0 17000.0 42500.0
                       *

          33           KK   R10-1   ROUTE
          34           RS       1    FLOW
          35           RC   0.045   0.045   0.045     800  0.0275    0.00
          36           RX    0.00   30.00   60.00   65.00   90.00   95.00  110.00  130.00
          37           RY   10.20   10.10   10.00    9.00    9.00   10.00   10.10   10.20
                       *

          38           KK   OFF15   BASIN
          39           BA   0.003
          40           LG    0.15    0.37    6.54    0.14       0
          41           UC   0.209   0.327
          42           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          43           UA     100
                       *
1                                             HEC-1 INPUT                                             PAGE  2

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


          44           KK   R10-2   ROUTE
          45           RS       1    FLOW
          46           RC   0.045   0.045   0.045     930  0.0300    0.00
          47           RX    0.00   10.00   38.00   40.00   42.00   50.00   60.00   70.00
          48           RY   10.00    9.90    9.80    9.00    9.80    9.90   10.00   10.00
                       *

          49           KK   OFF20   BASIN
          50           BA   0.008
          51           LG    0.15    0.37    6.54    0.14       0
          52           UC   0.261   0.375
          53           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          54           UA     100
                       *

          55           KK   R10-3   ROUTE
          56           RS       1    FLOW
          57           RC   0.045   0.045   0.045    1000  0.0350    0.00
          58           RX    0.00   20.00   23.00   26.00   30.00   40.00   50.00   60.00
          59           RY   10.20   10.00   10.00    8.00   10.00   10.10   10.20   10.30
                       *

          60           KK    ON10   BASIN
          61           BA   0.011
          62           LG    0.15    0.37    6.54    0.14       0
          63           UC   0.234   0.211
          64           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          65           UA     100
                       *

          66           KK    CP10 COMBINE
          67           HC       4
                       *

          68           KK    ON15   BASIN
          69           BA   0.001
          70           LG    0.15    0.37    6.54    0.14       0
          71           UC   0.120   0.165
          72           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          73           UA     100
                       *

          74           KK    ON20   BASIN
          75           BA   0.001
          76           LG    0.15    0.37    6.54    0.14       0
          77           UC   0.120   0.165
          78           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          79           UA     100
                       *
1                                             HEC-1 INPUT                                             PAGE  3

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

```
           80           KK    ON25   BASIN
           81           BA   0.002
           82           LG    0.15    0.37    6.54    0.14       0
           83           UC   0.152   0.189
           84           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           85           UA     100
                        *

           86           KK   OFF35   BASIN
           87           BA   0.031
           88           LG    0.20    0.31    6.54    0.14       5
           89           UC   0.456   0.937
           90           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           91           UA     100
                        *

           92           KK     R30   ROUTE
           93           RS       1    FLOW
           94           RC   0.045   0.045   0.045     825  0.0250    0.00
           95           RX    0.00   10.00   20.00   23.00   29.00   33.00   40.00   50.00
           96           RY   10.20   10.10   10.00    7.00    7.00   10.00   10.10   10.20
                        *

           97           KK    ON30   BASIN
           98           BA   0.006
           99           LG    0.15    0.37    6.54    0.14       0
          100           UC   0.248   0.335
          101           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          102           UA     100
                        *

          103           KK    CP30 COMBINE
          104           HC       2
                        *

          105           KK   OFF40   BASIN
          106           BA   0.004
          107           LG    0.30    0.19    6.54    0.13      17
          108           UC   0.147   0.226
          109           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          110           UA     100
                        *

          111           KK     R35   ROUTE
          112           RS       1    FLOW
          113           RC   0.045   0.045   0.045     805  0.0220    0.00
          114           RX    0.00   30.00   35.00   38.00   38.50   41.00   45.00   50.00
          115           RY   10.10   10.00    9.90    8.70    9.00    9.90   10.00   10.10
                        *
1                                                  HEC-1 INPUT                                          PAGE  4

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


          116           KK    ON35   BASIN
          117           BA   0.003
          118           LG    0.15    0.37    6.54    0.14       0
          119           UC   0.252   0.481
          120           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          121           UA     100
                        *

          122           KK    CP35 COMBINE
          123           HC       2
                        *

          124           KK   OFF50   BASIN
          125           BA   0.001
          126           LG    0.30    0.19    6.54    0.13      17
          127           UC   0.112   0.222
          128           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          129           UA     100
                        *
```

```
           130           KK     R40   ROUTE
           131           RS       1    FLOW
           132           RC   0.045   0.045   0.045     780  0.0250    0.00
           133           RX    0.00   30.00   48.00   52.00   58.00   60.00   70.00   80.00
           134           RY   10.10   10.00    9.90    9.20    9.20    9.90   10.00   10.10
                         *

           135           KK    ON40   BASIN
           136           BA   0.006
           137           LG    0.15    0.39    5.85    0.19       0
           138           UC   0.253   0.326
           139           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           140           UA     100
                         *

           141           KK    CP40 COMBINE
           142           HC       2
                         *

           143           KK   OFF30   BASIN
           144           BA   0.036
           145           LG    0.19    0.32    6.54    0.14       4
           146           UC   0.398   0.672
           147           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           148           UA     100
                         *

           149           KK    RO45   ROUTE
           150           RS       1    FLOW
           151           RC   0.045   0.045   0.045    1773  0.0300    0.00
           152           RX  610.00  620.00  637.00  650.00  663.00  679.00  689.00  697.00
           153           RY  139.00  138.70  138.30  138.50  138.80  139.00  138.90  138.90
                         *
1                                                        HEC-1 INPUT                                           PAGE  5

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


           154           KK   OFF45   BASIN
           155           BA   0.081
           156           LG    0.26    0.29    5.46    0.21      12
           157           UC   0.392   0.526
           158           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           159           UA     100
                         *

           160           KK   CPO45 COMBINE
           161           HC       2
                         *

           162           KK     R45   ROUTE
           163           RS       1    FLOW
           164           RC   0.045   0.045   0.045     395  0.0250    0.00
           165           RX    0.00   15.00   20.00   25.00   30.00   35.00   40.00   45.00
           166           RY   10.10   10.00    9.00    7.50    8.00    8.50    9.00    9.20
                         *

           167           KK    ON45   BASIN
           168           BA   0.001
           169           LG    0.15    0.35    3.29    0.73       0
           170           UC   0.222   0.474
           171           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           172           UA     100
                         *

           173           KK    CP45 COMBINE
           174           HC       2
                         *
           175           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

```
    23       OFF10
                 .
                 .
    30           .------->  DTFF10
    29      DOFF10
                 V
                 V
    33       R10-1
                 .
                 .
    38           .       OFF15
                 .           V
                 .           V
    44           .       R10-2
                 .           .
                 .           .
    49           .           .       OFF20
                 .           .           V
                 .           .           V
    55           .           .       R10-3
                 .           .           .
                 .           .           .
    60           .           .           .        ON10
                 .           .           .           .
                 .           .           .           .
    66            CP10....................................
                 .
                 .
    68           .        ON15
                 .           .
                 .           .
    74           .           .        ON20
                 .           .           .
                 .           .           .
    80           .           .           .        ON25
                 .           .           .           .
                 .           .           .           .
    86           .           .           .           .       OFF35
                 .           .           .           .           V
                 .           .           .           .           V
    92           .           .           .           .         R30
                 .           .           .           .           .
                 .           .           .           .           .
    97           .           .           .           .           .        ON30
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   103           .           .           .           .        CP30............
                 .           .           .           .           .
                 .           .           .           .           .
   105           .           .           .           .           .       OFF40
                 .           .           .           .           .           V
                 .           .           .           .           .           V
   111           .           .           .           .           .         R35
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   116           .           .           .           .           .           .        ON35
                 .           .           .           .           .           .           .
                 .           .           .           .           .           .           .
   122           .           .           .           .           .        CP35............
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   124           .           .           .           .           .           .       OFF50
                 .           .           .           .           .           .           V
                 .           .           .           .           .           .           V
   130           .           .           .           .           .           .         R40
                 .           .           .           .           .           .           .
                 .           .           .           .           .           .           .
   135           .           .           .           .           .           .           .        ON40
                 .           .           .           .           .           .           .           .
                 .           .           .           .           .           .           .           .
   141           .           .           .           .           .           .        CP40............
                 .           .           .           .           .           .           .
                 .           .           .           .           .           .           .
   143           .           .           .           .           .           .           .       OFF30
```

```
                .           .           .           .           .           .           .           V
                .           .           .           .           .           .           .           V
  149           .           .           .           .           .           .           .        RO45
                .           .           .           .           .           .           .           .
                .           .           .           .           .           .           .           .
  154           .           .           .           .           .           .           .           .          OFF45
                .           .           .           .           .           .           .           .            .
                .           .           .           .           .           .           .           .            .
  160           .           .           .           .           .           .           .       CPO45............
                .           .           .           .           .           .           .           V
                .           .           .           .           .           .           .           V
  162           .           .           .           .           .           .           .         R45
                .           .           .           .           .           .           .           .
                .           .           .           .           .           .           .           .
  167           .           .           .           .           .           .           .           .           ON45
                .           .           .           .           .           .           .           .            .
                .           .           .           .           .           .           .           .            .
  173           .           .           .           .           .           .           .        CP45............

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                             ********************************
 *                                       *                                             *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                             *    U.S. ARMY CORPS OF ENGINEER
 *             JUN   1998                *                                             *    HYDROLOGIC ENGINEERING CENT
 *          VERSION 4.1                  *                                             *          609 SECOND STREET
 *                                       *                                             *       DAVIS, CALIFORNIA 95616
 *  RUN DATE   29JUL20  TIME  10:49:59   *                                             *           (916) 756-1104
 *                                       *                                             *
 *****************************************                                             ********************************




                                 City of Scottsdale
                                 SOLITUDE EX - Solitude Existing Conditions Hydrology
                                 10 YEAR
                                 6 Hour  Storm
                                 Unit Hydrograph: Clark
                                 Storm: Multiple
                                 07/29/2020

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

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

                    COMPUTATION INTERVAL      .03 HOURS
                         TOTAL TIME BASE   66.63 HOURS

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

   11 JD          INDEX STORM NO. 1
                         STRM       2.00  PRECIPITATION DEPTH
                         TRDA        .00  TRANSPOSITION DRAINAGE AREA

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

5-PP-2020_V2
12/29/20

```
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .01      .01      .01
                         .01      .01      .01      .01      .01      .02      .02      .02      .02      .02
                         .02      .02      .04      .06      .06      .06      .06      .06      .06      .06
                         .01      .01      .01      .01      .01      .01      .01      .01      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00

  15 JD         INDEX STORM NO. 2
                      STRM        1.98  PRECIPITATION DEPTH
                      TRDA         .50  TRANSPOSITION DRAINAGE AREA

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

  19 JD         INDEX STORM NO. 3
                      STRM        1.95  PRECIPITATION DEPTH
                      TRDA        2.80  TRANSPOSITION DRAINAGE AREA

  20 PI           PRECIPITATION PATTERN
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                         .01      .01      .01      .01      .01      .03      .03      .03      .03      .03
                         .03      .03      .03      .03      .03      .03      .03      .03      .03      .03
                         .02      .02      .02      .02      .02      .02      .02      .01      .01      .01
                         .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                         .01      .01      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                         .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
1
```

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

                                     PEAK    TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
         OPERATION      STATION      FLOW     PEAK                                             AREA      STAGE     MAX STAGE
+                                                      6-HOUR      24-HOUR      72-HOUR

         HYDROGRAPH AT
+                         OFF10      439.    4.47        85.         22.          8.          .90
```

5-PP-2020_V2
12/29/20

	DIVERSION TO							
+		DTFF10	374.	4.47	72.	18.	7.	.90
	HYDROGRAPH AT							
+		DOFF10	66.	4.47	13.	3.	1.	.90
	ROUTED TO							
+		R10-1	65.	4.53	13.	3.	1.	.90
	HYDROGRAPH AT							
+		OFF15	3.	4.13	0.	0.	0.	.00
	ROUTED TO							
+		R10-2	3.	4.20	0.	0.	0.	.00
	HYDROGRAPH AT							
+		OFF20	7.	4.17	1.	0.	0.	.01
	ROUTED TO							
+		R10-3	7.	4.23	1.	0.	0.	.01
	HYDROGRAPH AT							
+		ON10	14.	4.13	1.	0.	0.	.01
	4 COMBINED AT							
+		CP10	72.	4.50	14.	4.	1.	.92
	HYDROGRAPH AT							
+		ON15	1.	4.07	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON20	1.	4.07	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON25	3.	4.07	0.	0.	0.	.00
	HYDROGRAPH AT							
+		OFF35	14.	4.33	3.	1.	0.	.03
	ROUTED TO							
+		R30	14.	4.40	3.	1.	0.	.03
	HYDROGRAPH AT							
+		ON30	6.	4.17	1.	0.	0.	.01
	2 COMBINED AT							
+		CP30	17.	4.37	3.	1.	0.	.04
	HYDROGRAPH AT							
+		OFF40	6.	4.07	0.	0.	0.	.00
	ROUTED TO							
+		R35	5.	4.13	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON35	2.	4.17	0.	0.	0.	.00
	2 COMBINED AT							
+		CP35	7.	4.13	1.	0.	0.	.01
	HYDROGRAPH AT							
+		OFF50	1.	4.07	0.	0.	0.	.00
	ROUTED TO							
+		R40	1.	4.13	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON40	5.	4.17	0.	0.	0.	.01
	2 COMBINED AT							
+		CP40	6.	4.17	1.	0.	0.	.01
	HYDROGRAPH AT							
+		OFF30	21.	4.27	3.	1.	0.	.04

	ROUTED TO							
+		RO45	17.	4.50	3.	1.	0.	.04
	HYDROGRAPH AT							
+		OFF45	55.	4.27	8.	2.	1.	.08
	2 COMBINED AT							
+		CPO45	67.	4.30	11.	3.	1.	.12
	ROUTED TO							
+		R45	66.	4.30	11.	3.	1.	.12
	HYDROGRAPH AT							
+		ON45	0.	4.17	0.	0.	0.	.00
	2 COMBINED AT							
+		CP45	67.	4.30	11.	3.	1.	.12

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

```
1****************************************                                                    *******************************
 *                                      *                                                    *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *    U.S. ARMY CORPS OF ENGINEER
 *             JUN   1998               *                                                    *    HYDROLOGIC ENGINEERING CENT
 *          VERSION 4.1                 *                                                    *          609 SECOND STREET
 *                                      *                                                    *       DAVIS, CALIFORNIA 95616
 *  RUN DATE   29JUL20  TIME  10:50:17  *                                                    *           (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        SOLITUDE EX - Solitude Existing Conditions Hydrology
             3          ID        100 YEAR
             4          ID        6 Hour  Storm
             5          ID        Unit Hydrograph: Clark
             6          ID        Storm: Multiple
             7          ID        07/29/2020
                        *DIAGRAM
             8          IT       2  1JAN99       0    2000
             9          IO       5
            10          IN      15
                        *
            11          JD   3.024  0.0001
            12          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            13          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            14          PC   0.962   0.972   0.983   0.991   1.000
            15          JD   3.006  0.5000
            16          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            17          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            18          PC   0.962   0.972   0.983   0.991   1.000
            19          JD   2.948     2.8
            20          PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
            21          PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
            22          PC   0.950   0.963   0.975   0.988   1.000
                        *

            23          KK   OFF10   BASIN
            24          BA   0.900
            25          LG    0.30    0.28    5.58    0.23      21
            26          UC   0.515   0.478
            27          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
            28          UA     100
                        *

            29          KK  DOFF10  DIVERT
            30          DT  DTFF10     0.0     0.0
            31          DI     0.0   100.0   200.0   500.0  1000.0  2000.0  4000.0 10000.0 20000.0 50000.0
```

5-PP-2020_V2
12/29/20

```
    32            DQ     0.0    85.0   170.0   425.0   850.0  1700.0  3400.0  8500.0 17000.0 42500.0
                  *

    33            KK   R10-1   ROUTE
    34            RS       1    FLOW
    35            RC   0.045   0.045   0.045     800  0.0275    0.00
    36            RX    0.00   30.00   60.00   65.00   90.00   95.00  110.00  130.00
    37            RY   10.20   10.10   10.00    9.00    9.00   10.00   10.10   10.20
                  *

    38            KK   OFF15   BASIN
    39            BA   0.003
    40            LG    0.15    0.37    6.54    0.14       0
    41            UC   0.161   0.244
    42            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
    43            UA     100
                  *
1                                             HEC-1 INPUT                                          PAGE  2

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


    44            KK   R10-2   ROUTE
    45            RS       1    FLOW
    46            RC   0.045   0.045   0.045     930  0.0300    0.00
    47            RX    0.00   10.00   38.00   40.00   42.00   50.00   60.00   70.00
    48            RY   10.00    9.90    9.80    9.00    9.80    9.90   10.00   10.00
                  *

    49            KK   OFF20   BASIN
    50            BA   0.008
    51            LG    0.15    0.37    6.54    0.14       0
    52            UC   0.201   0.281
    53            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
    54            UA     100
                  *

    55            KK   R10-3   ROUTE
    56            RS       1    FLOW
    57            RC   0.045   0.045   0.045    1000  0.0350    0.00
    58            RX    0.00   20.00   23.00   26.00   30.00   40.00   50.00   60.00
    59            RY   10.20   10.00   10.00    8.00   10.00   10.10   10.20   10.30
                  *

    60            KK    ON10   BASIN
    61            BA   0.011
    62            LG    0.15    0.37    6.54    0.14       0
    63            UC   0.180   0.158
    64            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
    65            UA     100
                  *

    66            KK    CP10 COMBINE
    67            HC       4
                  *

    68            KK    ON15   BASIN
    69            BA   0.001
    70            LG    0.15    0.37    6.54    0.14       0
    71            UC   0.093   0.123
    72            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
    73            UA     100
                  *

    74            KK    ON20   BASIN
    75            BA   0.001
    76            LG    0.15    0.37    6.54    0.14       0
    77            UC   0.093   0.123
    78            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
    79            UA     100
                  *
1                                             HEC-1 INPUT                                          PAGE  3

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

```
 80           KK    ON25   BASIN
 81           BA   0.002
 82           LG    0.15    0.37    6.54    0.14       0
 83           UC   0.117   0.141
 84           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 85           UA     100
              *

 86           KK   OFF35   BASIN
 87           BA   0.031
 88           LG    0.20    0.31    6.54    0.14       5
 89           UC   0.355   0.711
 90           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 91           UA     100
              *

 92           KK     R30   ROUTE
 93           RS       1    FLOW
 94           RC   0.045   0.045   0.045     825  0.0250    0.00
 95           RX    0.00   10.00   20.00   23.00   29.00   33.00   40.00   50.00
 96           RY   10.20   10.10   10.00    7.00    7.00   10.00   10.10   10.20
              *

 97           KK    ON30   BASIN
 98           BA   0.006
 99           LG    0.15    0.37    6.54    0.14       0
100           UC   0.191   0.251
101           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
102           UA     100
              *

103           KK    CP30 COMBINE
104           HC       2
              *

105           KK   OFF40   BASIN
106           BA   0.004
107           LG    0.30    0.19    6.54    0.13      17
108           UC   0.118   0.176
109           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
110           UA     100
              *

111           KK     R35   ROUTE
112           RS       1    FLOW
113           RC   0.045   0.045   0.045     805  0.0220    0.00
114           RX    0.00   30.00   35.00   38.00   38.50   41.00   45.00   50.00
115           RY   10.10   10.00    9.90    8.70    9.00    9.90   10.00   10.10
              *
```



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

116           KK    ON35   BASIN
117           BA   0.003
118           LG    0.15    0.37    6.54    0.14       0
119           UC   0.194   0.360
120           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
121           UA     100
              *

122           KK    CP35 COMBINE
123           HC       2
              *

124           KK   OFF50   BASIN
125           BA   0.001
126           LG    0.30    0.19    6.54    0.13      17
127           UC   0.090   0.173
128           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
129           UA     100
              *
```

```
          130           KK     R40   ROUTE
          131           RS       1    FLOW
          132           RC   0.045   0.045   0.045     780  0.0250    0.00
          133           RX    0.00   30.00   48.00   52.00   58.00   60.00   70.00   80.00
          134           RY   10.10   10.00    9.90    9.20    9.20    9.90   10.00   10.10
                        *

          135           KK    ON40   BASIN
          136           BA   0.006
          137           LG    0.15    0.39    5.85    0.19       0
          138           UC   0.192   0.240
          139           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          140           UA     100
                        *

          141           KK    CP40 COMBINE
          142           HC       2
                        *

          143           KK   OFF30   BASIN
          144           BA   0.036
          145           LG    0.19    0.32    6.54    0.14       4
          146           UC   0.309   0.509
          147           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          148           UA     100
                        *

          149           KK    RO45   ROUTE
          150           RS       1    FLOW
          151           RC   0.045   0.045   0.045    1773  0.0300    0.00
          152           RX  610.00  620.00  637.00  650.00  663.00  679.00  689.00  697.00
          153           RY  139.00  138.70  138.30  138.50  138.80  139.00  138.90  138.90
                        *
1                                                        HEC-1 INPUT                                         PAGE  5

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


          154           KK   OFF45   BASIN
          155           BA   0.081
          156           LG    0.26    0.29    5.46    0.21      12
          157           UC   0.303   0.396
          158           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          159           UA     100
                        *

          160           KK   CPO45 COMBINE
          161           HC       2
                        *

          162           KK     R45   ROUTE
          163           RS       1    FLOW
          164           RC   0.045   0.045   0.045     395  0.0250    0.00
          165           RX    0.00   15.00   20.00   25.00   30.00   35.00   40.00   45.00
          166           RY   10.10   10.00    9.00    7.50    8.00    8.50    9.00    9.20
                        *

          167           KK    ON45   BASIN
          168           BA   0.001
          169           LG    0.15    0.35    3.29    0.73       0
          170           UC   0.164   0.339
          171           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          172           UA     100
                        *

          173           KK    CP45 COMBINE
          174           HC       2
                        *
          175           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

5-PP-2020_V2
12/29/20

```
   23       OFF10
                .
                .
   30           .------->  DTFF10
   29      DOFF10
                V
                V
   33       R10-1
                .
                .
   38           .       OFF15
                .           V
                .           V
   44           .       R10-2
                .           .
                .           .
   49           .           .       OFF20
                .           .           V
                .           .           V
   55           .           .       R10-3
                .           .           .
                .           .           .
   60           .           .           .        ON10
                .           .           .           .
                .           .           .           .
   66        CP10....................................
                .
                .
   68           .        ON15
                .           .
                .           .
   74           .           .        ON20
                .           .           .
                .           .           .
   80           .           .           .        ON25
                .           .           .           .
                .           .           .           .
   86           .           .           .           .       OFF35
                .           .           .           .           V
                .           .           .           .           V
   92           .           .           .           .         R30
                .           .           .           .           .
                .           .           .           .           .
   97           .           .           .           .           .        ON30
                .           .           .           .           .           .
                .           .           .           .           .           .
  103           .           .           .           .        CP30............
                .           .           .           .           .
                .           .           .           .           .
  105           .           .           .           .           .       OFF40
                .           .           .           .           .           V
                .           .           .           .           .           V
  111           .           .           .           .           .         R35
                .           .           .           .           .           .
                .           .           .           .           .           .
  116           .           .           .           .           .           .        ON35
                .           .           .           .           .           .           .
                .           .           .           .           .           .           .
  122           .           .           .           .           .        CP35............
                .           .           .           .           .           .
                .           .           .           .           .           .
  124           .           .           .           .           .           .       OFF50
                .           .           .           .           .           .           V
                .           .           .           .           .           .           V
  130           .           .           .           .           .           .         R40
                .           .           .           .           .           .           .
                .           .           .           .           .           .           .
  135           .           .           .           .           .           .           .        ON40
                .           .           .           .           .           .           .           .
                .           .           .           .           .           .           .           .
  141           .           .           .           .           .           .        CP40............
                .           .           .           .           .           .           .
                .           .           .           .           .           .           .
  143           .           .           .           .           .           .           .       OFF30
```

```
                .           .           .           .           .           .           .          V
                .           .           .           .           .           .           .          V
 149            .           .           .           .           .           .           .       RO45
                .           .           .           .           .           .           .          .
                .           .           .           .           .           .           .          .
 154            .           .           .           .           .           .           .          .         OFF45
                .           .           .           .           .           .           .          .            .
                .           .           .           .           .           .           .          .            .
 160            .           .           .           .           .           .           .      CPO45............
                .           .           .           .           .           .           .          V
                .           .           .           .           .           .           .          V
 162            .           .           .           .           .           .           .        R45
                .           .           .           .           .           .           .          .
                .           .           .           .           .           .           .          .
 167            .           .           .           .           .           .           .          .          ON45
                .           .           .           .           .           .           .          .            .
                .           .           .           .           .           .           .          .            .
 173            .           .           .           .           .           .           .       CP45............

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                              ********************************
 *                                       *                                              *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                              *    U.S. ARMY CORPS OF ENGINEER
 *             JUN   1998                *                                              *    HYDROLOGIC ENGINEERING CENT
 *          VERSION 4.1                  *                                              *       609 SECOND STREET
 *                                       *                                              *      DAVIS, CALIFORNIA 95616
 *  RUN DATE   29JUL20  TIME  10:50:17   *                                              *          (916) 756-1104
 *                                       *                                              *
 *****************************************                                              ********************************



                                 City of Scottsdale
                                 SOLITUDE EX - Solitude Existing Conditions Hydrology
                                 100 YEAR
                                 6 Hour  Storm
                                 Unit Hydrograph: Clark
                                 Storm: Multiple
                                 07/29/2020

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

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

                    COMPUTATION INTERVAL      .03 HOURS
                         TOTAL TIME BASE   66.63 HOURS

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

   11 JD          INDEX STORM NO. 1
                         STRM        3.02  PRECIPITATION DEPTH
                         TRDA         .00  TRANSPOSITION DRAINAGE AREA

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

5-PP-2020_V2
12/29/20

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
.02	.02	.04	.06	.06	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

15 JD INDEX STORM NO. 2
STRM 3.01 PRECIPITATION DEPTH
TRDA .50 TRANSPOSITION DRAINAGE AREA

16 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.01	.01
.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
.02	.02	.04	.06	.06	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

19 JD INDEX STORM NO. 3
STRM 2.95 PRECIPITATION DEPTH
TRDA 2.80 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.03	.03	.03	.03	.03
.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+					6-HOUR	24-HOUR	72-HOUR			
	HYDROGRAPH AT									
+		OFF10	1028.	4.33	166.	42.	15.	.90		

5-PP-2020_V2
12/29/20

	DIVERSION TO							
+		DTFF10	874.	4.33	141.	35.	13.	.90
	HYDROGRAPH AT							
+		DOFF10	154.	4.33	25.	6.	2.	.90
	ROUTED TO							
+		R10-1	152.	4.40	25.	6.	2.	.90
	HYDROGRAPH AT							
+		OFF15	6.	4.10	1.	0.	0.	.00
	ROUTED TO							
+		R10-2	4.	4.40	1.	0.	0.	.00
	HYDROGRAPH AT							
+		OFF20	15.	4.13	1.	0.	0.	.01
	ROUTED TO							
+		R10-3	15.	4.17	1.	0.	0.	.01
	HYDROGRAPH AT							
+		ON10	27.	4.10	2.	0.	0.	.01
	4 COMBINED AT							
+		CP10	172.	4.37	28.	7.	3.	.92
	HYDROGRAPH AT							
+		ON15	3.	4.03	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON20	3.	4.03	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON25	5.	4.03	0.	0.	0.	.00
	HYDROGRAPH AT							
+		OFF35	33.	4.27	6.	1.	1.	.03
	ROUTED TO							
+		R30	32.	4.30	6.	1.	1.	.03
	HYDROGRAPH AT							
+		ON30	12.	4.10	1.	0.	0.	.01
	2 COMBINED AT							
+		CP30	40.	4.27	7.	2.	1.	.04
	HYDROGRAPH AT							
+		OFF40	10.	4.07	1.	0.	0.	.00
	ROUTED TO							
+		R35	10.	4.10	1.	0.	0.	.00
	HYDROGRAPH AT							
+		ON35	5.	4.13	1.	0.	0.	.00
	2 COMBINED AT							
+		CP35	15.	4.10	1.	0.	0.	.01
	HYDROGRAPH AT							
+		OFF50	3.	4.03	0.	0.	0.	.00
	ROUTED TO							
+		R40	2.	4.10	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON40	12.	4.10	1.	0.	0.	.01
	2 COMBINED AT							
+		CP40	14.	4.10	1.	0.	0.	.01
	HYDROGRAPH AT							
+		OFF30	48.	4.20	7.	2.	1.	.04

```
         ROUTED TO
+                          RO45       39.    4.37          7.          2.          1.        .04

         HYDROGRAPH AT
+                         OFF45      124.    4.20         15.          4.          1.        .08

         2 COMBINED AT
+                         CPO45      154.    4.20         21.          5.          2.        .12

         ROUTED TO
+                           R45      154.    4.23         21.          5.          2.        .12

         HYDROGRAPH AT
+                          ON45        1.    4.10          0.          0.          0.        .00

         2 COMBINED AT
+                          CP45      155.    4.23         22.          5.          2.        .12


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

Proposed Condition

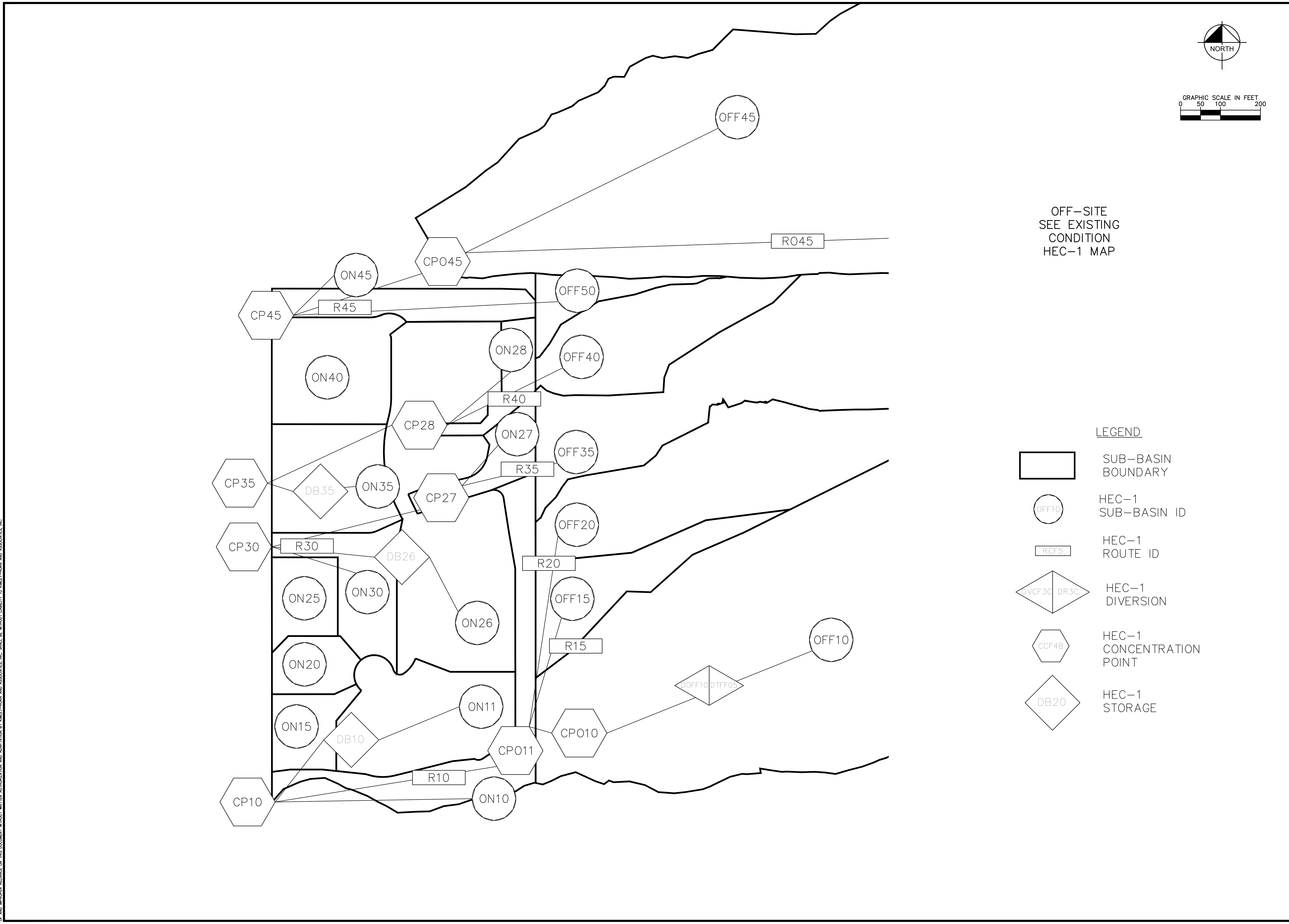
Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
Major Basin ID: 01																		
OFF10	0.900	3.21	245.5	237.0	Natural	0.034	0.30	0.28	5.58	0.231	21	**Tc (Hrs)**	0.766*	0.749*	0.671*	0.594*	0.550*	0.515 *
												Vel (f/s)	6.15	6.29	7.02	7.93	8.56	9.14
												R (Hrs)	0.743	0.724	0.642	0.560	0.514	0.478
OFF15	0.003	0.12	176.5	176.5	Natural	0.076	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.238	0.233	0.209	0.185	0.171	0.161
												Vel (f/s)	0.74	0.76	0.84	0.95	1.03	1.09
												R (Hrs)	0.379	0.369	0.327	0.285	0.262	0.244
OFF20	0.008	0.21	184.0	184.0	Natural	0.070	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.298	0.291	0.261	0.231	0.214	0.201
												Vel (f/s)	1.03	1.06	1.18	1.33	1.44	1.53
												R (Hrs)	0.435	0.423	0.375	0.327	0.301	0.281
OFF30	0.036	0.71	204.2	204.0	Natural	0.054	0.19	0.32	6.54	0.138	4	**Tc (Hrs)**	0.453*	0.443*	0.398	0.354	0.329	0.309
												Vel (f/s)	2.30	2.35	2.62	2.94	3.17	3.37
												R (Hrs)	0.778	0.758	0.672	0.590	0.545	0.509
OFF35	0.031	0.80	147.5	147.5	Natural	0.052	0.20	0.31	6.54	0.138	5	**Tc (Hrs)**	0.519*	0.508*	0.456*	0.406	0.378	0.355
												Vel (f/s)	2.26	2.31	2.57	2.89	3.10	3.31
												R (Hrs)	1.084	1.056	0.937	0.824	0.761	0.711
OFF40	0.004	0.15	179.3	179.3	Natural	0.037	0.30	0.19	6.54	0.133	17	**Tc (Hrs)**	0.166	0.163	0.147	0.133	0.125	0.118
												Vel (f/s)	1.33	1.35	1.50	1.65	1.76	1.86
												R (Hrs)	0.258	0.251	0.226	0.201	0.187	0.176
OFF45	0.081	0.95	194.1	194.1	Natural	0.037	0.26	0.29	5.46	0.212	12	**Tc (Hrs)**	0.442*	0.432*	0.392	0.349	0.324	0.303
												Vel (f/s)	3.15	3.23	3.55	3.99	4.30	4.60
												R (Hrs)	0.601	0.586	0.526	0.463	0.425	0.396
OFF50	0.001	0.08	187.5	187.5	Natural	0.041	0.30	0.19	6.54	0.133	17	**Tc (Hrs)**	0.126	0.124	0.112	0.101	0.095*	0.090 *
												Vel (f/s)	0.93	0.95	1.05	1.16	1.24	1.30
												R (Hrs)	0.253	0.247	0.222	0.198	0.184	0.173
ON10	0.003	0.15	145.7	145.7	Natural	0.076	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.283	0.276	0.248	0.219	0.203	0.191
												Vel (f/s)	0.78	0.80	0.89	1.00	1.08	1.15
												R (Hrs)	0.548	0.533	0.472	0.412	0.379	0.353

5-PP-2020_V2
12/29/20

	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
ON11	0.004	0.11	87.7	87.7	NATURAL	0.037	0.30	0.19	6.54	0.133	17	**Tc (Hrs)**	0.178	0.174	0.158	0.142	0.133	0.126
												Vel (f/s)	0.91	0.93	1.02	1.14	1.21	1.28
												R (Hrs)	0.217	0.211	0.189	0.169	0.157	0.148
ON15	0.001	0.07	76.9	76.9	Natural	0.041	0.30	0.19	6.54	0.133	17	**Tc (Hrs)**	0.156	0.152	0.138	0.125	0.117	0.110
												Vel (f/s)	0.66	0.68	0.74	0.82	0.88	0.93
												R (Hrs)	0.287	0.280	0.251	0.224	0.209	0.196
ON20	0.001	0.08	66.7	66.7	Natural	0.041	0.30	0.19	6.54	0.133	17	**Tc (Hrs)**	0.174	0.170	0.154	0.139	0.131	0.123
												Vel (f/s)	0.67	0.69	0.76	0.84	0.90	0.95
												R (Hrs)	0.362	0.352	0.316	0.282	0.263	0.247
ON25	0.001	0.07	121.2	121.2	NATURAL	0.041	0.30	0.19	6.54	0.133	17	**Tc (Hrs)**	0.135	0.132	0.120	0.108	0.102	0.096 *
												Vel (f/s)	0.76	0.78	0.86	0.95	1.01	1.07
												R (Hrs)	0.246	0.239	0.215	0.192	0.178	0.168
ON26	0.008	0.18	44.4	44.4	NATURAL	0.036	0.30	0.19	6.54	0.133	17	**Tc (Hrs)**	0.277	0.271	0.246	0.222	0.208	0.196
												Vel (f/s)	0.95	0.97	1.07	1.19	1.27	1.35
												R (Hrs)	0.354	0.345	0.309	0.276	0.257	0.241
ON27	0.001	0.08	177.2	177.2	NATURAL	0.083	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.204	0.199	0.178	0.158	0.146	0.137
												Vel (f/s)	0.58	0.59	0.66	0.74	0.80	0.86
												R (Hrs)	0.430	0.419	0.371	0.323	0.298	0.277
ON28	0.001	0.10	168.4	168.4	NATURAL	0.083	0.15	0.37	6.54	0.140		**Tc (Hrs)**	0.231	0.226	0.202	0.179	0.166	0.156
												Vel (f/s)	0.63	0.65	0.73	0.82	0.88	0.94
												R (Hrs)	0.592	0.576	0.511	0.445	0.410	0.382
ON30	0.002	0.10	40.4	40.4	Natural	0.039	0.30	0.19	6.54	0.133	17	**Tc (Hrs)**	0.222	0.217	0.196	0.177	0.166	0.157
												Vel (f/s)	0.66	0.68	0.75	0.83	0.88	0.93
												R (Hrs)	0.380	0.371	0.333	0.297	0.276	0.260
ON35	0.003	0.08	105.3	105.3	Natural	0.038	0.30	0.19	6.54	0.133	17	**Tc (Hrs)**	0.145	0.142	0.129	0.116	0.109	0.103
												Vel (f/s)	0.81	0.83	0.91	1.01	1.08	1.14
												R (Hrs)	0.158	0.154	0.138	0.123	0.115	0.108

5-PP-2020_V2
12/29/20

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
ON40	0.003	0.10	84.2	84.2	NATURAL	0.038	0.30	0.25	4.72	0.303	17	**Tc (Hrs)**	0.189	0.184	0.168	0.151	0.140	0.131
												Vel (f/s)	0.78	0.80	0.87	0.97	1.05	1.12
												R (Hrs)	0.252	0.246	0.221	0.197	0.181	0.168
ON45	0.001	0.12	146.3	146.3	NATURAL	0.083	0.15	0.35	4.72	0.319		**Tc (Hrs)**	0.290	0.282	0.252	0.223	0.205	0.190
												Vel (f/s)	0.61	0.62	0.70	0.79	0.86	0.93
												R (Hrs)	0.879	0.853	0.753	0.659	0.600	0.552



NO. | REVISION | DATE | BY | APPR.

Kimley»Horn

© 2019 KIMLEY–HORN AND ASSOCIATES, INC.
7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944–5500

SCALE (H): 1"=100'
SCALE (V): NONE
DESIGNED BY: ZJH
DRAWN BY: ZJH
CHECKED BY: JMB
DATE: SEP 2019

SOLITUDE
PROPOSED CONDITION
HEC–1 MAP
SCOTTSDALE, ARIZONA

PROJECT NO.
291203001

DRAWING NAME

1 OF 1

5-PP-2020_V2
12/29/20

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
Major Basin ID: 01									
OFF10	DESERT	0.0740	8.2	0.15	0	25.0	DRY	0.042	Desert
	GOLF	0.1020	11.3	0.44	0	60.0	NORMAL	0.023	Golf Course
	R1-18	0.5110	56.8	0.30	27	50.0	NORMAL	0.023	Residential 18,000 sq-ft lots
	R1-43	0.0650	7.2	0.30	17	20.0	NORMAL	0.023	Residential 43,000 sq-ft lots
	UND	0.1480	16.4	0.25	0	0.0	DRY	0.081	Undisturbed natural desert or desert landscaping (no impervi
		0.9000	**99.9**						
OFF15	DESERT	0.0020	100.0	0.15	0	25.0	DRY	0.076	Desert
		0.0020	**100.0**						
OFF20	DESERT	0.0080	100.0	0.15	0	25.0	DRY	0.070	Desert
		0.0080	**100.0**						
OFF30	DESERT	0.0260	74.3	0.15	0	25.0	DRY	0.061	Desert
	R1-43	0.0090	25.7	0.30	17	20.0	NORMAL	0.031	Residential 43,000 sq-ft lots
		0.0350	**100.0**						
OFF35	DESERT	0.0210	67.7	0.15	0	25.0	DRY	0.062	Desert
	R1-43	0.0100	32.3	0.30	17	20.0	NORMAL	0.032	Residential 43,000 sq-ft lots
		0.0310	**100.0**						
OFF40	R1-43	0.0040	100.0	0.30	17	20.0	NORMAL	0.037	Residential 43,000 sq-ft lots
		0.0040	**100.0**						
OFF45	DESERT	0.0220	27.2	0.15	0	25.0	DRY	0.056	Desert
	R1-43	0.0590	72.8	0.30	17	20.0	NORMAL	0.029	Residential 43,000 sq-ft lots

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description

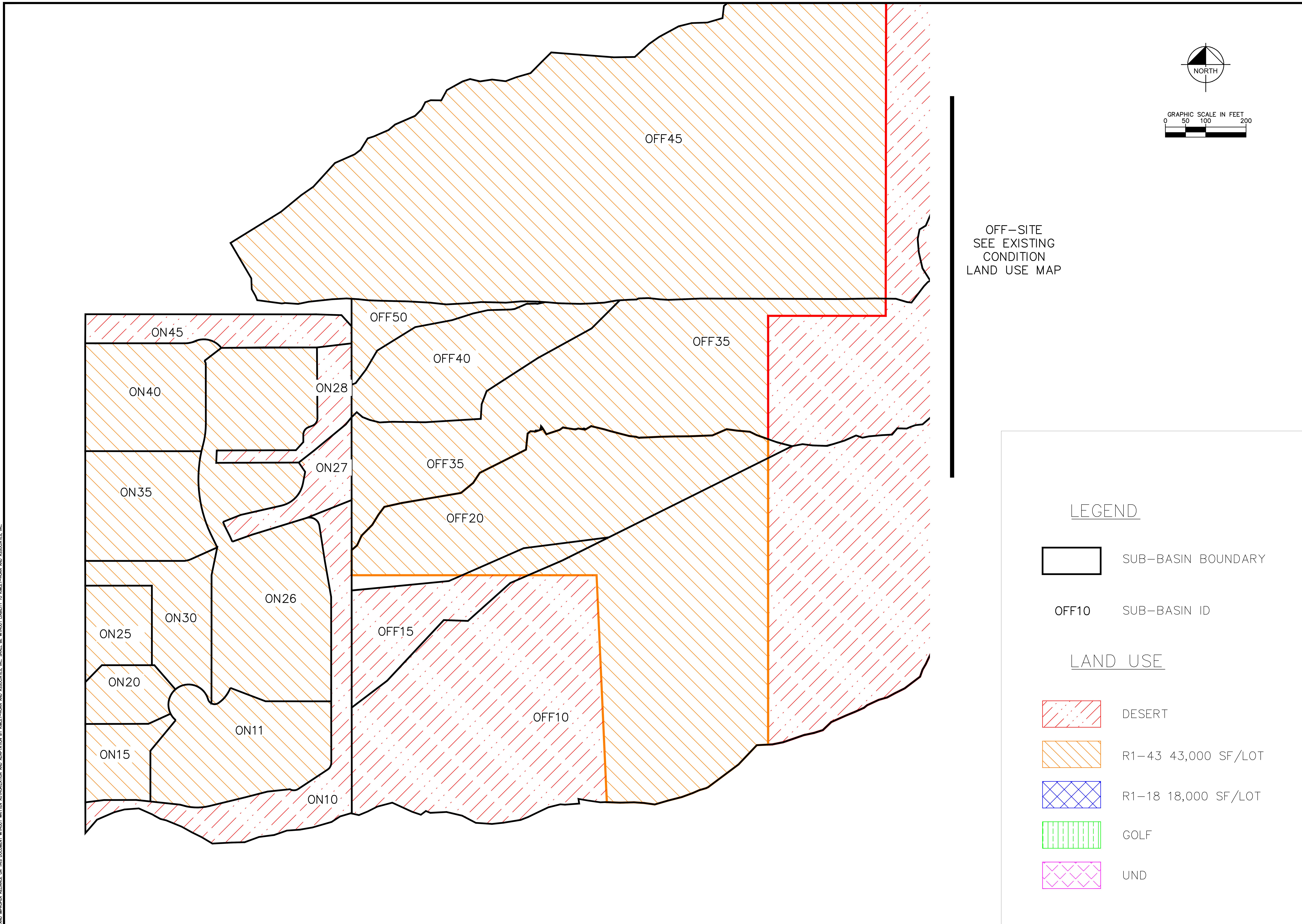
Major Basin ID: 01

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
		0.0810	**100.0**						
OFF50	R1-43	0.0010	100.0	0.30	17	20.0	NORMAL	0.041	Residential 43,000 sq-ft lots
		0.0010	**100.0**						
ON10	DESERT	0.0030	100.0	0.15	0	25.0	DRY	0.076	Desert
		0.0030	**100.0**						
ON11	R1-43	0.0040	100.0	0.30	17	20.0	NORMAL	0.037	Residential 43,000 sq-ft lots
		0.0040	**100.0**						
ON15	R1-43	0.0010	100.0	0.30	17	20.0	NORMAL	0.041	Residential 43,000 sq-ft lots
		0.0010	**100.0**						
ON20	R1-43	0.0010	100.0	0.30	17	20.0	NORMAL	0.041	Residential 43,000 sq-ft lots
		0.0010	**100.0**						
ON25	R1-43	0.0010	100.0	0.30	17	20.0	NORMAL	0.041	Residential 43,000 sq-ft lots
		0.0010	**100.0**						
ON26	R1-43	0.0080	100.0	0.30	17	20.0	NORMAL	0.036	Residential 43,000 sq-ft lots
		0.0080	**100.0**						
ON27	DESERT	0.0010	100.0	0.15	0	25.0	DRY	0.083	Desert
		0.0010	**100.0**						
ON28	DESERT	0.0010	100.0	0.15	0	25.0	DRY	0.083	Desert
		0.0010	**100.0**						
ON30	R1-43	0.0020	100.0	0.30	17	20.0	NORMAL	0.039	Residential 43,000 sq-ft lots

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description

Major Basin ID: 01

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
		0.0020	**100.0**						
ON35	R1-43	0.0030	100.0	0.30	17	20.0	NORMAL	0.038	Residential 43,000 sq-ft lots
		0.0030	**100.0**						
ON40	R1-43	0.0030	100.0	0.30	17	20.0	NORMAL	0.038	Residential 43,000 sq-ft lots
		0.0030	**100.0**						
ON45	DESERT	0.0010	100.0	0.15	0	25.0	DRY	0.083	Desert
		0.0010	**100.0**						



NO. | REVISION | BY | DATE | APPR.

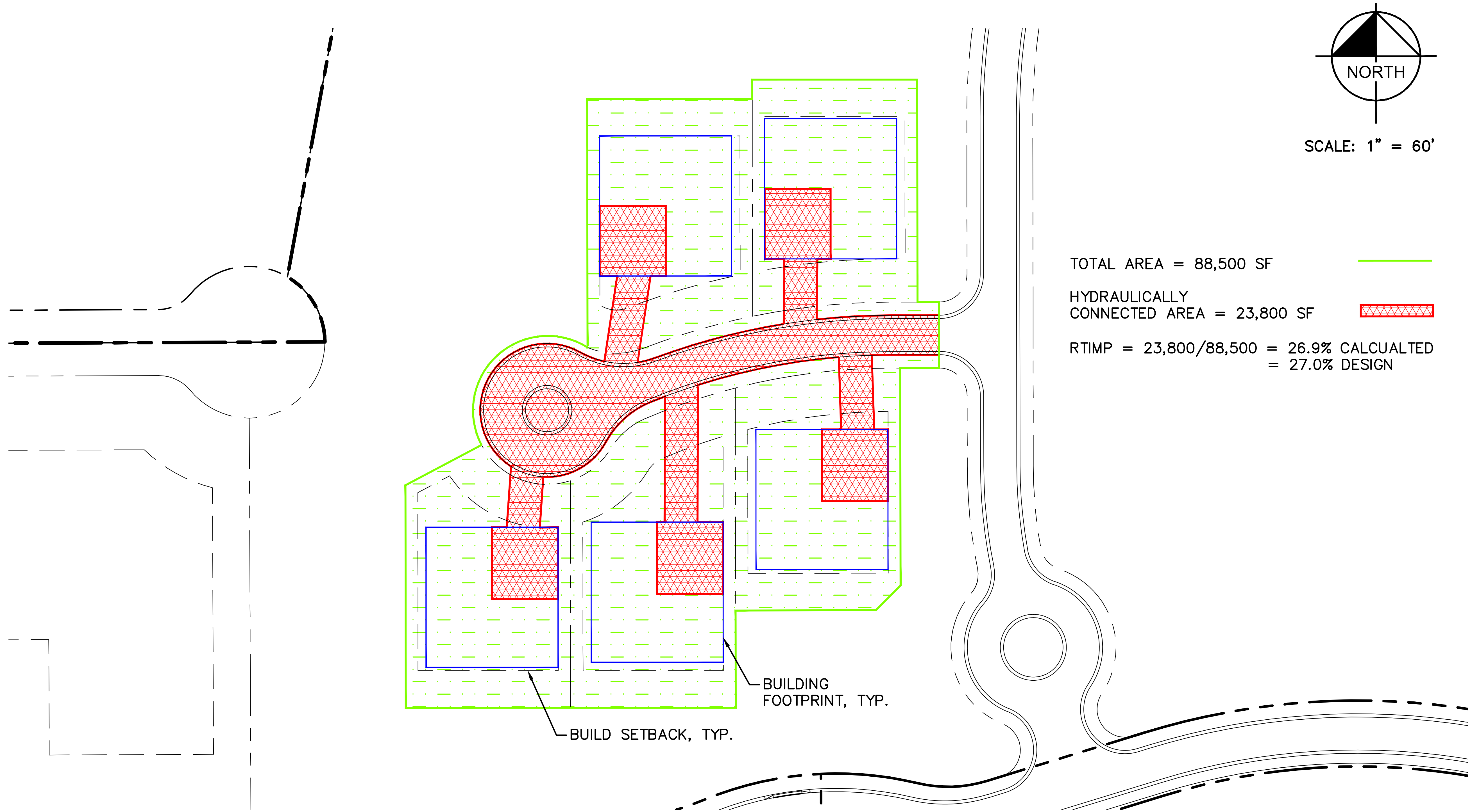
Kimley»Horn
© 2019 KIMLEY-HORN AND ASSOCIATES, INC.
7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

SCALE (H): 1"=100'
SCALE (V): NONE
DESIGNED BY: ZJH
DRAWN BY: ZJH
CHECKED BY: JMN
DATE: SEP 2019

SOLITUDE
PROPOSED CONDITION
HEC 1 - LAND USE MAP
SCOTTSDALE, ARIZONA

PROJECT NO.
291203001
DRAWING NAME
1 OF 1

5-PP-2020_V2
12/29/20



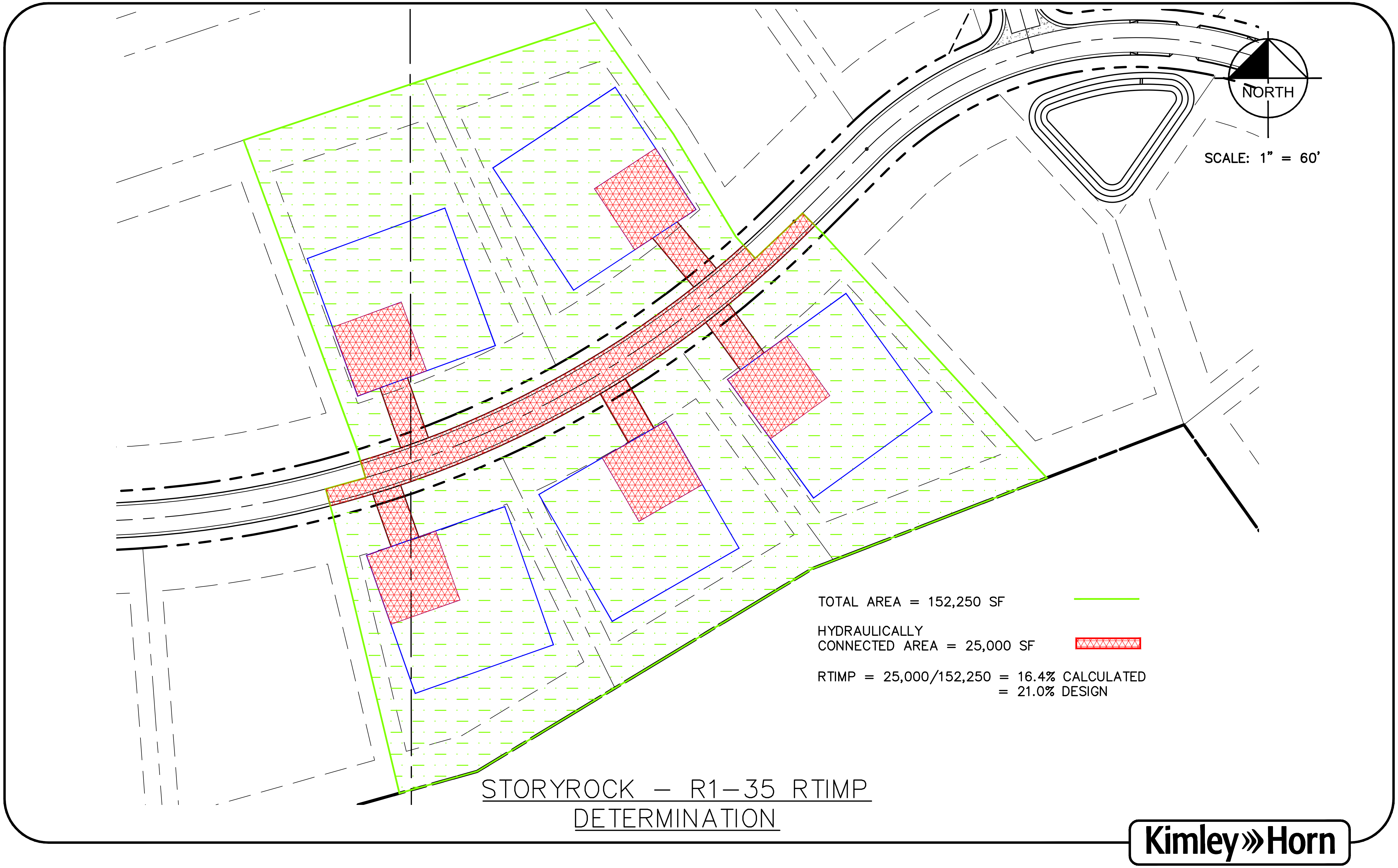
TOTAL AREA = 88,500 SF

HYDRAULICALLY CONNECTED AREA = 23,800 SF

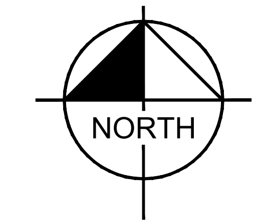
RTIMP = 23,800/88,500 = 26.9% CALCUALTED
= 27.0% DESIGN

STORYROCK – R1–18 RTIMP DETERMINATION

Kimley»Horn



5-PP-2020_V2
12/29/20

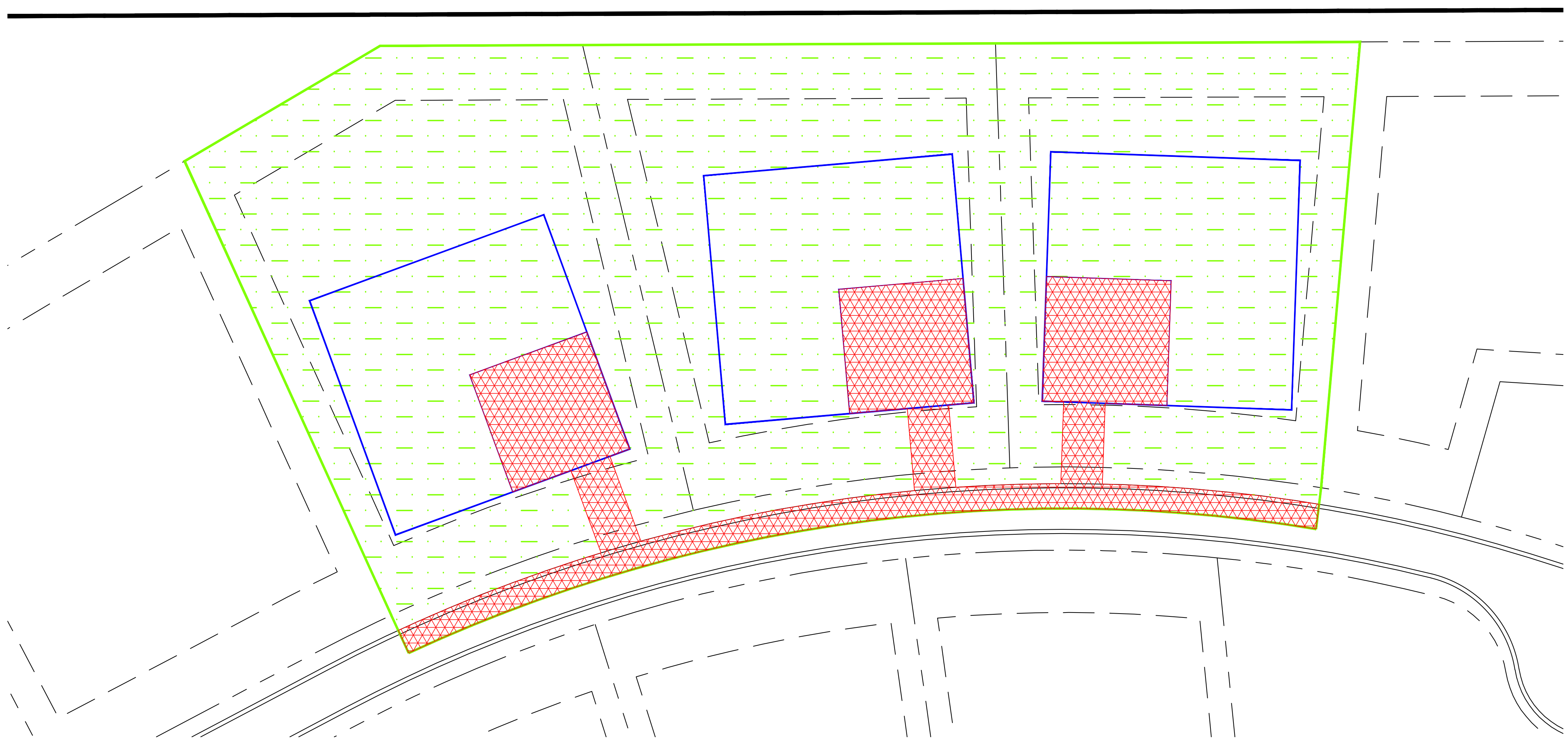


SCALE: 1" = 60'

TOTAL AREA = 123,750 SF

HYDRAULICALLY
CONNECTED AREA = 19,000 SF

RTIMP = 19,000/123,750 = 15.4% CALCULATED
17.0% DESIGN



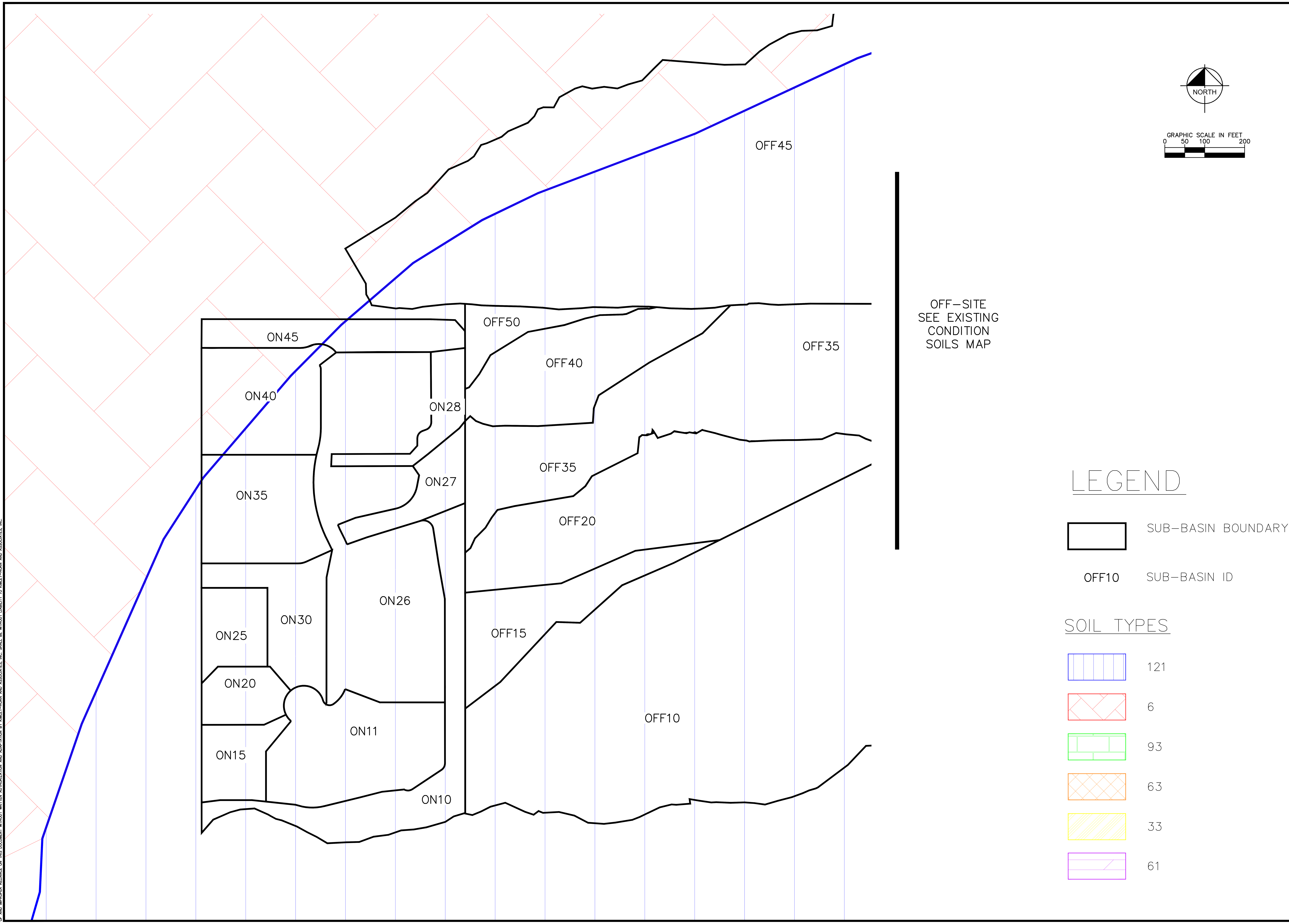
STORYROCK – R1-43 RTIMP DETERMINATION

Kimley»Horn

5-PP-2020_V2
12/29/20

Major Basin ID: 01

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
OFF10	645	33	64533	0.165	18.30	0.230	-	100	
	645	61	64561	0.135	15.00	0.150	-	100	
	645	93	64593	0.168	18.60	0.330	-	100	
	645	121	645121	0.259	28.70	0.120	-	100	
	645	63	64563	0.174	19.30	0.140	25.00	100	
OFF15	645	121	645121	0.003	100.00	0.120	-	100	
OFF20	645	121	645121	0.008	100.00	0.120	-	100	
OFF30	645	121	645121	0.036	100.00	0.120	-	100	
OFF35	645	121	645121	0.031	100.00	0.120	-	100	
OFF40	645	121	645121	0.004	100.00	0.120	-	100	
OFF45	645	121	645121	0.059	72.80	0.120	-	100	
	645	6	6456	0.022	27.20	0.620	-	100	
OFF50	645	121	645121	0.001	100.00	0.120	-	100	
ON10	645	121	645121	0.003	100.00	0.120	-	100	
ON11	645	121	645121	0.004	100.00	0.120	-	100	
ON15	645	121	645121	0.001	100.00	0.120	-	100	
ON20	645	121	645121	0.001	100.00	0.120	-	100	
ON25	645	121	645121	0.001	100.00	0.120	-	100	
ON26	645	121	645121	0.008	100.00	0.120	-	100	
ON27	645	121	645121	0.001	100.00	0.120	-	100	
ON28	645	121	645121	0.001	100.00	0.120	-	100	
ON30	645	121	645121	0.002	100.00	0.120	-	100	
ON35	645	121	645121	0.003	100.00	0.120	-	100	
ON40	645	6	6456	0.001	50.00	0.620	-	100	
	645	121	645121	0.001	50.00	0.120	-	100	
ON45	645	6	6456	0.001	50.00	0.620	-	100	
	645	121	645121	0.001	50.00	0.120	-	100	



NO. | REVISION | BY | DATE | APPR.

Kimley»Horn

© 2019 KIMLEY-HORN AND ASSOCIATES, INC.
7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

SCALE (H): 1"=100'
SCALE (V): NONE
DESIGNED BY: ZJH
DRAWN BY: ZJH
CHECKED BY: JMB
DATE: SEP 2019

SOLITUDE
PROPOSED CONDITION
HEC 1 - SOILS MAP
SCOTTSDALE, ARIZONA

PROJECT NO.
291203001

DRAWING NAME

1 OF 1

K:\EAV_Civil\291203001 - HV92\Drainage\Preliminary\Figures\Prop Soils.dwg Sep 25, 2019 zach.hill
XREFS:
THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE SPECIFIC PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY-HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.

5-PP-2020_V2
12/29/20

Storage Basin ID: DB10

Spillway Characteristics (SS)			1	2	3	4	5	6	7	8	9	10
Spillway Crest Elevation:	-NA-	**Volume (ac-ft)**		-	-	0.1	0.1	0.1	0.2	0.2		
Spillway Length:	-NA-	**Discharge (cfs)**	0	0	0	1	1	1	1	15	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	0.5	1.0	1.5	2.0	2.5	3.0	3.0	-	-
Weir Coefficient:	-NA-											

Low-Level Outlet (SL)			11	12	13	14.	15	16	17	18	19	20
Centerline Elevation:	-NA-	**Volume (ac-ft)**	-	-	-	-	-	-	-	-	-	-
Cross-Section Area:	-NA-	**Discharge (cfs)**	0	0	0	0	0	0	0	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	-	-	-	-	-	-	-	-	-
Orifice Equation Exponent:	-NA-											

Top of Dam Overflow (ST)			2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Elevation Top of Dam:	-NA-	**Peak Volume (ac-ft)**	0.07	0.00	0.07	0.00	0.00	0.19
Length of Dam:	-NA-	**Peak Stage (ft)**	1.50	0.00	1.50	0.00	0.00	3.00
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	1.00	0.00	1.00	0.00	0.00	11.00
Weir Coefficient:	-NA-							

Storage Basin ID: DB26

Spillway Characteristics (SS)			1	2	3	4	5	6	7	8	9	10
Spillway Crest Elevation:	-NA-	**Volume (ac-ft)**		0.1	0.2	0.3	0.4	0.6	0.7	0.7		
Spillway Length:	-NA-	**Discharge (cfs)**	0	0	0	1	1	2	2	2	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	0.5	1.0	1.5	2.0	2.5	2.9	3.0	-	-
Weir Coefficient:	-NA-											

Low-Level Outlet (SL)			11	12	13	14.	15	16	17	18	19	20
Centerline Elevation:	-NA-	**Volume (ac-ft)**	-	-	-	-	-	-	-	-	-	-
Cross-Section Area:	-NA-	**Discharge (cfs)**	0	0	0	0	0	0	0	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	-	-	-	-	-	-	-	-	-
Orifice Equation Exponent:	-NA-											

Top of Dam Overflow (ST)			2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Elevation Top of Dam:	-NA-	**Peak Volume (ac-ft)**	0.25	0.00	0.30	0.00	0.00	0.56
Length of Dam:	-NA-	**Peak Stage (ft)**	1.31	0.00	1.50	0.00	0.00	2.50
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	0.00	0.00	1.00	0.00	0.00	2.00
Weir Coefficient:	-NA-							

Storage Basin ID: **DB35**

Spillway Characteristics (SS)			1	2	3	4	5	6	7	8	9	10
Spillway Crest Elevation:	-NA-	**Volume (ac-ft)**		-	0.1	0.1	0.1	0.2	0.2	0.2		
Spillway Length:	-NA-	**Discharge (cfs)**	0	0	0	1	1	2	2	2	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	0.5	1.0	1.5	2.0	2.5	2.9	3.0	-	-
Weir Coefficient:	-NA-											

Low-Level Outlet (SL)			11	12	13	14.	15	16	17	18	19	20
Centerline Elevation:	-NA-	**Volume (ac-ft)**	-	-	-	-	-	-	-	-	-	-
Cross-Section Area:	-NA-	**Discharge (cfs)**	0	0	0	0	0	0	0	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	-	-	-	-	-	-	-	-	-
Orifice Equation Exponent:	-NA-											

Top of Dam Overflow (ST)			2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Elevation Top of Dam:	-NA-	**Peak Volume (ac-ft)**	0.10	0.00	0.10	0.00	0.00	0.18
Length of Dam:	-NA-	**Peak Stage (ft)**	1.50	0.00	1.50	0.00	0.00	2.50
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	1.00	0.00	1.00	0.00	0.00	2.00
Weir Coefficient:	-NA-							

Kimley»Horn

Project ***Solitude***
Subject **Detention Basin Calculations**
Designed by **ZJH** Date 9/24/2019 Project No. 291203001
Checked by **JMB** Date 9/24/2019

Objective: to determine the storage-flow relationship for small detention basins

DB10 ***Drains in 4.31 hours***

Outlet Diameter	0.50 ft	Outlet X-Sect Area	0.196 ft^2
Outlet Elevation	0.5 ft	No. of Outlet Barrels	1
		Outlet Pipe Slope	0.005 ft/ft

Elevation [ft]	**Surface Storage Area** [ft^2]	**Surface Storage Area** [acre]	**Average Area** [acre]	**Δ Elev** [ft]	**Δ Vol** [ac-ft]	**Σ Vol** [ac-ft]	**Δ Time to Drain** [hr]	**Q_{pipe}** [cfs]	**Q_{weir}** [cfs]	**Total Q_{out}** [cfs]
0	1,200	0.03				0		0	0	0
			0.04	1.0	0.04		2.38			
1	2,200	0.05				0.04		0	0	0
			0.06	1.0	0.06		1.05			
2	3,300	0.08				0.10		1	0	1
			0.09	1.0	0.09		0.88			
3	4,500	0.10				0.19		1	0	1

Notes:
Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter)
per Linsley et al. *Water Resources Engineering* 4th Edition, pg 652.

5-PP-2020_V2
12/29/20

Kimley»Horn

Project ***Solitude***
Subject **Detention Basin Calculations**
Designed by **ZJH** Date 9/24/2019 Project No. 291203001
Checked by **JMB** Date 9/24/2019

Objective: to determine the storage-flow relationship for small detention basins

DB26 ***Drains in 9.42 hours***

Outlet Diameter	0.66 ft	Outlet X-Sect Area	0.342 ft^2
Outlet Elevation	0.5 ft	No. of Outlet Barrels	1
		Outlet Pipe Slope	0.005 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]	Q_{weir} [cfs]	Total Q_{out} [cfs]
0	6,319	0.15				0		0	0	0
			0.17	1.0	0.17		5.50			
1	8,874	0.20				0.17		1	0	1
			0.23	1.0	0.23		2.23			
2	11,550	0.27				0.41		2	0	2
			0.29	1.0	0.29		1.69			
3	14,105	0.32				0.70		2	0	2

Notes:
Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter)
per Linsley et al. *Water Resources Engineering* 4th Edition, pg 652.

5-PP-2020_V2
12/29/20

Kimley»Horn

Project ***Solitude***
Subject **Detention Basin Calculations**
Designed by **ZJH** Date 9/24/2019 Project No. 291203001
Checked by **JMB** Date 9/24/2019

Objective: to determine the storage-flow relationship for small detention basins

DB35 ***Drains in 2.92 hours***

Outlet Diameter	0.66 ft	Outlet X-Sect Area	0.342 ft^2
Outlet Elevation	0.5 ft	No. of Outlet Barrels	1
		Outlet Pipe Slope	0.005 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]	Q_{weir} [cfs]	Total Q_{out} [cfs]
0	1,940	0.04				0		0	0	0
			0.05	1.0	0.05		1.70			
1	2,750	0.06				0.05		1	0	1
			0.07	1.0	0.07		0.69			
2	3,580	0.08				0.13		2	0	2
			0.09	1.0	0.09		0.54			
3	4,550	0.10				0.22		2	0	2

Notes:
Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter)
per Linsley et al. *Water Resources Engineering* 4th Edition, pg 652.

5-PP-2020_V2
12/29/20

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)		1.	2.	3.	4.	5.	6.	7.	8.
NORMAL DEPTH															
Major Basin 01															
R10	0.045	0.045	0.045	800.00	0.0275	-	X:	-	30.00	60.00	65.00	90.00	95.00	110.00	130.00
							Y:	10.20	10.10	10.00	9.00	9.00	10.00	10.10	10.20
R15	0.045	0.045	0.045	370.00	0.0200	-	X:	-	2.00	8.00	10.00	12.00	16.00	20.00	30.00
							Y:	10.00	10.00	10.00	9.00	9.00	10.00	10.00	10.00
R20	0.045	0.045	0.045	500.00	0.0200	-	X:	-	2.00	8.00	10.00	12.00	16.00	20.00	30.00
							Y:	10.00	10.00	10.00	9.00	9.00	10.00	10.00	10.00
R30	0.045	0.045	0.045	300.00	0.0250	-	X:	-	10.00	20.00	26.00	30.00	34.00	40.00	50.00
							Y:	10.20	10.10	10.00	8.00	8.00	10.00	10.10	10.20
R35	0.045	0.045	0.045	400.00	0.0250	-	X:	-	10.00	20.00	26.00	30.00	34.00	40.00	50.00
							Y:	10.20	10.10	10.00	8.00	8.00	10.00	10.10	10.20
R40	0.045	0.045	0.045	500.00	0.0250	-	X:	-	10.00	20.00	26.00	30.00	34.00	40.00	50.00
							Y:	10.20	10.10	10.00	8.00	8.00	10.00	10.10	10.20
R45	0.045	0.045	0.045	650.00	0.0250	-	X:	-	2.00	10.00	18.00	24.00	32.00	40.00	45.00
							Y:	10.20	10.10	10.00	7.50	7.50	10.00	10.10	10.20
RO45	0.045	0.045	0.045	1,773.00	0.0300	-	X:	610.00	620.00	637.00	650.00	663.00	679.00	689.00	697.00
							Y:	139.00	138.70	138.30	138.50	138.80	139.00	138.90	138.90

City of Scottsdale
Drainage Design Management System
HEC-1 DIVERSIONS
Project Reference: SOLITUDE PROP

9/25/2019

Diversion ID/ DT Card ID	Maximum Volume (ac-ft)	Maximum Diversion (cfs)		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
DOFF10			**Inflow (cfs)**		100	200	500	1,000	2,000	4,000	10,000	20,000	50,000
			Diversion (cfs)		85	170	425	850	1,700	3,400	8,500	17,000	42,500

5-PP-2020_V2
12/29/20

```
1*****************************************                                   ********************************
 *                                       *                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                   *    U.S. ARMY CORPS OF ENGINEER
 *             JUN   1998                *                                   *    HYDROLOGIC ENGINEERING CENT
 *          VERSION 4.1                  *                                   *          609 SECOND STREET
 *                                       *                                   *       DAVIS, CALIFORNIA 95616
 *   RUN DATE   29JUL20  TIME  10:50:46  *                                   *           (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        SOLITUDE PROP - Solitude Proposed Conditions Hydrology
             3           ID        2 YEAR
             4           ID        6 Hour  Storm
             5           ID        Unit Hydrograph: Clark
             6           ID        Storm: Multiple
             7           ID        07/29/2020
                         *DIAGRAM
             8           IT       2  1JAN99       0    2000
             9           IO       5
            10           IN      15
                         *
            11           JD   1.342  0.0001
            12           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            13           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            14           PC   0.962   0.972   0.983   0.991   1.000
            15           JD   1.334  0.5000
            16           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            17           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            18           PC   0.962   0.972   0.983   0.991   1.000
            19           JD   1.308     2.8
            20           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
            21           PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
            22           PC   0.950   0.963   0.975   0.988   1.000
                         *

            23           KK   OFF10   BASIN
            24           BA   0.900
            25           LG    0.30    0.28    5.58    0.23      21
            26           UC   0.766   0.743
            27           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
            28           UA     100
                         *

            29           KK  DOFF10  DIVERT
            30           DT  DTFF10     0.0     0.0
            31           DI     0.0   100.0   200.0   500.0  1000.0  2000.0  4000.0 10000.0 20000.0 50000.0
```

5-PP-2020_V2
12/29/20

```
  32           DQ     0.0    85.0   170.0   425.0   850.0  1700.0  3400.0  8500.0 17000.0 42500.0
               *

  33           KK   OFF15   BASIN
  34           BA   0.003
  35           LG    0.15    0.37    6.54    0.14       0
  36           UC   0.238   0.379
  37           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  38           UA     100
               *

  39           KK     R15   ROUTE
  40           RS       1    FLOW
  41           RC   0.045   0.045   0.045     370  0.0200    0.00
  42           RX    0.00    2.00    8.00   10.00   12.00   16.00   20.00   30.00
  43           RY   10.00   10.00   10.00    9.00    9.00   10.00   10.00   10.00
               *
1                                                 HEC-1 INPUT                                         PAGE  2

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


  44           KK   OFF20   BASIN
  45           BA   0.008
  46           LG    0.15    0.37    6.54    0.14       0
  47           UC   0.298   0.435
  48           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  49           UA     100
               *

  50           KK     R20   ROUTE
  51           RS       1    FLOW
  52           RC   0.045   0.045   0.045     500  0.0200    0.00
  53           RX    0.00    2.00    8.00   10.00   12.00   16.00   20.00   30.00
  54           RY   10.00   10.00   10.00    9.00    9.00   10.00   10.00   10.00
               *

  55           KK   CP011 COMBINE
  56           HC       3
               *

  57           KK     R10   ROUTE
  58           RS       1    FLOW
  59           RC   0.045   0.045   0.045     800  0.0275    0.00
  60           RX    0.00   30.00   60.00   65.00   90.00   95.00  110.00  130.00
  61           RY   10.20   10.10   10.00    9.00    9.00   10.00   10.10   10.20
               *

  62           KK    ON11   BASIN
  63           BA   0.004
  64           LG    0.30    0.19    6.54    0.13      17
  65           UC   0.178   0.217
  66           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  67           UA     100
               *

  68           KK    DB10 STORAGE
  69           KO
  70           RS       1    STOR
  71           SV            0.02    0.04    0.07    0.10    0.05    0.19    0.19
  72           SQ                            1.00    1.00    1.00    1.00   15.00
  73           SE            0.50    1.00    1.50    2.00    2.50    2.95    3.00
               *

  74           KK    ON10   BASIN
  75           BA   0.003
  76           LG    0.15    0.37    6.54    0.14       0
  77           UC   0.283   0.548
  78           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  79           UA     100
               *
1                                                 HEC-1 INPUT                                         PAGE  3

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

```
            80           KK    CP10 COMBINE
            81           HC       3
                         *

            82           KK    ON15   BASIN
            83           BA   0.001
            84           LG    0.30    0.19    6.54    0.13      17
            85           UC   0.156   0.287
            86           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
            87           UA     100
                         *

            88           KK    ON20   BASIN
            89           BA   0.001
            90           LG    0.30    0.19    6.54    0.13      17
            91           UC   0.174   0.362
            92           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
            93           UA     100
                         *

            94           KK    ON25   BASIN
            95           BA   0.001
            96           LG    0.30    0.19    6.54    0.13      17
            97           UC   0.135   0.246
            98           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
            99           UA     100
                         *

           100           KK   OFF35   BASIN
           101           BA   0.031
           102           LG    0.20    0.31    6.54    0.14       5
           103           UC   0.519   1.084
           104           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           105           UA     100
                         *

           106           KK     R35   ROUTE
           107           RS       1    FLOW
           108           RC   0.045   0.045   0.045     400  0.0250    0.00
           109           RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
           110           RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
                         *

           111           KK    ON27   BASIN
           112           BA   0.001
           113           LG    0.15    0.37    6.54    0.14       0
           114           UC   0.204   0.430
           115           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           116           UA     100
                         *
```



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


           117           KK    CP27 COMBINE
           118           HC       2
                         *

           119           KK     R30   ROUTE
           120           RS       1    FLOW
           121           RC   0.045   0.045   0.045     300  0.0250    0.00
           122           RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
           123           RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
                         *

           124           KK    ON26   BASIN
           125           BA   0.008
           126           LG    0.30    0.19    6.54    0.13      17
           127           UC   0.277   0.354
           128           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           129           UA     100
                         *
```

```
 130           KK    DB26 STORAGE
 131           KO
 132           RS       1    STOR
 133           SV            0.10    0.17    0.30    0.41    0.56    0.70    0.71
 134           SQ                            1.00    1.00    2.00    2.00    2.00
 135           SE            0.50    1.00    1.50    2.00    2.50    2.90    3.00
               *

 136           KK     R30   ROUTE
 137           RS       1    FLOW
 138           RC   0.045   0.045   0.045     300  0.0250    0.00
 139           RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
 140           RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
               *

 141           KK    ON30   BASIN
 142           BA   0.002
 143           LG    0.30    0.19    6.54    0.13      17
 144           UC   0.222   0.380
 145           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 146           UA     100
               *

 147           KK    CP30 COMBINE
 148           HC       3
               *

 149           KK      X1 COMBINE
 150           HC       5
               *
```

1 HEC-1 INPUT PAGE 5

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


 151           KK   OFF40   BASIN
 152           BA   0.004
 153           LG    0.30    0.19    6.54    0.13      17
 154           UC   0.166   0.258
 155           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 156           UA     100
               *

 157           KK     R40   ROUTE
 158           RS       1    FLOW
 159           RC   0.045   0.045   0.045     500  0.0250    0.00
 160           RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
 161           RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
               *

 162           KK    ON28   BASIN
 163           BA   0.001
 164           LG    0.15    0.37    6.54    0.14       0
 165           UC   0.231   0.592
 166           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 167           UA     100
               *

 168           KK    CP28 COMBINE
 169           HC       2
               *

 170           KK    ON35   BASIN
 171           BA   0.003
 172           LG    0.30    0.19    6.54    0.13      17
 173           UC   0.145   0.158
 174           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 175           UA     100
               *

 176           KK    DB35 STORAGE
 177           KO
 178           RS       1    STOR
 179           SV            0.03    0.05    0.10    0.13    0.18    0.22    0.22
 180           SQ                            1.00    1.00    2.00    2.00    2.00
```

```
           181            SE           0.50    1.00    1.50    2.00    2.50    2.90    3.00
                          *

           182            KK     CO35 COMBINE
           183            HC        2
                          *

           184            KK     ON40   BASIN
           185            BA    0.003
           186            LG     0.30    0.25    4.72    0.30      17
           187            UC    0.189   0.252
           188            UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           189            UA      100
                          *
1                                                       HEC-1 INPUT                                                  PAGE  6

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


           190            KK    OFF30   BASIN
           191            BA    0.036
           192            LG     0.19    0.32    6.54    0.14       4
           193            UC    0.453   0.778
           194            UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           195            UA      100
                          *

           196            KK     RO45   ROUTE
           197            RS        1    FLOW
           198            RC    0.045   0.045   0.045    1773  0.0300    0.00
           199            RX   610.00  620.00  637.00  650.00  663.00  679.00  689.00  697.00
           200            RY   139.00  138.70  138.30  138.50  138.80  139.00  138.90  138.90
                          *

           201            KK    OFF45   BASIN
           202            BA    0.081
           203            LG     0.26    0.29    5.46    0.21      12
           204            UC    0.442   0.601
           205            UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           206            UA      100
                          *

           207            KK    CPO45 COMBINE
           208            HC        2
                          *

           209            KK      R45   ROUTE
           210            RS        1    FLOW
           211            RC    0.045   0.045   0.045     650  0.0250    0.00
           212            RX     0.00    2.00   10.00   18.00   24.00   32.00   40.00   45.00
           213            RY    10.20   10.10   10.00    7.50    7.50   10.00   10.10   10.20
                          *

           214            KK    OFF50   BASIN
           215            BA    0.001
           216            LG     0.30    0.19    6.54    0.13      17
           217            UC    0.126   0.253
           218            UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           219            UA      100
                          *

           220            KK      R45   ROUTE
           221            RS        1    FLOW
           222            RC    0.045   0.045   0.045     650  0.0250    0.00
           223            RX     0.00    2.00   10.00   18.00   24.00   32.00   40.00   45.00
           224            RY    10.20   10.10   10.00    7.50    7.50   10.00   10.10   10.20
                          *
1                                                       HEC-1 INPUT                                                  PAGE  7

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


           225            KK     ON45   BASIN
           226            BA    0.001
           227            LG     0.15    0.35    4.72    0.32       0
```

```
            228           UC   0.290   0.879
            229           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
            230           UA     100
                          *

            231           KK    CP45 COMBINE
            232           HC       3
                          *
            233           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    23       OFF10
                 .
                 .
    30           .------->  DTFF10
    29      DOFF10
                 .
                 .
    33           .       OFF15
                 .           V
                 .           V
    39           .         R15
                 .           .
                 .           .
    44           .           .       OFF20
                 .           .           V
                 .           .           V
    50           .           .         R20
                 .           .           .
                 .           .           .
    55       CP011........................
                 V
                 V
    57         R10
                 .
                 .
    62           .        ON11
                 .           V
                 .           V
    68           .        DB10
                 .           .
                 .           .
    74           .           .        ON10
                 .           .           .
                 .           .           .
    80        CP10........................
                 .
                 .
    82           .        ON15
                 .           .
                 .           .
    88           .           .        ON20
                 .           .           .
                 .           .           .
    94           .           .           .        ON25
                 .           .           .           .
                 .           .           .           .
   100           .           .           .           .       OFF35
                 .           .           .           .           V
                 .           .           .           .           V
   106           .           .           .           .         R35
                 .           .           .           .           .
                 .           .           .           .           .
   111           .           .           .           .           .        ON27
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   117           .           .           .           .        CP27............
                 .           .           .           .           V
                 .           .           .           .           V
   119           .           .           .           .         R30
```

```
                 .           .           .           .           .
                 .           .           .           .           .
   124           .           .           .           .           .        ON26
                 .           .           .           .           .           V
                 .           .           .           .           .           V
   130           .           .           .           .           .        DB26
                 .           .           .           .           .           V
                 .           .           .           .           .           V
   136           .           .           .           .           .         R30
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   141           .           .           .           .           .           .        ON30
                 .           .           .           .           .           .           .
                 .           .           .           .           .           .           .
   147           .           .           .           .        CP30........................
                 .           .           .           .           .
                 .           .           .           .           .
   149          X1................................................
                 .
                 .
   151           .       OFF40
                 .           V
                 .           V
   157           .         R40
                 .           .
                 .           .
   162           .           .        ON28
                 .           .           .
                 .           .           .
   168           .        CP28............
                 .           .
                 .           .
   170           .           .        ON35
                 .           .           V
                 .           .           V
   176           .           .        DB35
                 .           .           .
                 .           .           .
   182           .        CO35............
                 .           .
                 .           .
   184           .           .        ON40
                 .           .           .
                 .           .           .
   190           .           .           .       OFF30
                 .           .           .           V
                 .           .           .           V
   196           .           .           .        RO45
                 .           .           .           .
                 .           .           .           .
   201           .           .           .           .       OFF45
                 .           .           .           .           .
                 .           .           .           .           .
   207           .           .           .       CPO45............
                 .           .           .           V
                 .           .           .           V
   209           .           .           .         R45
                 .           .           .           .
                 .           .           .           .
   214           .           .           .           .       OFF50
                 .           .           .           .           V
                 .           .           .           .           V
   220           .           .           .           .         R45
                 .           .           .           .           .
                 .           .           .           .           .
   225           .           .           .           .           .        ON45
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   231           .           .           .        CP45........................

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                                   ********************************
 *                                       *                                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *    U.S. ARMY CORPS OF ENGINEER
 *               JUN   1998              *                                                   *    HYDROLOGIC ENGINEERING CENT
```

```
 *           VERSION 4.1              *                                                   *         609 SECOND STREET
 *                                    *                                                   *      DAVIS, CALIFORNIA 95616
 *  RUN DATE   29JUL20  TIME  10:50:46   *                                                *          (916) 756-1104
 *                                    *                                                   *
 ****************************************                                                 *******************************
```

```
                              City of Scottsdale
                              SOLITUDE PROP - Solitude Proposed Conditions Hydrology
                              2 YEAR
                              6 Hour  Storm
                              Unit Hydrograph: Clark
                              Storm: Multiple
                              07/29/2020

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

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

                   COMPUTATION INTERVAL     .03 HOURS
                        TOTAL TIME BASE   66.63 HOURS

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

   11 JD         INDEX STORM NO. 1
                        STRM       1.34  PRECIPITATION DEPTH
                        TRDA        .00  TRANSPOSITION DRAINAGE AREA

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

   15 JD         INDEX STORM NO. 2
                        STRM       1.33  PRECIPITATION DEPTH
                        TRDA        .50  TRANSPOSITION DRAINAGE AREA

   16 PI           PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                         .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                         .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                         .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  19 JD         INDEX STORM NO. 3
                      STRM        1.31  PRECIPITATION DEPTH
                      TRDA        2.80  TRANSPOSITION DRAINAGE AREA

  20 PI           PRECIPITATION PATTERN
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                         .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                         .03       .03       .03       .03       .03       .03       .03       .03       .03       .03
                         .02       .02       .02       .02       .02       .02       .02       .01       .01       .01
                         .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                         .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                         .00       .00       .00       .00       .00       .00       .00       .00       .00       .00


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


             **************
             *            *
  68 KK      *      DB10  *      STORAGE
             *            *
             **************

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


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


             **************
             *            *
 130 KK      *      DB26  *      STORAGE
             *            *
             **************

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

*** ***

```
            **************
            *            *
  176 KK    *      DB35  *      STORAGE
            *            *
            **************

  177 KO         OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
1
```

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	OFF10	186.	4.57	42.	11.	4.	.90		
+	DIVERSION TO	DTFF10	158.	4.57	36.	9.	3.	.90		
+	HYDROGRAPH AT	DOFF10	28.	4.57	6.	2.	1.	.90		
+	HYDROGRAPH AT	OFF15	1.	4.17	0.	0.	0.	.00		
+	ROUTED TO	R15	1.	4.20	0.	0.	0.	.00		
+	HYDROGRAPH AT	OFF20	3.	4.20	0.	0.	0.	.01		
+	ROUTED TO	R20	3.	4.27	0.	0.	0.	.01		
+	3 COMBINED AT	CP011	30.	4.53	7.	2.	1.	.91		
+	ROUTED TO	R10	29.	4.60	7.	2.	1.	.91		
+	HYDROGRAPH AT	ON11	3.	4.10	0.	0.	0.	.00		
+	ROUTED TO	DB10	1.	4.20	0.	0.	0.	.00		
+	HYDROGRAPH AT	ON10	1.	4.20	0.	0.	0.	.00		
+	3 COMBINED AT	CP10	30.	4.60	7.	2.	1.	.92		
+	HYDROGRAPH AT	ON15	1.	4.10	0.	0.	0.	.00		
+	HYDROGRAPH AT	ON20	1.	4.10	0.	0.	0.	.00		
+	HYDROGRAPH AT	ON25	1.	4.07	0.	0.	0.	.00		
+	HYDROGRAPH AT	OFF35	6.	4.40	1.	0.	0.	.03		
+	ROUTED TO	R35	6.	4.43	1.	0.	0.	.03		

	HYDROGRAPH AT							
+		ON27	0.	4.13	0.	0.	0.	.00
	2 COMBINED AT							
+		CP27	6.	4.43	1.	0.	0.	.03
	ROUTED TO							
+		R30	6.	4.43	1.	0.	0.	.03
	HYDROGRAPH AT							
+		ON26	5.	4.17	1.	0.	0.	.01
	ROUTED TO							
+		DB26	0.	5.13	0.	0.	0.	.01
	ROUTED TO							
+		R30	0.	5.20	0.	0.	0.	.01
	HYDROGRAPH AT							
+		ON30	1.	4.13	0.	0.	0.	.00
	3 COMBINED AT							
+		CP30	7.	4.43	2.	0.	0.	.04
	5 COMBINED AT							
+		X1	35.	4.60	8.	2.	1.	.96
	HYDROGRAPH AT							
+		OFF40	3.	4.10	0.	0.	0.	.00
	ROUTED TO							
+		R40	3.	4.13	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON28	0.	4.17	0.	0.	0.	.00
	2 COMBINED AT							
+		CP28	3.	4.13	0.	0.	0.	.01
	HYDROGRAPH AT							
+		ON35	3.	4.07	0.	0.	0.	.00
	ROUTED TO							
+		DB35	1.	4.40	0.	0.	0.	.00
	2 COMBINED AT							
+		CO35	3.	4.17	0.	0.	0.	.01
	HYDROGRAPH AT							
+		ON40	2.	4.10	0.	0.	0.	.00
	HYDROGRAPH AT							
+		OFF30	9.	4.33	2.	0.	0.	.04
	ROUTED TO							
+		RO45	7.	4.60	2.	0.	0.	.04
	HYDROGRAPH AT							
+		OFF45	25.	4.30	4.	1.	0.	.08
	2 COMBINED AT							
+		CPO45	29.	4.33	5.	1.	1.	.12
	ROUTED TO							
+		R45	29.	4.40	5.	1.	1.	.12
	HYDROGRAPH AT							
+		OFF50	1.	4.07	0.	0.	0.	.00
	ROUTED TO							
+		R45	1.	4.17	0.	0.	0.	.00
	HYDROGRAPH AT							
+		ON45	0.	4.20	0.	0.	0.	.00

```
          3 COMBINED AT
+                            CP45        29.    4.40          6.          1.          1.         .12
```

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

```
1*****************************************                                                  ********************************
 *                                       *                                                  *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                  *    U.S. ARMY CORPS OF ENGINEER
 *              JUN   1998               *                                                  *    HYDROLOGIC ENGINEERING CENT
 *           VERSION 4.1                 *                                                  *          609 SECOND STREET
 *                                       *                                                  *       DAVIS, CALIFORNIA 95616
 *  RUN DATE   29JUL20  TIME  10:51:04   *                                                  *           (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        SOLITUDE PROP - Solitude Proposed Conditions Hydrology
              3           ID        10 YEAR
              4           ID        6 Hour  Storm
              5           ID        Unit Hydrograph: Clark
              6           ID        Storm: Multiple
              7           ID        07/29/2020
                          *DIAGRAM
              8           IT       2  1JAN99       0    2000
              9           IO       5
             10           IN      15
                          *
             11           JD   1.995  0.0001
             12           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
             13           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
             14           PC   0.962   0.972   0.983   0.991   1.000
             15           JD   1.983  0.5000
             16           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
             17           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
             18           PC   0.962   0.972   0.983   0.991   1.000
             19           JD   1.945     2.8
             20           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
             21           PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
             22           PC   0.950   0.963   0.975   0.988   1.000
                          *

             23           KK   OFF10   BASIN
             24           BA   0.900
             25           LG    0.30    0.28    5.58    0.23      21
             26           UC   0.671   0.642
             27           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
             28           UA     100
                          *

             29           KK  DOFF10  DIVERT
             30           DT  DTFF10     0.0     0.0
             31           DI     0.0   100.0   200.0   500.0  1000.0  2000.0  4000.0 10000.0 20000.0 50000.0
```

5-PP-2020_V2
12/29/20

```
          32           DQ     0.0    85.0   170.0   425.0   850.0  1700.0  3400.0  8500.0 17000.0 42500.0
                       *

          33           KK   OFF15   BASIN
          34           BA   0.003
          35           LG    0.15    0.37    6.54    0.14       0
          36           UC   0.209   0.327
          37           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          38           UA     100
                       *

          39           KK     R15   ROUTE
          40           RS       1    FLOW
          41           RC   0.045   0.045   0.045     370  0.0200    0.00
          42           RX    0.00    2.00    8.00   10.00   12.00   16.00   20.00   30.00
          43           RY   10.00   10.00   10.00    9.00    9.00   10.00   10.00   10.00
                       *
1                                           HEC-1 INPUT                                          PAGE  2

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


          44           KK   OFF20   BASIN
          45           BA   0.008
          46           LG    0.15    0.37    6.54    0.14       0
          47           UC   0.261   0.375
          48           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          49           UA     100
                       *

          50           KK     R20   ROUTE
          51           RS       1    FLOW
          52           RC   0.045   0.045   0.045     500  0.0200    0.00
          53           RX    0.00    2.00    8.00   10.00   12.00   16.00   20.00   30.00
          54           RY   10.00   10.00   10.00    9.00    9.00   10.00   10.00   10.00
                       *

          55           KK   CP011 COMBINE
          56           HC       3
                       *

          57           KK     R10   ROUTE
          58           RS       1    FLOW
          59           RC   0.045   0.045   0.045     800  0.0275    0.00
          60           RX    0.00   30.00   60.00   65.00   90.00   95.00  110.00  130.00
          61           RY   10.20   10.10   10.00    9.00    9.00   10.00   10.10   10.20
                       *

          62           KK    ON11   BASIN
          63           BA   0.004
          64           LG    0.30    0.19    6.54    0.13      17
          65           UC   0.158   0.189
          66           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          67           UA     100
                       *

          68           KK    DB10 STORAGE
          69           KO
          70           RS       1    STOR
          71           SV            0.02    0.04    0.07    0.10    0.05    0.19    0.19
          72           SQ                            1.00    1.00    1.00    1.00   15.00
          73           SE            0.50    1.00    1.50    2.00    2.50    2.95    3.00
                       *

          74           KK    ON10   BASIN
          75           BA   0.003
          76           LG    0.15    0.37    6.54    0.14       0
          77           UC   0.248   0.472
          78           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          79           UA     100
                       *
1                                           HEC-1 INPUT                                          PAGE  3

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

```
  80           KK    CP10 COMBINE
  81           HC       3
               *

  82           KK    ON15   BASIN
  83           BA   0.001
  84           LG    0.30    0.19    6.54    0.13      17
  85           UC   0.138   0.251
  86           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  87           UA     100
               *

  88           KK    ON20   BASIN
  89           BA   0.001
  90           LG    0.30    0.19    6.54    0.13      17
  91           UC   0.154   0.316
  92           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  93           UA     100
               *

  94           KK    ON25   BASIN
  95           BA   0.001
  96           LG    0.30    0.19    6.54    0.13      17
  97           UC   0.120   0.215
  98           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  99           UA     100
               *

 100           KK   OFF35   BASIN
 101           BA   0.031
 102           LG    0.20    0.31    6.54    0.14       5
 103           UC   0.456   0.937
 104           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 105           UA     100
               *

 106           KK     R35   ROUTE
 107           RS       1    FLOW
 108           RC   0.045   0.045   0.045     400  0.0250    0.00
 109           RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
 110           RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
               *

 111           KK    ON27   BASIN
 112           BA   0.001
 113           LG    0.15    0.37    6.54    0.14       0
 114           UC   0.178   0.371
 115           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 116           UA     100
               *
1                                                        HEC-1 INPUT                                        PAGE  4

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


 117           KK    CP27 COMBINE
 118           HC       2
               *

 119           KK     R30   ROUTE
 120           RS       1    FLOW
 121           RC   0.045   0.045   0.045     300  0.0250    0.00
 122           RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
 123           RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
               *

 124           KK    ON26   BASIN
 125           BA   0.008
 126           LG    0.30    0.19    6.54    0.13      17
 127           UC   0.246   0.309
 128           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 129           UA     100
               *
```

```
 130            KK    DB26 STORAGE
 131            KO
 132            RS       1    STOR
 133            SV            0.10    0.17    0.30    0.41    0.56    0.70    0.71
 134            SQ                            1.00    1.00    2.00    2.00    2.00
 135            SE            0.50    1.00    1.50    2.00    2.50    2.90    3.00
                *

 136            KK     R30   ROUTE
 137            RS       1    FLOW
 138            RC   0.045   0.045   0.045     300  0.0250    0.00
 139            RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
 140            RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
                *

 141            KK    ON30   BASIN
 142            BA   0.002
 143            LG    0.30    0.19    6.54    0.13      17
 144            UC   0.196   0.333
 145            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 146            UA     100
                *

 147            KK    CP30 COMBINE
 148            HC       3
                *

 149            KK      X1 COMBINE
 150            HC       5
                *
```



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


 151            KK   OFF40   BASIN
 152            BA   0.004
 153            LG    0.30    0.19    6.54    0.13      17
 154            UC   0.147   0.226
 155            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 156            UA     100
                *

 157            KK     R40   ROUTE
 158            RS       1    FLOW
 159            RC   0.045   0.045   0.045     500  0.0250    0.00
 160            RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
 161            RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
                *

 162            KK    ON28   BASIN
 163            BA   0.001
 164            LG    0.15    0.37    6.54    0.14       0
 165            UC   0.202   0.511
 166            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 167            UA     100
                *

 168            KK    CP28 COMBINE
 169            HC       2
                *

 170            KK    ON35   BASIN
 171            BA   0.003
 172            LG    0.30    0.19    6.54    0.13      17
 173            UC   0.129   0.138
 174            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 175            UA     100
                *

 176            KK    DB35 STORAGE
 177            KO
 178            RS       1    STOR
 179            SV            0.03    0.05    0.10    0.13    0.18    0.22    0.22
 180            SQ                            1.00    1.00    2.00    2.00    2.00
```

```
 181           SE           0.50    1.00    1.50    2.00    2.50    2.90    3.00
               *

 182           KK    CO35 COMBINE
 183           HC       2
               *

 184           KK    ON40   BASIN
 185           BA   0.003
 186           LG    0.30    0.25    4.72    0.30      17
 187           UC   0.168   0.221
 188           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 189           UA     100
               *
```



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

 190           KK   OFF30   BASIN
 191           BA   0.036
 192           LG    0.19    0.32    6.54    0.14       4
 193           UC   0.398   0.672
 194           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 195           UA     100
               *

 196           KK    RO45   ROUTE
 197           RS       1    FLOW
 198           RC   0.045   0.045   0.045    1773  0.0300    0.00
 199           RX  610.00  620.00  637.00  650.00  663.00  679.00  689.00  697.00
 200           RY  139.00  138.70  138.30  138.50  138.80  139.00  138.90  138.90
               *

 201           KK   OFF45   BASIN
 202           BA   0.081
 203           LG    0.26    0.29    5.46    0.21      12
 204           UC   0.392   0.526
 205           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 206           UA     100
               *

 207           KK   CPO45 COMBINE
 208           HC       2
               *

 209           KK     R45   ROUTE
 210           RS       1    FLOW
 211           RC   0.045   0.045   0.045     650  0.0250    0.00
 212           RX    0.00    2.00   10.00   18.00   24.00   32.00   40.00   45.00
 213           RY   10.20   10.10   10.00    7.50    7.50   10.00   10.10   10.20
               *

 214           KK   OFF50   BASIN
 215           BA   0.001
 216           LG    0.30    0.19    6.54    0.13      17
 217           UC   0.112   0.222
 218           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 219           UA     100
               *

 220           KK     R45   ROUTE
 221           RS       1    FLOW
 222           RC   0.045   0.045   0.045     650  0.0250    0.00
 223           RX    0.00    2.00   10.00   18.00   24.00   32.00   40.00   45.00
 224           RY   10.20   10.10   10.00    7.50    7.50   10.00   10.10   10.20
               *
```



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

 225           KK    ON45   BASIN
 226           BA   0.001
 227           LG    0.15    0.35    4.72    0.32       0
```

```
            228           UC   0.252   0.753
            229           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
            230           UA     100
                          *

            231           KK    CP45 COMBINE
            232           HC       3
                          *
            233           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    23       OFF10
                 .
                 .
    30           .------->  DTFF10
    29      DOFF10
                 .
                 .
    33           .       OFF15
                 .           V
                 .           V
    39           .         R15
                 .           .
                 .           .
    44           .           .       OFF20
                 .           .           V
                 .           .           V
    50           .           .         R20
                 .           .           .
                 .           .           .
    55       CP011.......................
                 V
                 V
    57         R10
                 .
                 .
    62           .        ON11
                 .           V
                 .           V
    68           .        DB10
                 .           .
                 .           .
    74           .           .        ON10
                 .           .           .
                 .           .           .
    80        CP10.......................
                 .
                 .
    82           .        ON15
                 .           .
                 .           .
    88           .           .        ON20
                 .           .           .
                 .           .           .
    94           .           .           .        ON25
                 .           .           .           .
                 .           .           .           .
   100           .           .           .           .      OFF35
                 .           .           .           .          V
                 .           .           .           .          V
   106           .           .           .           .        R35
                 .           .           .           .          .
                 .           .           .           .          .
   111           .           .           .           .          .        ON27
                 .           .           .           .          .           .
                 .           .           .           .          .           .
   117           .           .           .           .       CP27............
                 .           .           .           .          V
                 .           .           .           .          V
   119           .           .           .           .        R30
```

```
                 .           .           .           .           .
                 .           .           .           .           .
  124            .           .           .           .           .        ON26
                 .           .           .           .           .           V
                 .           .           .           .           .           V
  130            .           .           .           .           .        DB26
                 .           .           .           .           .           V
                 .           .           .           .           .           V
  136            .           .           .           .           .         R30
                 .           .           .           .           .           .
                 .           .           .           .           .           .
  141            .           .           .           .           .           .        ON30
                 .           .           .           .           .           .           .
                 .           .           .           .           .           .           .
  147            .           .           .           .        CP30.......................
                 .           .           .           .           .
                 .           .           .           .           .
  149           X1...............................................
                 .
                 .
  151            .        OFF40
                 .           V
                 .           V
  157            .         R40
                 .           .
                 .           .
  162            .           .        ON28
                 .           .           .
                 .           .           .
  168            .        CP28...........
                 .           .
                 .           .
  170            .           .        ON35
                 .           .           V
                 .           .           V
  176            .           .        DB35
                 .           .           .
                 .           .           .
  182            .        CO35...........
                 .           .
                 .           .
  184            .           .        ON40
                 .           .           .
                 .           .           .
  190            .           .           .       OFF30
                 .           .           .           V
                 .           .           .           V
  196            .           .           .        RO45
                 .           .           .           .
                 .           .           .           .
  201            .           .           .           .       OFF45
                 .           .           .           .           .
                 .           .           .           .           .
  207            .           .           .       CPO45...........
                 .           .           .           V
                 .           .           .           V
  209            .           .           .         R45
                 .           .           .           .
                 .           .           .           .
  214            .           .           .           .       OFF50
                 .           .           .           .           V
                 .           .           .           .           V
  220            .           .           .           .         R45
                 .           .           .           .           .
                 .           .           .           .           .
  225            .           .           .           .           .        ON45
                 .           .           .           .           .           .
                 .           .           .           .           .           .
  231            .           .           .        CP45.......................

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                                   ******************************
 *                                       *                                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *    U.S. ARMY CORPS OF ENGINEER
 *             JUN   1998                *                                                   *    HYDROLOGIC ENGINEERING CENT
```

5-PP-2020_V2
12/29/20

```
 *           VERSION 4.1              *                                                  *        609 SECOND STREET
 *                                    *                                                  *      DAVIS, CALIFORNIA 95616
 *  RUN DATE   29JUL20  TIME  10:51:04   *                                               *          (916) 756-1104
 *                                    *                                                  *
 ****************************************                                                ********************************



                                 City of Scottsdale
                                 SOLITUDE PROP - Solitude Proposed Conditions Hydrology
                                 10 YEAR
                                 6 Hour  Storm
                                 Unit Hydrograph: Clark
                                 Storm: Multiple
                                 07/29/2020

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

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

                  COMPUTATION INTERVAL     .03 HOURS
                       TOTAL TIME BASE   66.63 HOURS

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

   11 JD          INDEX STORM NO. 1
                         STRM       2.00  PRECIPITATION DEPTH
                         TRDA        .00  TRANSPOSITION DRAINAGE AREA

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

   15 JD          INDEX STORM NO. 2
                         STRM       1.98  PRECIPITATION DEPTH
                         TRDA        .50  TRANSPOSITION DRAINAGE AREA

   16 PI            PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                     .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                     .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                     .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  19 JD          INDEX STORM NO. 3
                        STRM        1.95  PRECIPITATION DEPTH
                        TRDA        2.80  TRANSPOSITION DRAINAGE AREA

  20 PI            PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                     .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                     .03       .03       .03       .03       .03       .03       .03       .03       .03       .03
                     .02       .02       .02       .02       .02       .02       .02       .01       .01       .01
                     .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00


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


            **************
            *            *
  68 KK     *    DB10    *     STORAGE
            *            *
            **************

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


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


            **************
            *            *
 130 KK     *    DB26    *     STORAGE
            *            *
            **************

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

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** 


             **************
             *            *
  176 KK     *      DB35  *      STORAGE
             *            *
             **************

  177 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
1
```

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	OFF10	439.	4.47	85.	22.	8.	.90		
+	DIVERSION TO	DTFF10	374.	4.47	72.	18.	7.	.90		
+	HYDROGRAPH AT	DOFF10	66.	4.47	13.	3.	1.	.90		
+	HYDROGRAPH AT	OFF15	3.	4.13	0.	0.	0.	.00		
+	ROUTED TO	R15	3.	4.17	0.	0.	0.	.00		
+	HYDROGRAPH AT	OFF20	7.	4.17	1.	0.	0.	.01		
+	ROUTED TO	R20	7.	4.20	1.	0.	0.	.01		
+	3 COMBINED AT	CP011	71.	4.47	14.	3.	1.	.91		
+	ROUTED TO	R10	70.	4.50	14.	3.	1.	.91		
+	HYDROGRAPH AT	ON11	6.	4.07	0.	0.	0.	.00		
+	ROUTED TO	DB10	1.	4.03	0.	0.	0.	.00		
+	HYDROGRAPH AT	ON10	2.	4.17	0.	0.	0.	.00		
+	3 COMBINED AT	CP10	72.	4.50	14.	4.	1.	.92		
+	HYDROGRAPH AT	ON15	1.	4.07	0.	0.	0.	.00		
+	HYDROGRAPH AT	ON20	1.	4.10	0.	0.	0.	.00		
+	HYDROGRAPH AT	ON25	1.	4.07	0.	0.	0.	.00		
+	HYDROGRAPH AT	OFF35	14.	4.33	3.	1.	0.	.03		
+	ROUTED TO	R35	14.	4.37	3.	1.	0.	.03		

```
         HYDROGRAPH AT
+                         ON27      1.    4.10        0.        0.        0.      .00

         2 COMBINED AT
+                         CP27     15.    4.37        3.        1.        0.      .03

         ROUTED TO
+                          R30     15.    4.37        3.        1.        0.      .03

         HYDROGRAPH AT
+                         ON26      9.    4.17        1.        0.        0.      .01

         ROUTED TO
+                         DB26      1.    4.37        1.        0.        0.      .01

         ROUTED TO
+                          R30      1.    4.53        1.        0.        0.      .01

         HYDROGRAPH AT
+                         ON30      2.    4.13        0.        0.        0.      .00

         3 COMBINED AT
+                         CP30     17.    4.37        4.        1.        0.      .04

         5 COMBINED AT
+                           X1     86.    4.50       18.        5.        2.      .96

         HYDROGRAPH AT
+                        OFF40      6.    4.07        0.        0.        0.      .00

         ROUTED TO
+                          R40      5.    4.10        0.        0.        0.      .00

         HYDROGRAPH AT
+                         ON28      1.    4.13        0.        0.        0.      .00

         2 COMBINED AT
+                         CP28      6.    4.10        1.        0.        0.      .01

         HYDROGRAPH AT
+                         ON35      5.    4.07        0.        0.        0.      .00

         ROUTED TO
+                         DB35      1.    4.37        0.        0.        0.      .00

         2 COMBINED AT
+                         CO35      7.    4.10        1.        0.        0.      .01

         HYDROGRAPH AT
+                         ON40      4.    4.10        0.        0.        0.      .00

         HYDROGRAPH AT
+                        OFF30     21.    4.27        3.        1.        0.      .04

         ROUTED TO
+                         RO45     17.    4.50        3.        1.        0.      .04

         HYDROGRAPH AT
+                        OFF45     55.    4.27        8.        2.        1.      .08

         2 COMBINED AT
+                        CPO45     67.    4.30       11.        3.        1.      .12

         ROUTED TO
+                          R45     66.    4.33       11.        3.        1.      .12

         HYDROGRAPH AT
+                        OFF50      1.    4.07        0.        0.        0.      .00

         ROUTED TO
+                          R45      1.    4.13        0.        0.        0.      .00

         HYDROGRAPH AT
+                         ON45      0.    4.17        0.        0.        0.      .00
```

```
         3 COMBINED AT
+                            CP45        67.    4.33          11.          3.          1.         .12
```

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

```
1*****************************************                                                   ********************************
 *                                       *                                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *    U.S. ARMY CORPS OF ENGINEER
 *              JUN   1998               *                                                   *    HYDROLOGIC ENGINEERING CENT
 *           VERSION 4.1                 *                                                   *         609 SECOND STREET
 *                                       *                                                   *       DAVIS, CALIFORNIA 95616
 *   RUN DATE   29JUL20  TIME  10:51:53  *                                                   *           (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        SOLITUDE PROP - Solitude Proposed Conditions Hydrology
             3           ID        100 YEAR
             4           ID        6 Hour  Storm
             5           ID        Unit Hydrograph: Clark
             6           ID        Storm: Multiple
             7           ID        07/29/2020
                         *DIAGRAM
             8           IT       2  1JAN99       0    2000
             9           IO       5
            10           IN      15
                         *
            11           JD   3.024  0.0001
            12           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            13           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            14           PC   0.962   0.972   0.983   0.991   1.000
            15           JD   3.006  0.5000
            16           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            17           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            18           PC   0.962   0.972   0.983   0.991   1.000
            19           JD   2.948     2.8
            20           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
            21           PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
            22           PC   0.950   0.963   0.975   0.988   1.000
                         *

            23           KK   OFF10   BASIN
            24           BA   0.900
            25           LG    0.30    0.28    5.58    0.23      21
            26           UC   0.515   0.478
            27           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
            28           UA     100
                         *

            29           KK  DOFF10  DIVERT
            30           DT  DTFF10     0.0     0.0
            31           DI     0.0   100.0   200.0   500.0  1000.0  2000.0  4000.0 10000.0 20000.0 50000.0
```

5-PP-2020_V2
12/29/20

```
      32         DQ     0.0    85.0   170.0   425.0   850.0  1700.0  3400.0  8500.0 17000.0 42500.0
                 *

      33         KK   OFF15   BASIN
      34         BA   0.003
      35         LG    0.15    0.37    6.54    0.14       0
      36         UC   0.161   0.244
      37         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
      38         UA     100
                 *

      39         KK     R15   ROUTE
      40         RS       1    FLOW
      41         RC   0.045   0.045   0.045     370  0.0200    0.00
      42         RX    0.00    2.00    8.00   10.00   12.00   16.00   20.00   30.00
      43         RY   10.00   10.00   10.00    9.00    9.00   10.00   10.00   10.00
                 *
1                                        HEC-1 INPUT                                           PAGE  2

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


      44         KK   OFF20   BASIN
      45         BA   0.008
      46         LG    0.15    0.37    6.54    0.14       0
      47         UC   0.201   0.281
      48         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
      49         UA     100
                 *

      50         KK     R20   ROUTE
      51         RS       1    FLOW
      52         RC   0.045   0.045   0.045     500  0.0200    0.00
      53         RX    0.00    2.00    8.00   10.00   12.00   16.00   20.00   30.00
      54         RY   10.00   10.00   10.00    9.00    9.00   10.00   10.00   10.00
                 *

      55         KK   CP011 COMBINE
      56         HC       3
                 *

      57         KK     R10   ROUTE
      58         RS       1    FLOW
      59         RC   0.045   0.045   0.045     800  0.0275    0.00
      60         RX    0.00   30.00   60.00   65.00   90.00   95.00  110.00  130.00
      61         RY   10.20   10.10   10.00    9.00    9.00   10.00   10.10   10.20
                 *

      62         KK    ON11   BASIN
      63         BA   0.004
      64         LG    0.30    0.19    6.54    0.13      17
      65         UC   0.126   0.148
      66         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
      67         UA     100
                 *

      68         KK    DB10 STORAGE
      69         KO
      70         RS       1    STOR
      71         SV            0.02    0.04    0.07    0.10    0.05    0.19    0.19
      72         SQ                            1.00    1.00    1.00    1.00   15.00
      73         SE            0.50    1.00    1.50    2.00    2.50    2.95    3.00
                 *

      74         KK    ON10   BASIN
      75         BA   0.003
      76         LG    0.15    0.37    6.54    0.14       0
      77         UC   0.191   0.353
      78         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
      79         UA     100
                 *
1                                        HEC-1 INPUT                                           PAGE  3

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

```
  80            KK    CP10 COMBINE
  81            HC       3
                *

  82            KK    ON15   BASIN
  83            BA   0.001
  84            LG    0.30    0.19    6.54    0.13      17
  85            UC   0.110   0.196
  86            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  87            UA     100
                *

  88            KK    ON20   BASIN
  89            BA   0.001
  90            LG    0.30    0.19    6.54    0.13      17
  91            UC   0.123   0.247
  92            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  93            UA     100
                *

  94            KK    ON25   BASIN
  95            BA   0.001
  96            LG    0.30    0.19    6.54    0.13      17
  97            UC   0.096   0.168
  98            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  99            UA     100
                *

 100            KK   OFF35   BASIN
 101            BA   0.031
 102            LG    0.20    0.31    6.54    0.14       5
 103            UC   0.355   0.711
 104            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 105            UA     100
                *

 106            KK     R35   ROUTE
 107            RS       1    FLOW
 108            RC   0.045   0.045   0.045     400  0.0250    0.00
 109            RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
 110            RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
                *

 111            KK    ON27   BASIN
 112            BA   0.001
 113            LG    0.15    0.37    6.54    0.14       0
 114            UC   0.137   0.277
 115            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 116            UA     100
                *
1                                                       HEC-1 INPUT                                          PAGE  4

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


 117            KK    CP27 COMBINE
 118            HC       2
                *

 119            KK     R30   ROUTE
 120            RS       1    FLOW
 121            RC   0.045   0.045   0.045     300  0.0250    0.00
 122            RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
 123            RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
                *

 124            KK    ON26   BASIN
 125            BA   0.008
 126            LG    0.30    0.19    6.54    0.13      17
 127            UC   0.196   0.241
 128            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 129            UA     100
                *
```

```
 130           KK    DB26 STORAGE
 131           KO
 132           RS       1    STOR
 133           SV            0.10    0.17    0.30    0.41    0.56    0.70    0.71
 134           SQ                            1.00    1.00    2.00    2.00    2.00
 135           SE            0.50    1.00    1.50    2.00    2.50    2.90    3.00
               *

 136           KK     R30   ROUTE
 137           RS       1    FLOW
 138           RC   0.045   0.045   0.045     300  0.0250    0.00
 139           RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
 140           RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
               *

 141           KK    ON30   BASIN
 142           BA   0.002
 143           LG    0.30    0.19    6.54    0.13      17
 144           UC   0.157   0.260
 145           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 146           UA     100
               *

 147           KK    CP30 COMBINE
 148           HC       3
               *

 149           KK      X1 COMBINE
 150           HC       5
               *
```



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


 151           KK   OFF40   BASIN
 152           BA   0.004
 153           LG    0.30    0.19    6.54    0.13      17
 154           UC   0.118   0.176
 155           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 156           UA     100
               *

 157           KK     R40   ROUTE
 158           RS       1    FLOW
 159           RC   0.045   0.045   0.045     500  0.0250    0.00
 160           RX    0.00   10.00   20.00   26.00   30.00   34.00   40.00   50.00
 161           RY   10.20   10.10   10.00    8.00    8.00   10.00   10.10   10.20
               *

 162           KK    ON28   BASIN
 163           BA   0.001
 164           LG    0.15    0.37    6.54    0.14       0
 165           UC   0.156   0.382
 166           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 167           UA     100
               *

 168           KK    CP28 COMBINE
 169           HC       2
               *

 170           KK    ON35   BASIN
 171           BA   0.003
 172           LG    0.30    0.19    6.54    0.13      17
 173           UC   0.103   0.108
 174           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 175           UA     100
               *

 176           KK    DB35 STORAGE
 177           KO
 178           RS       1    STOR
 179           SV            0.03    0.05    0.10    0.13    0.18    0.22    0.22
 180           SQ                            1.00    1.00    2.00    2.00    2.00
```

```
         181           SE           0.50    1.00    1.50    2.00    2.50    2.90    3.00
                       *

         182           KK     CO35 COMBINE
         183           HC        2
                       *

         184           KK     ON40   BASIN
         185           BA    0.003
         186           LG     0.30    0.25    4.72    0.30      17
         187           UC    0.131   0.168
         188           UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
         189           UA      100
                       *
```



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


         190           KK    OFF30   BASIN
         191           BA    0.036
         192           LG     0.19    0.32    6.54    0.14       4
         193           UC    0.309   0.509
         194           UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
         195           UA      100
                       *

         196           KK     RO45   ROUTE
         197           RS        1    FLOW
         198           RC    0.045   0.045   0.045    1773  0.0300    0.00
         199           RX   610.00  620.00  637.00  650.00  663.00  679.00  689.00  697.00
         200           RY   139.00  138.70  138.30  138.50  138.80  139.00  138.90  138.90
                       *

         201           KK    OFF45   BASIN
         202           BA    0.081
         203           LG     0.26    0.29    5.46    0.21      12
         204           UC    0.303   0.396
         205           UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
         206           UA      100
                       *

         207           KK    CPO45 COMBINE
         208           HC        2
                       *

         209           KK      R45   ROUTE
         210           RS        1    FLOW
         211           RC    0.045   0.045   0.045     650  0.0250    0.00
         212           RX     0.00    2.00   10.00   18.00   24.00   32.00   40.00   45.00
         213           RY    10.20   10.10   10.00    7.50    7.50   10.00   10.10   10.20
                       *

         214           KK    OFF50   BASIN
         215           BA    0.001
         216           LG     0.30    0.19    6.54    0.13      17
         217           UC    0.090   0.173
         218           UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
         219           UA      100
                       *

         220           KK      R45   ROUTE
         221           RS        1    FLOW
         222           RC    0.045   0.045   0.045     650  0.0250    0.00
         223           RX     0.00    2.00   10.00   18.00   24.00   32.00   40.00   45.00
         224           RY    10.20   10.10   10.00    7.50    7.50   10.00   10.10   10.20
                       *
```



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


         225           KK     ON45   BASIN
         226           BA    0.001
         227           LG     0.15    0.35    4.72    0.32       0
```

```
          228           UC   0.190   0.552
          229           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          230           UA     100
                        *

          231           KK    CP45 COMBINE
          232           HC       3
                        *
          233           ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    23       OFF10
                 .
                 .
    30           .------->  DTFF10
    29      DOFF10
                 .
                 .
    33           .       OFF15
                 .           V
                 .           V
    39           .         R15
                 .           .
                 .           .
    44           .           .       OFF20
                 .           .           V
                 .           .           V
    50           .           .         R20
                 .           .           .
                 .           .           .
    55       CP011........................
                 V
                 V
    57         R10
                 .
                 .
    62           .        ON11
                 .           V
                 .           V
    68           .        DB10
                 .           .
                 .           .
    74           .           .        ON10
                 .           .           .
                 .           .           .
    80        CP10........................
                 .
                 .
    82           .        ON15
                 .           .
                 .           .
    88           .           .        ON20
                 .           .           .
                 .           .           .
    94           .           .           .        ON25
                 .           .           .           .
                 .           .           .           .
   100           .           .           .           .       OFF35
                 .           .           .           .           V
                 .           .           .           .           V
   106           .           .           .           .         R35
                 .           .           .           .           .
                 .           .           .           .           .
   111           .           .           .           .           .        ON27
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   117           .           .           .           .        CP27............
                 .           .           .           .           V
                 .           .           .           .           V
   119           .           .           .           .         R30
```

```
                 .           .           .           .           .
                 .           .           .           .           .
   124           .           .           .           .           .        ON26
                 .           .           .           .           .           V
                 .           .           .           .           .           V
   130           .           .           .           .           .        DB26
                 .           .           .           .           .           V
                 .           .           .           .           .           V
   136           .           .           .           .           .         R30
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   141           .           .           .           .           .           .        ON30
                 .           .           .           .           .           .           .
                 .           .           .           .           .           .           .
   147           .           .           .           .        CP30........................
                 .           .           .           .           .
                 .           .           .           .           .
   149          X1................................................
                 .
                 .
   151           .       OFF40
                 .           V
                 .           V
   157           .         R40
                 .           .
                 .           .
   162           .           .        ON28
                 .           .           .
                 .           .           .
   168           .        CP28............
                 .           .
                 .           .
   170           .           .        ON35
                 .           .           V
                 .           .           V
   176           .           .        DB35
                 .           .           .
                 .           .           .
   182           .        CO35............
                 .           .
                 .           .
   184           .           .        ON40
                 .           .           .
                 .           .           .
   190           .           .           .       OFF30
                 .           .           .           V
                 .           .           .           V
   196           .           .           .        RO45
                 .           .           .           .
                 .           .           .           .
   201           .           .           .           .       OFF45
                 .           .           .           .           .
                 .           .           .           .           .
   207           .           .           .       CPO45............
                 .           .           .           V
                 .           .           .           V
   209           .           .           .         R45
                 .           .           .           .
                 .           .           .           .
   214           .           .           .           .       OFF50
                 .           .           .           .           V
                 .           .           .           .           V
   220           .           .           .           .         R45
                 .           .           .           .           .
                 .           .           .           .           .
   225           .           .           .           .           .        ON45
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   231           .           .           .        CP45........................

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                                   ********************************
 *                                       *                                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *    U.S. ARMY CORPS OF ENGINEER
 *             JUN   1998                *                                                   *    HYDROLOGIC ENGINEERING CENT
```

5-PP-2020_V2
12/29/20

```
 *           VERSION 4.1              *                                        *        609 SECOND STREET
 *                                    *                                        *      DAVIS, CALIFORNIA 95616
 *  RUN DATE   29JUL20  TIME  10:51:53 *                                       *          (916) 756-1104
 *                                    *                                        *
 ****************************************                                      *******************************



                                City of Scottsdale
                                SOLITUDE PROP - Solitude Proposed Conditions Hydrology
                                100 YEAR
                                6 Hour  Storm
                                Unit Hydrograph: Clark
                                Storm: Multiple
                                07/29/2020

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

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

                  COMPUTATION INTERVAL     .03 HOURS
                       TOTAL TIME BASE   66.63 HOURS

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

   11 JD          INDEX STORM NO. 1
                         STRM       3.02  PRECIPITATION DEPTH
                         TRDA        .00  TRANSPOSITION DRAINAGE AREA

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

   15 JD          INDEX STORM NO. 2
                         STRM       3.01  PRECIPITATION DEPTH
                         TRDA        .50  TRANSPOSITION DRAINAGE AREA

   16 PI            PRECIPITATION PATTERN
                        .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                        .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
```

```
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                              .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                              .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                              .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

   19 JD         INDEX STORM NO. 3
                        STRM        2.95  PRECIPITATION DEPTH
                        TRDA        2.80  TRANSPOSITION DRAINAGE AREA

   20 PI           PRECIPITATION PATTERN
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                              .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                              .03       .03       .03       .03       .03       .03       .03       .03       .03       .03
                              .02       .02       .02       .02       .02       .02       .02       .01       .01       .01
                              .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                              .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                              .00       .00       .00       .00       .00       .00       .00       .00       .00       .00


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


             **************
             *            *
   68 KK     *      DB10  *      STORAGE
             *            *
             **************

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


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


             **************
             *            *
  130 KK     *      DB26  *      STORAGE
             *            *
             **************

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

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


             **************
             *            *
 176 KK      *      DB35  *      STORAGE
             *            *
             **************

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

5-PP-2020_V2
12/29/20

Appendix C – Hydraulics

Flowmaster Cross Sections (Existing and Proposed Conditions)

- Flowmaster Output
- Cross Sections

HY-8 Output:

- Preliminary Culvert Calculations

HY-8 Culvert Calculation Output

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 29 cfs

Design Flow: 68 cfs

Maximum Flow: 158 cfs

Table 1 - Summary of Culvert Flows at Crossing: Culvert A

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert A Discharge (cfs)	Roadway Discharge (cfs)	Iterations
102.33	29.00	29.00	0.00	1
102.64	41.90	41.90	0.00	1
102.93	54.80	54.80	0.00	1
103.19	67.70	67.70	0.00	1
103.19	68.00	68.00	0.00	1
103.65	93.50	93.50	0.00	1
103.88	106.40	106.40	0.00	1
104.12	119.30	119.30	0.00	1
104.38	132.20	132.20	0.00	1
104.66	145.10	145.10	0.00	1
104.96	158.00	158.00	0.00	1
105.00	159.42	159.42	0.00	Overtopping

Rating Curve Plot for Crossing: Culvert A

Table 2 - Culvert Summary Table: Culvert A

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
29.00	29.00	102.33	1.327	0.029	1-S2n	0.682	0.980	0.714	0.495	7.233	4.187
41.90	41.90	102.64	1.641	0.290	1-S2n	0.821	1.187	0.869	0.621	7.938	4.819
54.80	54.80	102.93	1.934	0.544	1-S2n	0.944	1.369	1.007	0.734	8.470	5.333
67.70	67.70	103.19	2.189	0.796	1-S2n	1.055	1.528	1.134	0.838	8.902	5.773
68.00	68.00	103.19	2.195	0.801	1-S2n	1.058	1.531	1.137	0.840	8.911	5.783
93.50	93.50	103.65	2.649	1.318	1-S2n	1.258	1.808	1.367	1.026	9.609	6.507
106.40	106.40	103.88	2.877	1.593	1-S2n	1.354	1.932	1.476	1.114	9.911	6.822
119.30	119.30	104.12	3.118	1.882	5-S2n	1.446	2.051	1.582	1.198	10.180	7.112
132.20	132.20	104.38	3.376	2.180	5-S2n	1.537	2.160	1.684	1.279	10.448	7.381
145.10	145.10	104.66	3.658	2.860	5-S2n	1.628	2.262	1.784	1.358	10.702	7.632
158.00	158.00	104.96	3.964	3.135	5-S2n	1.718	2.356	1.882	1.434	10.943	7.868

****

Straight Culvert

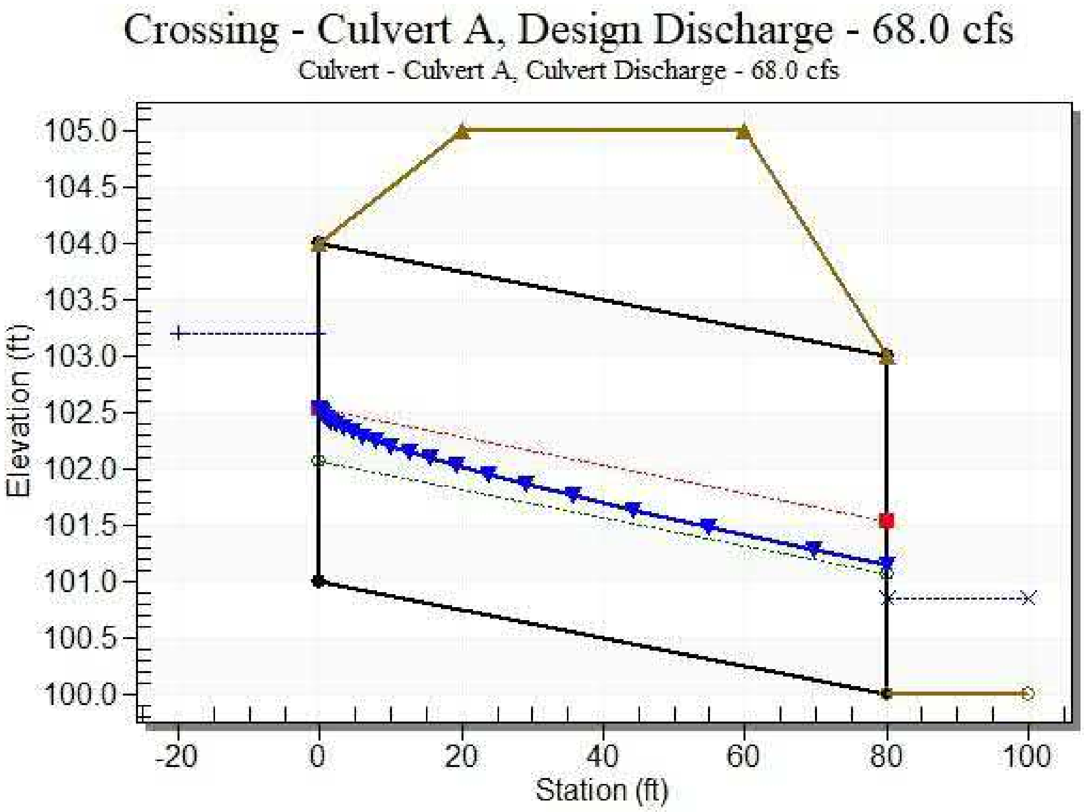
Inlet Elevation (invert): 101.00 ft, Outlet Elevation (invert): 100.00 ft

Culvert Length: 80.01 ft, Culvert Slope: 0.0125

****

Culvert Performance Curve Plot: Culvert A

Water Surface Profile Plot for Culvert: Culvert A



Site Data - Culvert A

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 101.00 ft

Outlet Station: 80.00 ft

Outlet Elevation: 100.00 ft

Number of Barrels: 3

Culvert Data Summary - Culvert A

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Culvert A)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
29.00	100.49	0.49	4.19	0.62	1.05
41.90	100.62	0.62	4.82	0.78	1.08
54.80	100.73	0.73	5.33	0.92	1.10
67.70	100.84	0.84	5.77	1.05	1.11
68.00	100.84	0.84	5.78	1.05	1.11
93.50	101.03	1.03	6.51	1.28	1.13
106.40	101.11	1.11	6.82	1.39	1.14
119.30	101.20	1.20	7.11	1.50	1.15
132.20	101.28	1.28	7.38	1.60	1.15
145.10	101.36	1.36	7.63	1.69	1.15
158.00	101.43	1.43	7.87	1.79	1.16

Tailwater Channel Data - Culvert A

Tailwater Channel Option: Rectangular Channel

Bottom Width: 14.00 ft

Channel Slope: 0.0200

Channel Manning's n: 0.0300

Channel Invert Elevation: 100.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 3 cfs

Design Flow: 6 cfs

Maximum Flow: 12 cfs

Table 4 - Summary of Culvert Flows at Crossing: Culvert B

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert B Discharge (cfs)	Roadway Discharge (cfs)	Iterations
111.81	3.00	3.00	0.00	1
111.93	3.90	3.90	0.00	1
112.05	4.80	4.80	0.00	1
112.17	5.70	5.70	0.00	1
112.20	6.00	6.00	0.00	1
112.38	7.50	7.50	0.00	1
112.47	8.40	8.40	0.00	1
112.56	9.30	9.30	0.00	1
112.65	10.20	10.20	0.00	1
112.74	11.10	11.10	0.00	1
112.82	12.00	12.00	0.00	1
115.00	27.32	27.32	0.00	Overtopping

Rating Curve Plot for Crossing: Culvert B

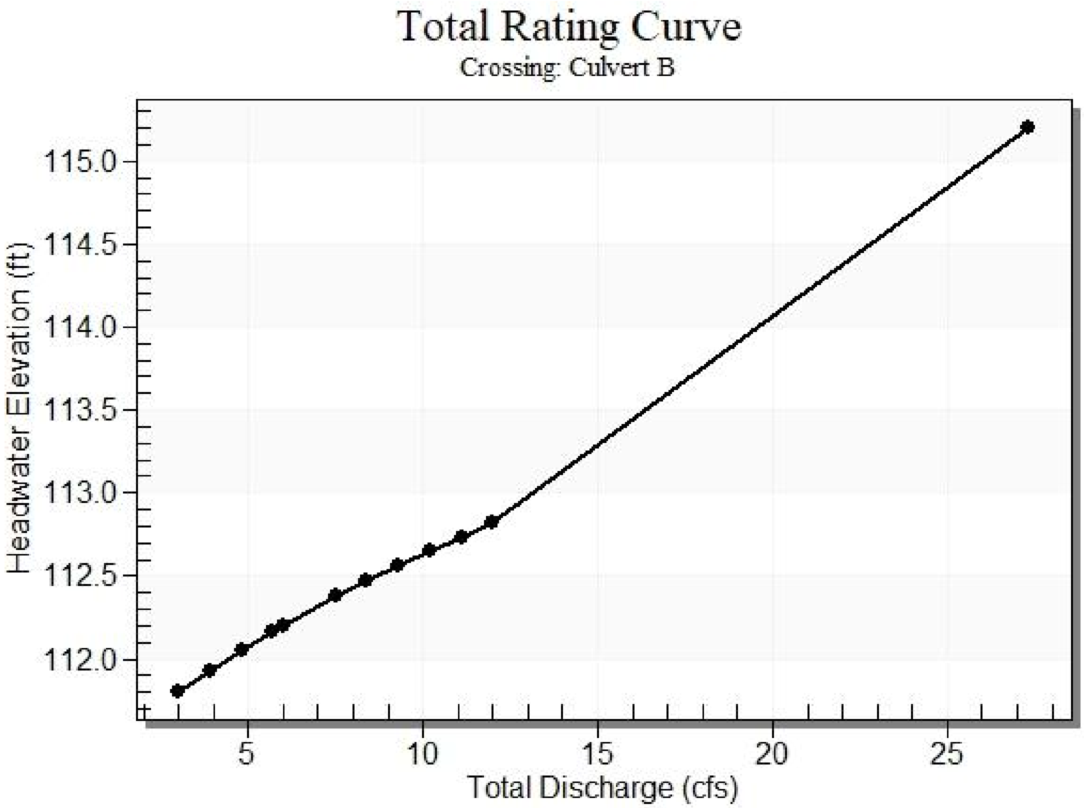


Table 5 - Culvert Summary Table: Culvert B

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
3.00	3.00	111.81	0.808	0.0*	1-S2n	0.374	0.601	0.394	0.428	6.633	3.506
3.90	3.90	111.93	0.929	0.0*	1-S2n	0.427	0.688	0.453	0.512	7.071	3.806
4.80	4.80	112.05	1.047	0.0*	1-S2n	0.473	0.765	0.507	0.592	7.425	4.051
5.70	5.70	112.17	1.167	0.0*	1-S2n	0.517	0.841	0.556	0.669	7.729	4.258
6.00	6.00	112.20	1.204	0.0*	1-S2n	0.530	0.865	0.573	0.694	7.783	4.321
7.50	7.50	112.38	1.376	0.121	1-S2n	0.595	0.974	0.649	0.816	8.203	4.595
8.40	8.40	112.47	1.471	0.217	1-S2n	0.631	1.032	0.693	0.887	8.394	4.735
9.30	9.30	112.56	1.561	0.313	1-S2n	0.666	1.086	0.735	0.957	8.577	4.860
10.20	10.20	112.65	1.649	0.413	1-S2n	0.699	1.141	0.775	1.025	8.755	4.975
11.10	11.10	112.74	1.735	0.514	1-S2n	0.731	1.191	0.815	1.093	8.925	5.079
12.00	12.00	112.82	1.822	0.616	1-S2n	0.763	1.239	0.853	1.160	9.074	5.174

* Full Flow Headwater elevation is below inlet invert.

****

Straight Culvert

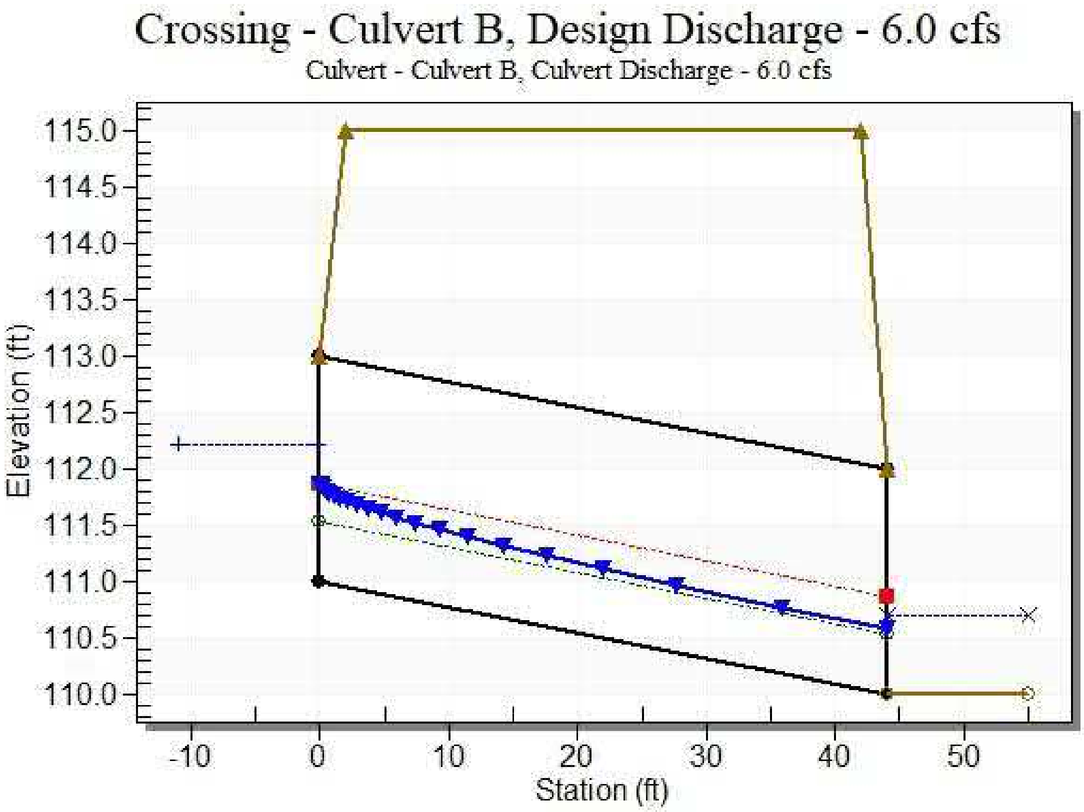
Inlet Elevation (invert): 111.00 ft,   Outlet Elevation (invert): 110.00 ft

Culvert Length: 44.01 ft,   Culvert Slope: 0.0227

****

Culvert Performance Curve Plot: Culvert B

Water Surface Profile Plot for Culvert: Culvert B



Site Data - Culvert B

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 111.00 ft

Outlet Station: 44.00 ft

Outlet Elevation: 110.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert B

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: None

Table 6 - Downstream Channel Rating Curve (Crossing: Culvert B)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
3.00	110.43	0.43	3.51	0.67	0.94
3.90	110.51	0.51	3.81	0.80	0.94
4.80	110.59	0.59	4.05	0.92	0.93
5.70	110.67	0.67	4.26	1.04	0.92
6.00	110.69	0.69	4.32	1.08	0.91
7.50	110.82	0.82	4.60	1.27	0.90
8.40	110.89	0.89	4.74	1.38	0.89
9.30	110.96	0.96	4.86	1.49	0.88
10.20	111.03	1.03	4.97	1.60	0.87
11.10	111.09	1.09	5.08	1.70	0.86
12.00	111.16	1.16	5.17	1.81	0.85

Tailwater Channel Data - Culvert B

Tailwater Channel Option: Rectangular Channel

Bottom Width: 2.00 ft

Channel Slope: 0.0250

Channel Manning's n: 0.0300

Channel Invert Elevation: 110.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 6 cfs

Design Flow: 15 cfs

Maximum Flow: 34 cfs

Table 7 - Summary of Culvert Flows at Crossing: Culvert C

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert C Discharge (cfs)	Roadway Discharge (cfs)	Iterations
110.02	6.00	6.00	0.00	1
110.25	8.80	8.80	0.00	1
110.45	11.60	11.60	0.00	1
110.65	14.40	14.40	0.00	1
110.69	15.00	15.00	0.00	1
111.02	20.00	20.00	0.00	1
111.18	22.80	22.80	0.00	1
111.33	25.60	25.60	0.00	1
111.48	28.40	28.40	0.00	1
111.63	31.20	31.20	0.00	1
111.78	34.00	34.00	0.00	1
112.00	38.08	38.08	0.00	Overtopping

Rating Curve Plot for Crossing: Culvert C

Table 8 - Culvert Summary Table: Culvert C

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
6.00	6.00	110.02	1.019	0.0*	1-S2n	0.444	0.766	0.464	0.251	8.317	2.991
8.80	8.80	110.25	1.247	0.0*	1-S2n	0.537	0.932	0.559	0.318	9.348	3.464
11.60	11.60	110.45	1.446	0.0*	1-S2n	0.615	1.075	0.651	0.377	9.913	3.848
14.40	14.40	110.65	1.651	0.0*	1-S2n	0.685	1.204	0.726	0.431	10.529	4.175
15.00	15.00	110.69	1.694	0.0*	1-S2n	0.699	1.231	0.732	0.442	10.844	4.239
20.00	20.00	111.02	2.018	0.0*	1-S2n	0.808	1.436	0.867	0.530	11.398	4.720
22.80	22.80	111.18	2.180	0.0*	1-S2n	0.864	1.536	0.930	0.575	11.792	4.954
25.60	25.60	111.33	2.333	0.0*	1-S2n	0.918	1.629	0.988	0.619	12.175	5.169
28.40	28.40	111.48	2.481	0.0*	1-S2n	0.969	1.721	1.052	0.661	12.401	5.368
31.20	31.20	111.63	2.628	0.0*	1-S2n	1.019	1.809	1.106	0.702	12.736	5.555
34.00	34.00	111.78	2.776	0.0*	1-S2n	1.066	1.890	1.166	0.742	12.929	5.729

* Full Flow Headwater elevation is below inlet invert.

****

Straight Culvert

Inlet Elevation (invert): 109.00 ft,   Outlet Elevation (invert): 106.00 ft

Culvert Length: 110.04 ft,   Culvert Slope: 0.0273

****

Culvert Performance Curve Plot: Culvert C

Water Surface Profile Plot for Culvert: Culvert C

Site Data - Culvert C

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 109.00 ft

Outlet Station: 110.00 ft

Outlet Elevation: 106.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert C

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: None

Table 9 - Downstream Channel Rating Curve (Crossing: Culvert C)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
6.00	106.25	0.25	2.99	0.39	1.05
8.80	106.32	0.32	3.46	0.50	1.08
11.60	106.38	0.38	3.85	0.59	1.10
14.40	106.43	0.43	4.17	0.67	1.12
15.00	106.44	0.44	4.24	0.69	1.12
20.00	106.53	0.53	4.72	0.83	1.14
22.80	106.58	0.58	4.95	0.90	1.15
25.60	106.62	0.62	5.17	0.97	1.16
28.40	106.66	0.66	5.37	1.03	1.16
31.20	106.70	0.70	5.55	1.10	1.17
34.00	106.74	0.74	5.73	1.16	1.17

Tailwater Channel Data - Culvert C

Tailwater Channel Option: Rectangular Channel

Bottom Width: 8.00 ft

Channel Slope: 0.0250

Channel Manning's n: 0.0300

Channel Invert Elevation: 106.00 ft

Wash Cross Sections Existing Condition

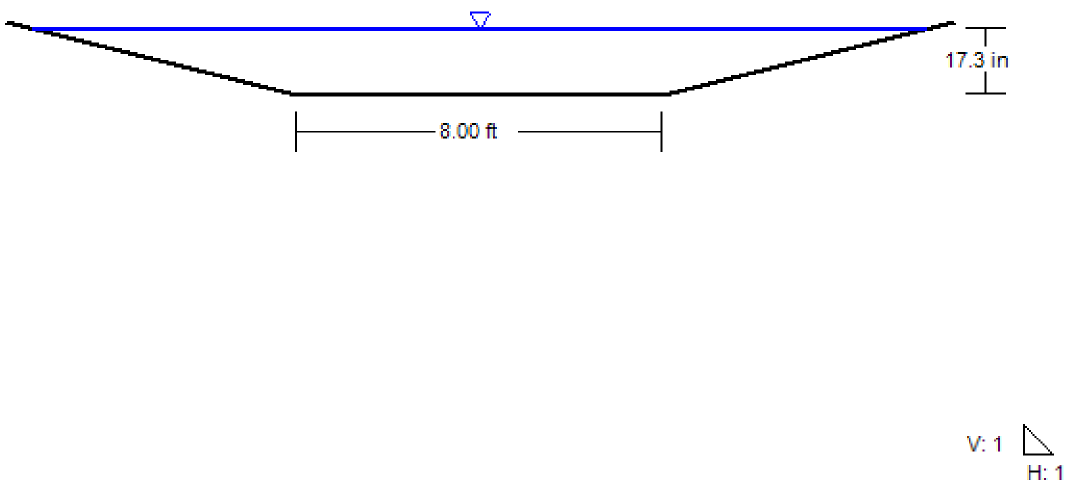
Cross Section for Chnl A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040
Channel Slope	0.040 ft/ft
Normal Depth	17.3 in
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	8.00 ft
Discharge	148.00 cfs



Worksheet for Chnl A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040
Channel Slope	0.040 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	8.00 ft
Discharge	148.00 cfs

Results

Normal Depth	17.3 in
Flow Area	19.9 ft²
Wetted Perimeter	19.9 ft
Hydraulic Radius	12.0 in
Top Width	19.56 ft
Critical Depth	20.0 in
Critical Slope	0.023 ft/ft
Velocity	7.43 ft/s
Velocity Head	0.86 ft
Specific Energy	2.30 ft
Froude Number	1.298
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

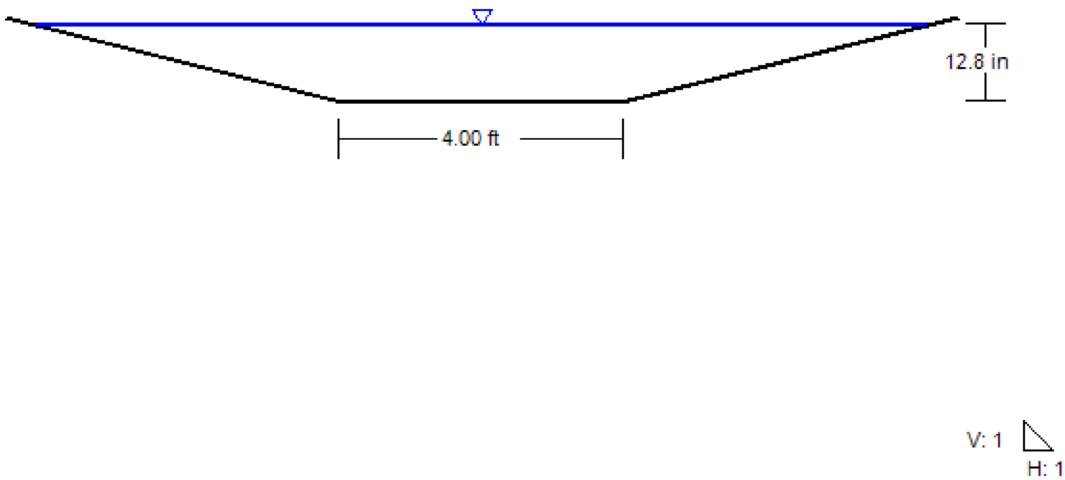
GVF Output Data

Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	17.3 in
Critical Depth	20.0 in
Channel Slope	0.040 ft/ft
Critical Slope	0.023 ft/ft

Cross Section for Chnl C

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.040
Channel Slope	0.030 ft/ft
Normal Depth	12.8 in
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	4.00 ft
Discharge	44.00 cfs



5-PP-2020_V2
12/29/20

Worksheet for Chnl C

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.040
Channel Slope	0.030 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	4.00 ft
Discharge	44.00 cfs

Results	
Normal Depth	12.8 in
Flow Area	8.8 ft²
Wetted Perimeter	12.8 ft
Hydraulic Radius	8.2 in
Top Width	12.51 ft
Critical Depth	13.1 in
Critical Slope	0.027 ft/ft
Velocity	5.01 ft/s
Velocity Head	0.39 ft
Specific Energy	1.45 ft
Froude Number	1.055
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	12.8 in
Critical Depth	13.1 in
Channel Slope	0.030 ft/ft
Critical Slope	0.027 ft/ft

Worksheet for EX A1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.022 ft/ft
Discharge	155.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	9.50
0+24	8.00
0+32	6.50
0+40	6.50
0+54	7.00
0+72	8.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 9.50)	(0+72, 8.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	13.1 in
Elevation Range	6.5 to 9.5 ft
Flow Area	26.9 ft^2
Wetted Perimeter	38.6 ft
Hydraulic Radius	8.4 in
Top Width	38.49 ft
Normal Depth	13.1 in
Critical Depth	14.4 in
Critical Slope	0.014 ft/ft
Velocity	5.77 ft/s
Velocity Head	0.52 ft
Specific Energy	1.61 ft
Froude Number	1.217
Flow Type	Supercritical

GVF Input Data

5-PP-2020_V2
12/29/20

Worksheet for EX A1

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	13.1 in
Critical Depth	14.4 in
Channel Slope	0.022 ft/ft
Critical Slope	0.014 ft/ft

Worksheet for EX C1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.035 ft/ft
Discharge	156.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	2.00
0+50	1.80
0+52	1.00
0+80	1.00
0+85	2.00
0+90	3.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.00)	(0+90, 3.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	8.7 in
Elevation Range	1.0 to 3.0 ft
Flow Area	22.2 ft²
Wetted Perimeter	33.6 ft
Hydraulic Radius	7.9 in
Top Width	33.42 ft
Normal Depth	8.7 in
Critical Depth	12.5 in
Critical Slope	0.017 ft/ft
Velocity	7.03 ft/s
Velocity Head	0.77 ft
Specific Energy	1.49 ft
Froude Number	1.520
Flow Type	Supercritical

GVF Input Data

Worksheet for EX C1

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.7 in
Critical Depth	12.5 in
Channel Slope	0.035 ft/ft
Critical Slope	0.017 ft/ft

Worksheet for EX C2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.035 ft/ft
Discharge	156.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	91.50
0+20	90.50
0+90	90.50
1+20	91.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 91.50)	(1+20, 91.00)	0.030

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	4.8 in
Elevation Range	90.5 to 91.5 ft
Flow Area	34.6 ft²
Wetted Perimeter	102.2 ft
Hydraulic Radius	4.1 in
Top Width	102.18 ft
Normal Depth	4.8 in
Critical Depth	5.8 in
Critical Slope	0.018 ft/ft
Velocity	4.50 ft/s
Velocity Head	0.32 ft
Specific Energy	0.72 ft
Froude Number	1.364
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in

5-PP-2020_V2
12/29/20

Worksheet for EX C2

GVF Input Data	
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.8 in
Critical Depth	5.8 in
Channel Slope	0.035 ft/ft
Critical Slope	0.018 ft/ft

Wash Cross Sections Proposed Condition

Worksheet for PROP A1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.040
Channel Slope	0.040 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	8.00 ft
Discharge	155.00 cfs

Results	
Normal Depth	17.8 in
Flow Area	20.6 ft^2
Wetted Perimeter	20.2 ft
Hydraulic Radius	12.2 in
Top Width	19.84 ft
Critical Depth	20.5 in
Critical Slope	0.023 ft/ft
Velocity	7.53 ft/s
Velocity Head	0.88 ft
Specific Energy	2.36 ft
Froude Number	1.302
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	17.8 in
Critical Depth	20.5 in
Channel Slope	0.040 ft/ft
Critical Slope	0.023 ft/ft

5-PP-2020_V2
12/29/20

Worksheet for PROP C1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.035 ft/ft
Discharge	156.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	4.00
0+20	4.00
0+20	2.00
0+50	1.80
0+52	1.00
0+80	1.00
0+85	2.00
0+90	3.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 4.00)	(0+90, 3.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	8.7 in
Elevation Range	1.0 to 4.0 ft
Flow Area	22.2 ft²
Wetted Perimeter	33.6 ft
Hydraulic Radius	7.9 in
Top Width	33.42 ft
Normal Depth	8.7 in
Critical Depth	12.4 in
Critical Slope	0.016 ft/ft
Velocity	7.03 ft/s
Velocity Head	0.77 ft
Specific Energy	1.49 ft
Froude Number	1.520
Flow Type	Supercritical

Worksheet for PROP C1

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.7 in
Critical Depth	12.4 in
Channel Slope	0.035 ft/ft
Critical Slope	0.016 ft/ft

Worksheet for PROP C2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.035 ft/ft
Discharge	156.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	95.00
0+10	95.00
0+11	91.50
0+20	90.50
0+90	90.50
1+20	91.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 95.00)	(1+20, 91.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	4.9 in
Elevation Range	90.5 to 95.0 ft
Flow Area	34.1 ft²
Wetted Perimeter	98.0 ft
Hydraulic Radius	4.2 in
Top Width	97.98 ft
Normal Depth	4.9 in
Critical Depth	5.9 in
Critical Slope	0.018 ft/ft
Velocity	4.58 ft/s
Velocity Head	0.33 ft
Specific Energy	0.73 ft
Froude Number	1.370
Flow Type	Supercritical

Worksheet for PROP C2

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.9 in
Critical Depth	5.9 in
Channel Slope	0.035 ft/ft
Critical Slope	0.018 ft/ft

Appendix D – Army Corp Jurisdiction Delineation

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, LOS ANGELES DISTRICT
3636 N CENTRAL AVENUE, SUITE 900
PHOENIX, AZ 85012-1939

June 26, 2019

SUBJECT: Determination of Need for Department of the Army Permit

Gideon H. Zeidler
Parolo, LLC
7775 E Fledgling Drive
Scottsdale, Arizona 85255

Dear Mr. Zeidler:

I am responding to your request (File No. SPL-2019-00519) dated May 29, 2019, for clarification whether a Department of the Army Permit is required concerning the proposed development of your property, located within 40 acres of land south of Happy Valley Road and west of 92nd Street, in a portion of Section 7, Township 4 North, Range 5 East (33.710817°N, -111.886054°W), City of Scottsdale, Maricopa County, Arizona.

The Corps' evaluation process for determining if you need a permit is based on whether or not the proposed project is located within or contains a water of the United States, and whether or not the proposed project includes an activity potentially regulated under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act. If both conditions are met, a permit would be required.

Based on the attached dry land approved jurisdictional determination dated June 24, 2019, it appears that your project site (described above) does not contain waters of the United States pursuant to 33 CFR Part 325.9. Although I have determined the proposed project does not require a permit under Section 404 of the Clean Water Act pursuant to 33 CFR Part 323.4, your proposed project may be regulated under other Federal, State, and local laws.

If you have any questions, please contact Ann Palaruan at (602) 230-6955 or via e-mail at Cynthia.A.Palaruan@usace.army.mil. Thank you for participating in the Regulatory Program. Please help me to evaluate and improve the regulatory experience for others by completing the customer survey form at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey.

Sincerely,

Sallie Diebolt

Sallie Diebolt
Chief, Arizona Branch
Regulatory Division

5-PP-2020_V2
12/29/20

DRY LAND APPROVED JURISDICTIONAL DETERMINATION FORM[1]
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 6/24/2019

B. DISTRICT OFFICE AND FILE NUMBER: Los Angeles District, SPL-2019-00519

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: Arizona County: Maricopa
Coordinates of site (lat/long in degree decimal format): Lat. 33°710817N, Long. -111.886054W°
Name of nearest waterbody: Cave Creek

☑ Check if map/diagram of review area is available upon request.

☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☑ Office (Desk) Determination. Date: 6/24/2019

☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area.

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **are no** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area.

SECTION III: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

☑ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:

Data sheets prepared/submitted by or on behalf of the applicant/consultant.

Office concurs with data sheets/delineation report.

Office does not concur with data sheets/delineation report.

Data sheets prepared by the Corps:

U.S. Geological Survey Hydrologic Atlas:

USGS NHD data.

USGS 8 and 12 digit HUC maps.

☑ U.S. Geological Survey map(s). Quad name: Curry's Corner, Ariz.

USDA Natural Resources Conservation Service Soil Survey. Citation: Aguila-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties

National wetlands inventory map(s). Cite name:

State/Local wetland inventory map(s):

FEMA/FIRM maps:

100-year Floodplain Elevation is:

☑ Photographs: ☑ Aerial (Name & Date): Goggle Map Imagery, Yr2019

☑ or ☑ (Name & Date): Field Photos: 2/2018

☐ Applicable/supporting case law:

B. REQUIRED ADDITIONAL COMMENTS TO SUPPORT JD. EXPLAIN RATIONALE FOR DETERMINATION THAT THE REVIEW AREA ONLY INCLUDES DRY LAND: This property lacks physical indicators of a 404 Ordinary Highwater Mark. No Clean Water Act Section 404 jurisdiction is evident on this property.

---

[1] This form is for use only in recording approved JDs involving dry land. It extracts the relevant elements of the longer approved JD form in use since 2007 for aquatic areas and adds no new fields.

Aerial Source/Date: NearMap 2019

Kimley»Horn
Expect More. Experience Better.

HV91	Scottsdale, Maricopa County, Arizona
Project Aerial	

5-PP-2020_V2
12/29/20

FINAL SEWER BASIS OF DESIGN REPORT

FINAL Basis of Design Report

☑ APPROVED

☐ APPROVED AS NOTED

☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE

SCOTTSDALE WATER

9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If approved; the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

10/19/2020

BY scan DATE 10/19/2020

Solitude

Southeast of Happy Valley Road and Pima Road
Scottsdale, Arizona

Prepared for:

Sonora West Development INC.
8937 East Bell Road
Suite 100
Scottsdale, Arizona 85260

Registered Professional Engineer (Civil)
CERTIFICATE NO.
63454
ZACHARY J.
HILL
Date Signed 05/20/20
ARIZONA, U.S.A.
Expires 03/31/23

Prepared by:

Kimley-Horn and Associates
1001 West Southern Avenue, Suite 131
Mesa, Arizona 85210
291203001
May 2020

5-PP-2020
9/28/2020

FINAL
SEWER BASIS OF DESIGN REPORT

SOLITUDE

SOUTHEAST OF HAPPY VALLEY ROAD AND PIMA ROAD

SCOTTSDALE, ARIZONA

MAY 2020

Prepared By:

Kimley»Horn

5-PP-2020
9/28/2020

Contents

Figures

Tables

Appendices

5-PP-2020
9/28/2020

INTRODUCTION

SITE LOCATION

This Final Sewer Basis of Design Report (SewerBOD) has been prepared for the proposed Solitude single family development located southeast of Happy Valley Road and Pima Road in Scottsdale, Arizona (development). The development is bound to the West by the 91st Street alignment, to the north by Happy Valley Road, to the south by undeveloped land, and to the west by the 92nd Street alignment. The development is located within Section 7 of Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. Refer to **Figure 1** for the Vicinity Map.

PROJECT SIZE AND TYPE

The development is a proposed 17-unit single family residential subdivision. The proposed buildings are one-story units. The development is approximately 20 acres.

PURPOSE AND OBJECTIVES

This report presents the basis of design criteria that will be used for engineering design of the proposed development. This report establishes a sewer solution for the development of the site.

- Demonstrate compliance with the City's Design Standards & Polices Manual (DSPM).
- Identify a final sewer system layout for the proposed development.
- Determination of the sewer demand generated by the development.
- Analysis of the capacity of the development's gravity sewer system.
- Proposed lift station location and force main sizing.

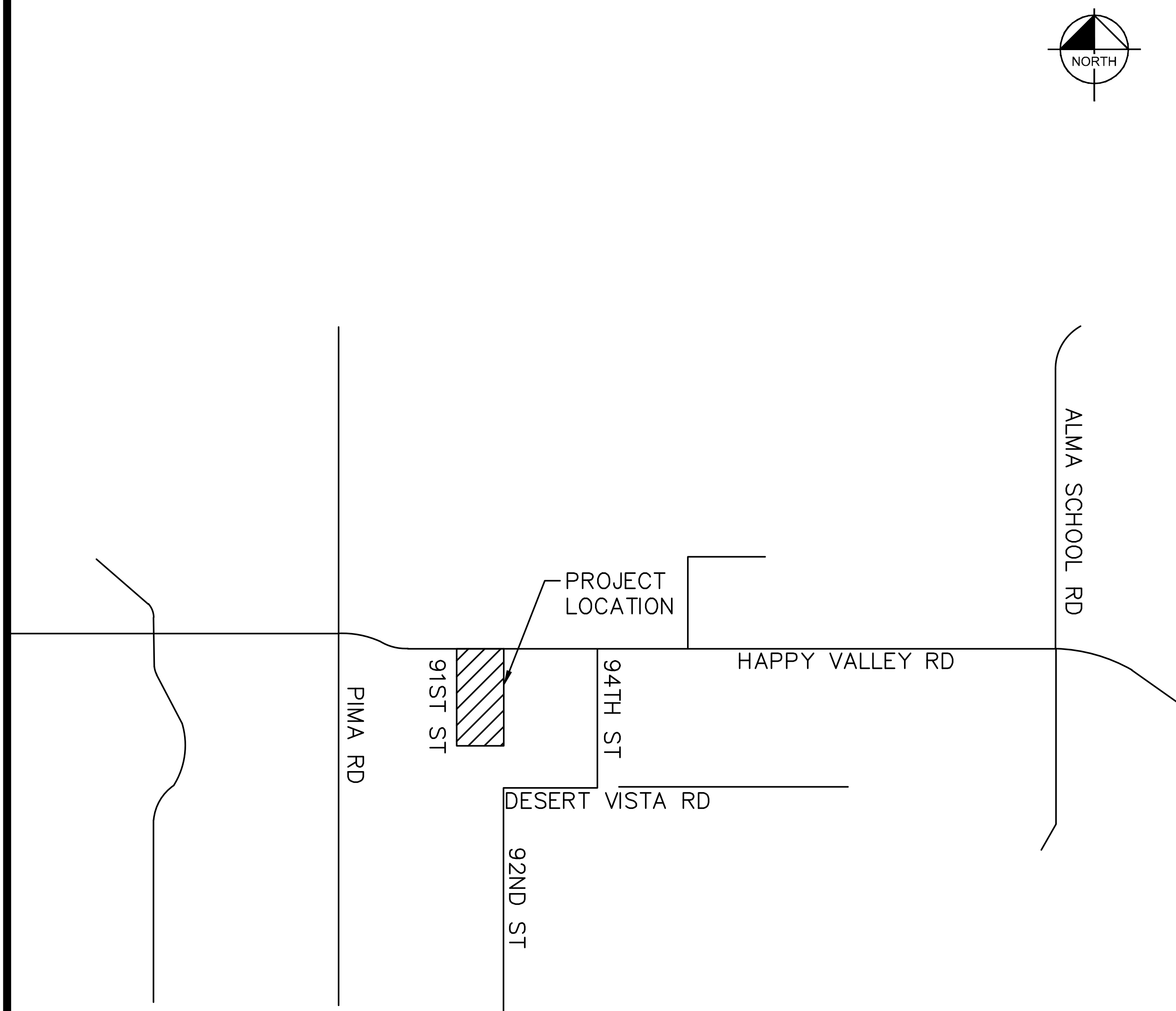


FIGURE 1
VICINITY MAP

Kimley»Horn

K:\EAV_Civil\291203001 – HV92\Reports\WaterBOD\Figures\V–MAP.dwg Sep 24, 2019 dan.recker
XREFS:

5-PP-2020
9/28/2020

COLLECTION SYSTEM DESCRIPTION

EXISTING COLLECTION SYSTEM

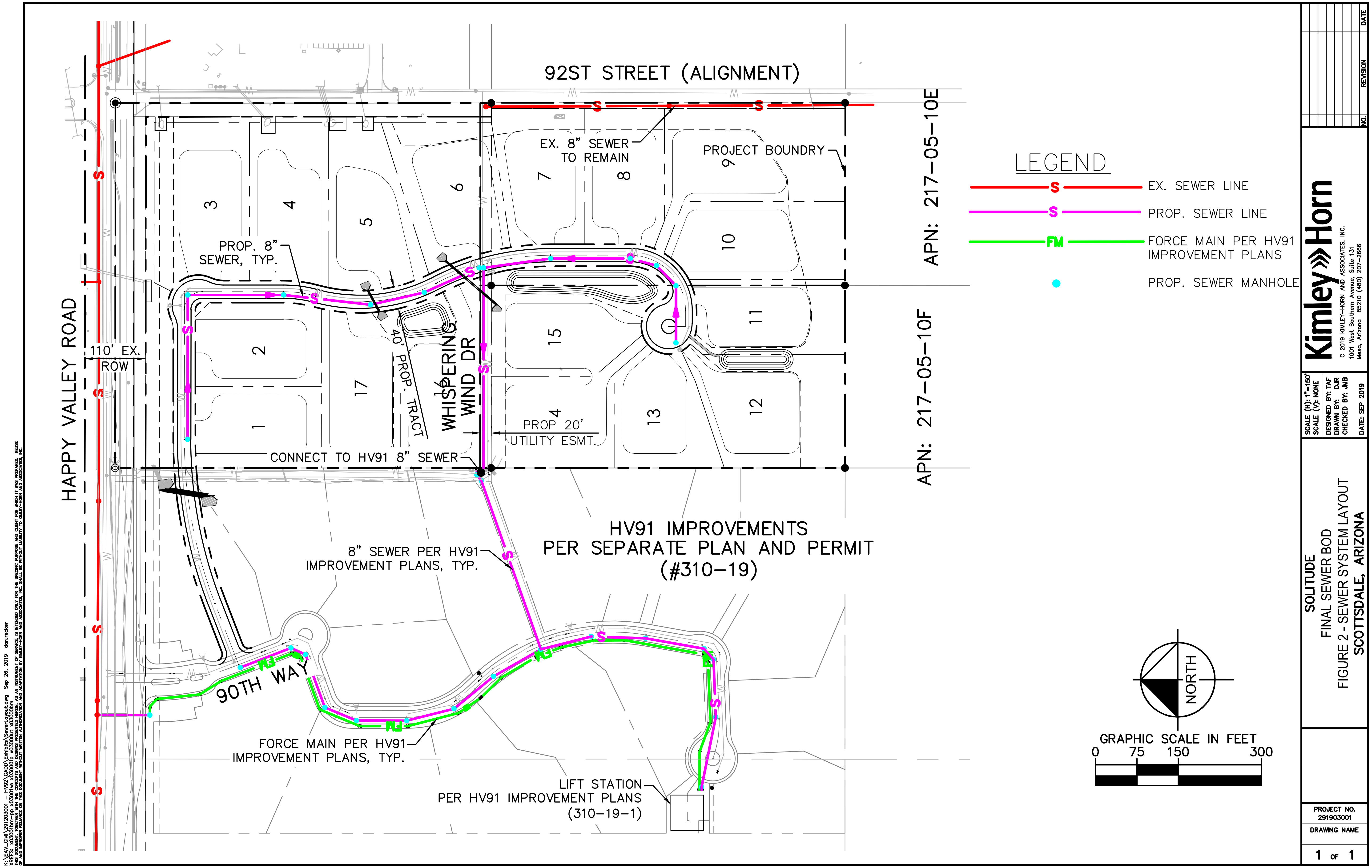
The existing site is undeveloped natural desert and one existing residential lot. The site slopes consistently in the southwesterly direction across the site. Existing grade elevations on the site range from approximately 2125-2080. Based on a review of the City Quarter Section Maps, there is existing 8-inch sewer in Happy Valley Road routing flow west to Pima Road. Existing invert elevations of the 8-inch sewer in Happy Valley Road along the development frontage appear to range from 2096-2120+/- according to the City Quarter Section Maps. Additionally, there is an 8-inch sewer in the 92nd Street which appears to be a dry line and run south from the Whispering Wind alignment. The existing home is served by a septic system.

PROPOSED COLLECTION SYSTEM

On the western boarder of the proposed development is the HV91 development (CoS Plan Check #310-19). As a part of the HV91 project a lift station with a force main line connecting to the existing 8-inch sewer line in Happy Valley Road has been approved. The Lift station was anticipated to accommodate the flows from HV91 and future development. The wet well and forcemain can accommodate the additional flow. A larger pump will be installed to handle the increased flow. As apart of HV91 an 8-inch sewer stub will be installed at the western boundary of the proposed development, in the Whispering Wind alignment. A biofilter system will be designed and installed for the outfall of the force main system at Happy Valley Road.

The proposed development consists of 17 single family residential units. This development will be served by an 8-inch public sewer system within the private roadway tract and will connect to the 8-inch sewer stub installed with the HV91 system. From there flows will connect to the lift station described above. Refer to **Figure 2** for the proposed sewer layout.

In addition to the installation of the proposed sewer system, the existing septic system will be removed from the site.



5-PP-2020
9/28/2020

BASIS OF DESIGN

DESIGN CRITERIA

The design criteria for the development is based on the City of Scottsdale Design Standards and Policies Manual (DS&PM). Average daily demands and peaking factors for the various building uses were used to determine the existing and proposed peak flows generated on site. See **Table 1** below for a summary of the design criteria used.

Table 1. Wastewater Design Criteria

WASTEWATER DESIGN CRITERIA			
Wastewater Demands			
Land Use	**Average Daily Flow (gpd)**		**Peaking Factor**
Residential	250	Per Unit	4
Wastewater Design Criteria			
Minimum Pipe Slope			
8-inch	0.52	%	
Full Flow Velocities			
Minimum	2.5	fps	
Maximum	10	fps	
Manning's Roughness Coefficient (n)	0.013		
Design d/D	0.65		

The proposed site generates a peak flow of approximately 17,000 gpd or 12 gpm. Additionally, a peak demand of 35pm is added to the lift station flow to account for swimming pool drainage. The previously approved lift station will serve flow from this development and HV91 for a total peak flow of approximately 59 gpm. A new pump has been selected to handle this flow, see **Appendix B**. See **Table 2** below for a summary of the proposed flows generated with the proposed development. See **Appendix C** for the HV91 Lift Station Report.

Table 2. Wastewater Demand Calculations

Wastewater Demand Calculations						
Use	**Units**	**Demand (gpd)**	**Average Daily Demand (gpd)**	**Peaking Factor**	**Peak Flow (gpd)**	**Peak Flow (gpm)**
Solitude	17	250	4,250	4.0	17,000	12
HV91	17	250	4,250	4.0	17,000	12
Pool Drainage	-	-	-	-	50,400	35
Total to Lift Station					84,400	59

5-PP-2020
9/28/2020

WASTEWATER SYSTEM ANALYSIS

To determine the capacity of the proposed wastewater collection system, the peak design flow was analyzed using the minimum design pipe slope. At the minimum design slope of 0.0052 ft/ft, an 8-inch line has the capacity to convey approximately 391 gpm. An 8-inch line at the minimum design slope can convey the proposed peak design flow from Solitude of 12 gpm at a normal depth of 0.08 or a d/D ratio of 0.13, at a velocity of 1.13 ft/s. An 8-inch line at the minimum design slope can convey the proposed combined peak design flow to the lift station of 59 gpm at a normal depth of 0.167 or a d/D ratio of 0.25, at a velocity of 1.74 ft/s.

The existing 2-inch forcemain conveys the pumped flor of 59 gpm at a velocity of 6 ft/s. See **Appendix A** for Flowmaster results.

CONCLUSION

The proposed development for Solitude results in a generated wastewater peak flow of 17,000 gallons per day. The proposed wastewater flow will be conveyed through a gravity sanitary sewer to connect with the HV91 sewer system. From there the combined peak flow of 84,400 gallons per day to a proposed lift station at the southwest corner of the adjacent property. From there, flow will be pumped back to the existing 8-inch gravity sewer in Happy Valley Road. Previous discussions with City staff has indicated that the existing gravity line in Happy Valley Road has capacity to serve the proposed development flows identified in this report. The scope of this BOD does not include analysis of the existing Happy Valley Road sewer system.

Appendix A – Flowmaster Calculations

WASTEWATER SYSTEM ANALYSIS

To determine the capacity of the proposed wastewater collection system, the peak design flow was analyzed using the minimum design pipe slope. At the minimum design slope of 0.0052 ft/ft, an 8-inch line has the capacity to convey approximately 391 gpm. An 8-inch line at the minimum design slope can convey the proposed peak design flow from Solitude of 12 gpm at a normal depth of 0.08 or a d/D ratio of 0.13, at a velocity of 1.13 ft/s. An 8-inch line at the minimum design slope can convey the proposed combined peak design flow to the lift station of 59 gpm at a normal depth of 0.167 or a d/D ratio of 0.25, at a velocity of 1.74 ft/s.

The existing 2-inch forcemain conveys the pumped flor of 59 gpm at a velocity of 6 ft/s. See Appendix A for Flowmaster results.

CONCLUSION

The proposed development for Solitude results in a generated wastewater peak flow of 17,000 gallons per day. The proposed wastewater flow will be conveyed through a gravity sanitary sewer to connect with the HV91 sewer system. From there the combined peak flow of 84,400 gallons per day to a proposed lift station at the southwest corner of the adjacent property. From there, flow will be pumped back to the existing 8-inch gravity sewer in Happy Valley Road. Previous discussions with City staff has indicated that the existing gravity line in Happy Valley Road has capacity to serve the proposed development flows identified in this report. The scope of this BOD does not include analysis of the existing Happy Valley Road sewer system.

5-PP-2020
9/28/2020

Appendix A – Flowmaster Calculations

Worksheet for 8" Sewer (min. slope)

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	8.0 in
Diameter	8.0 in
Discharge	0.87 cfs

Results

Discharge	0.87 cfs
Normal Depth	8.0 in
Flow Area	0.3 ft²
Wetted Perimeter	2.1 ft
Hydraulic Radius	2.0 in
Top Width	0.00 ft
Critical Depth	5.3 in
Percent Full	100.0 %
Critical Slope	0.009 ft/ft
Velocity	2.50 ft/s
Velocity Head	0.10 ft
Specific Energy	0.76 ft
Froude Number	(N/A)
Maximum Discharge	0.94 cfs
Discharge Full	0.87 cfs
Slope Full	0.005 ft/ft
Flow Type	SubCritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.0 in
Critical Depth	5.3 in
Channel Slope	0.005 ft/ft
Critical Slope	0.009 ft/ft

Worksheet for 8" Sewer (Design)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Diameter	8.0 in
Discharge	0.03 cfs

Results

Normal Depth	1.0 in
Flow Area	0.0 ft²
Wetted Perimeter	0.5 ft
Hydraulic Radius	0.6 in
Top Width	0.43 ft
Critical Depth	0.9 in
Percent Full	12.0 %
Critical Slope	0.007 ft/ft
Velocity	1.13 ft/s
Velocity Head	0.02 ft
Specific Energy	0.10 ft
Froude Number	0.849
Maximum Discharge	0.94 cfs
Discharge Full	0.87 cfs
Slope Full	0.000 ft/ft
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	12.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.0 in
Critical Depth	0.9 in
Channel Slope	0.005 ft/ft
Critical Slope	0.007 ft/ft

Worksheet for 8" Sewer (Combined Design)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Diameter	8.0 in
Discharge	53.00 gal/min

Results

Normal Depth	2.0 in
Flow Area	0.1 ft²
Wetted Perimeter	0.7 ft
Hydraulic Radius	1.2 in
Top Width	0.58 ft
Critical Depth	1.9 in
Percent Full	24.9 %
Critical Slope	0.007 ft/ft
Velocity	1.74 ft/s
Velocity Head	0.05 ft
Specific Energy	0.21 ft
Froude Number	0.897
Maximum Discharge	420.70 gal/min
Discharge Full	391.09 gal/min
Slope Full	0.000 ft/ft
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	12.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	2.0 in
Critical Depth	1.9 in
Channel Slope	0.005 ft/ft
Critical Slope	0.007 ft/ft

5-PP-2020
9/28/2020

Worksheet for Force main

Project Description	
Friction Method	Manning Formula
Solve For	Pressure at 1

Input Data		
Pressure 2	0	psi
Elevation 1	2,070.00	ft
Elevation 2	2,105.00	ft
Length	1,200.0	ft
Roughness Coefficient	0.010	
Diameter	2.0	in
Discharge	59.00	gal/min

Results		
Pressure 1	74	psi
Headloss	136.60	ft
Energy Grade 1	2,242.16	ft
Energy Grade 2	2,105.56	ft
Hydraulic Grade 1	2,241.60	ft
Hydraulic Grade 2	2,105.00	ft
Flow Area	0.0	ft²
Wetted Perimeter	0.5	ft
Velocity	6.03	ft/s
Velocity Head	0.56	ft
Friction Slope	0.114	ft/ft

5-PP-2020
9/28/2020

Appendix B – Pump Selection

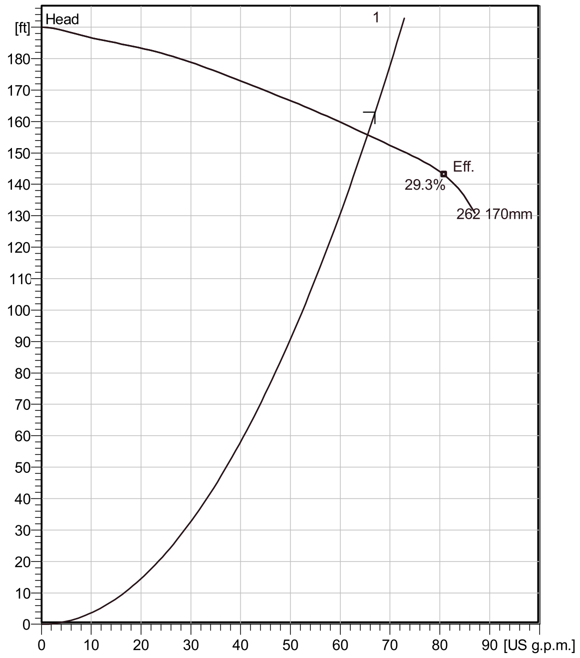
MP 3127 HT 3~ 262

Semi-open multi-channel impellers with integral grinder cutter in single volute casing for liquids containing solids and fibres.

FLYGT
a xylem brand

Technical specification

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Configuration

Motor number
M3127.170 21-11-2AL-W
11hp

Installation type
P - Semi permanent, Wet

Impeller diameter
170 mm

Discharge diameter
1 15/16 inch

Pump information

Impeller diameter
170 mm

Discharge diameter
1 15/16 inch

Inlet diameter
50 mm

Maximum operating speed
3495 rpm

Number of blades
6

Max. operating temperature
40 °F

Materials

Impeller
Grey cast iron

Stator housing material
Grey cast iron

Project		**Created by**		**Last update**
Block	0	**Created on**	3/4/2020	

5-PP-2020
9/28/2020

MP 3127 HT 3~ 262

Technical specification

Motor - General

Motor number M3127.170 21-11-2AL-W 11hp	**Phases** 3~	**Rated speed** 3495 rpm	**Rated power** 11 hp
Approval No	**Number of poles** 2	**Rated current** 13 A	**Stator variant** 12
Frequency 60 Hz	**Rated voltage** 460 V	**Insulation class** H	**Type of Duty** S1
Version code 170			

Motor - Technical

Power factor - 1/1 Load 0.92	**Motor efficiency - 1/1 Load** 87.6 %	**Total moment of inertia** 0.285 lb ft²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.90	**Motor efficiency - 3/4 Load** 88.4 %	**Starting current, direct starting** 110 A	
Power factor - 1/2 Load 0.85	**Motor efficiency - 1/2 Load** 87.7 %	**Starting current, star-delta** 36.7 A	

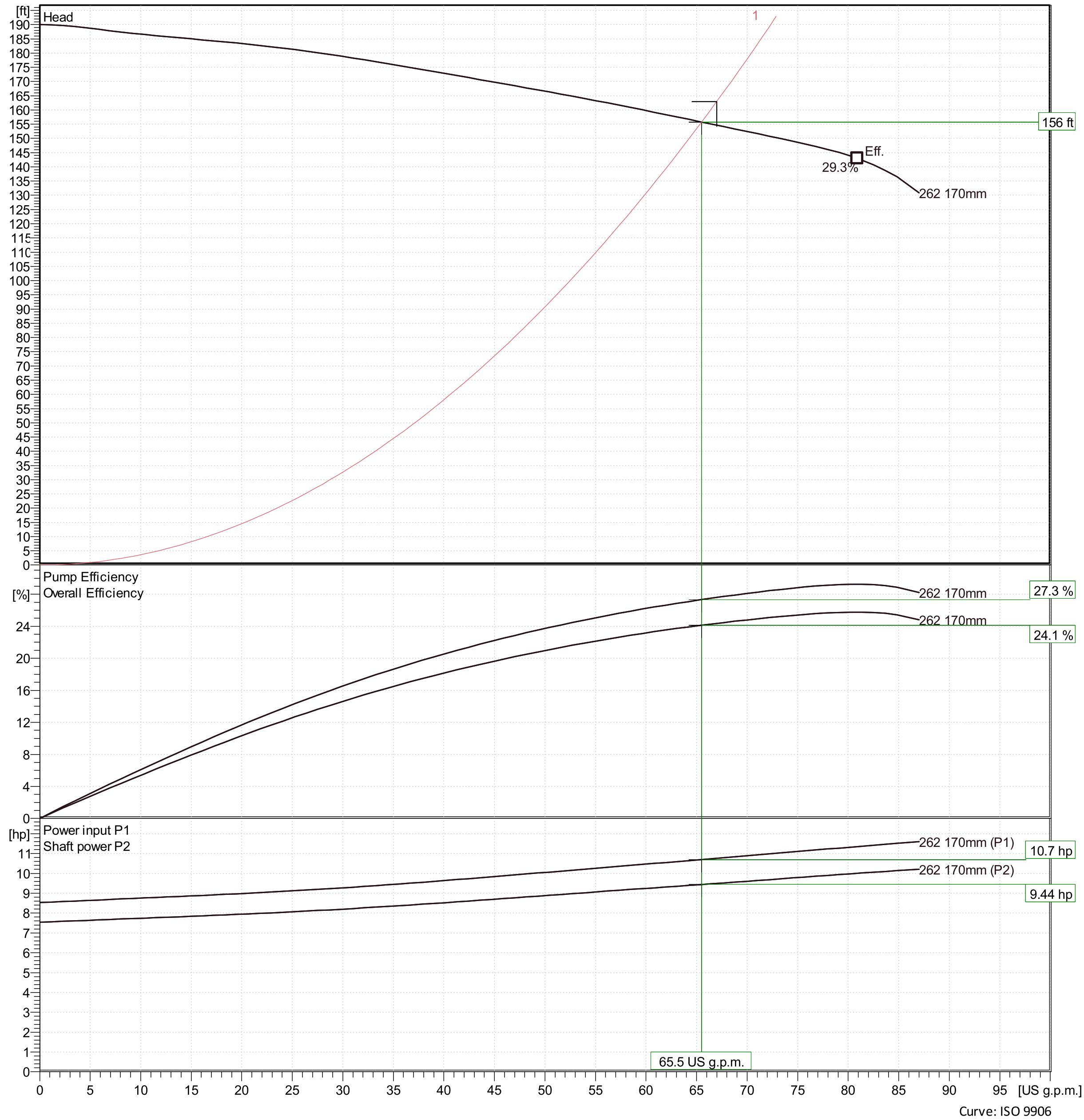
MP 3127 HT 3~ 262

Performance curve

Duty point

Flow	Head
65.5 US g.p.m.	156 ft

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



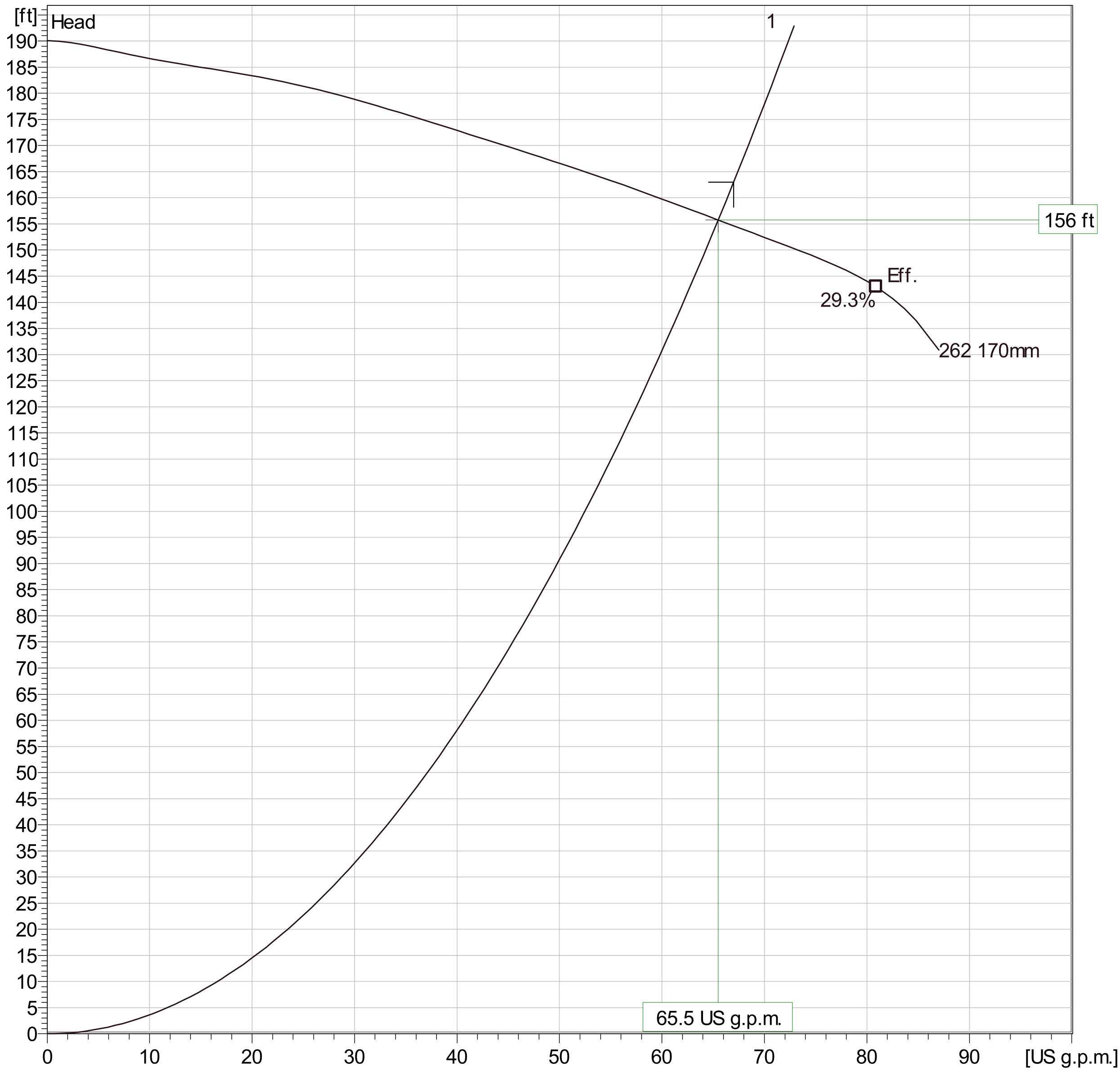
Project		Created by		Last update
Block	0	Created on	3/4/2020	

5-PP-2020
9/28/2020

MP 3127 HT 3~ 262

Duty Analysis

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Operating characteristics

Pumps/Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHr
1	65.5 US g.p.m.	156 ft	9.44 hp	65.5 US g.p.m.	156 ft	9.44 hp	27.3 %	2030 kWh/US M	

Project		Created by		Last update	
Block	0	Created on	3/4/2020		

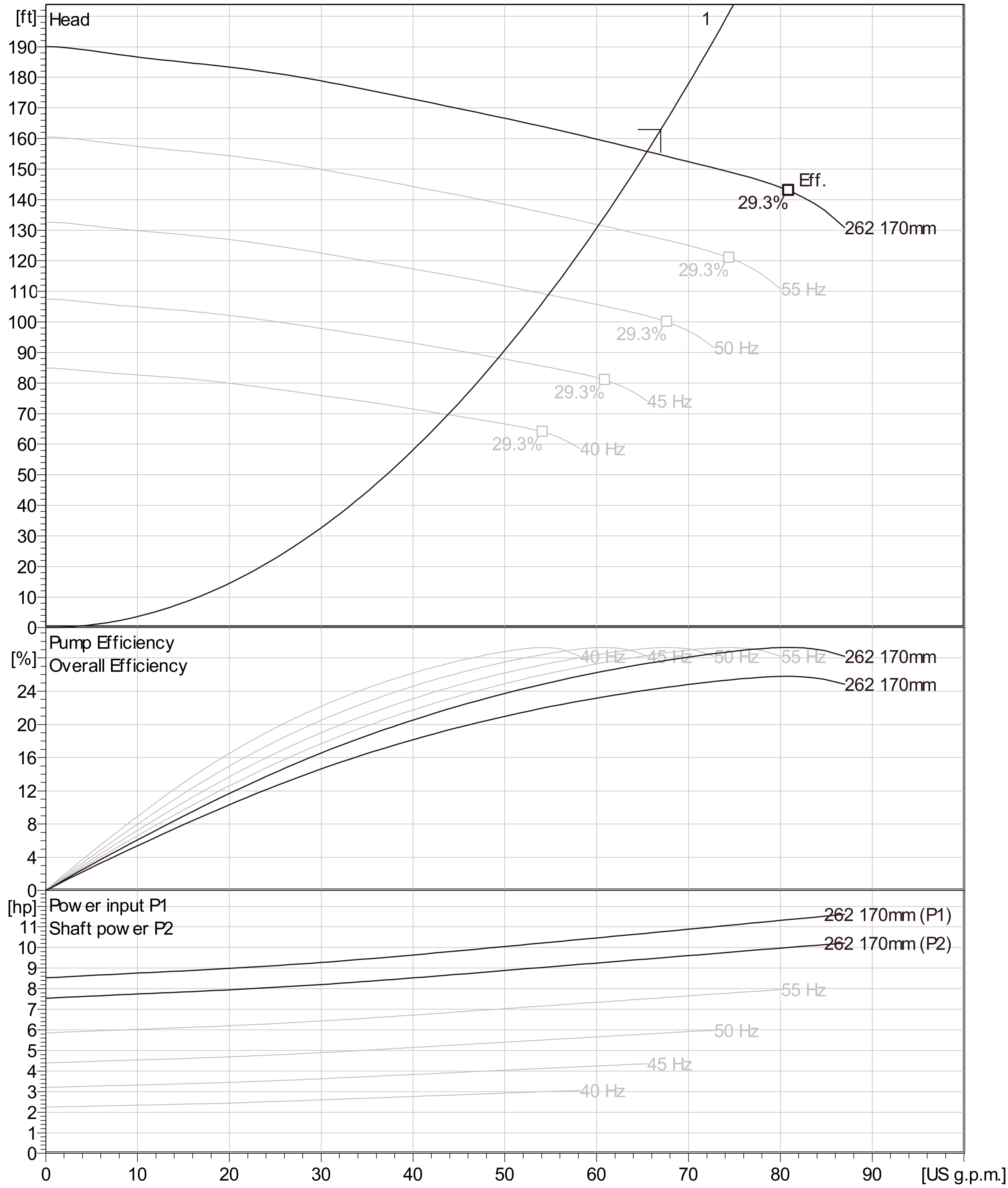
5-PP-2020
9/28/2020

MP 3127 HT 3~ 262

VFD Curve

FLYGT
a xylem brand

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

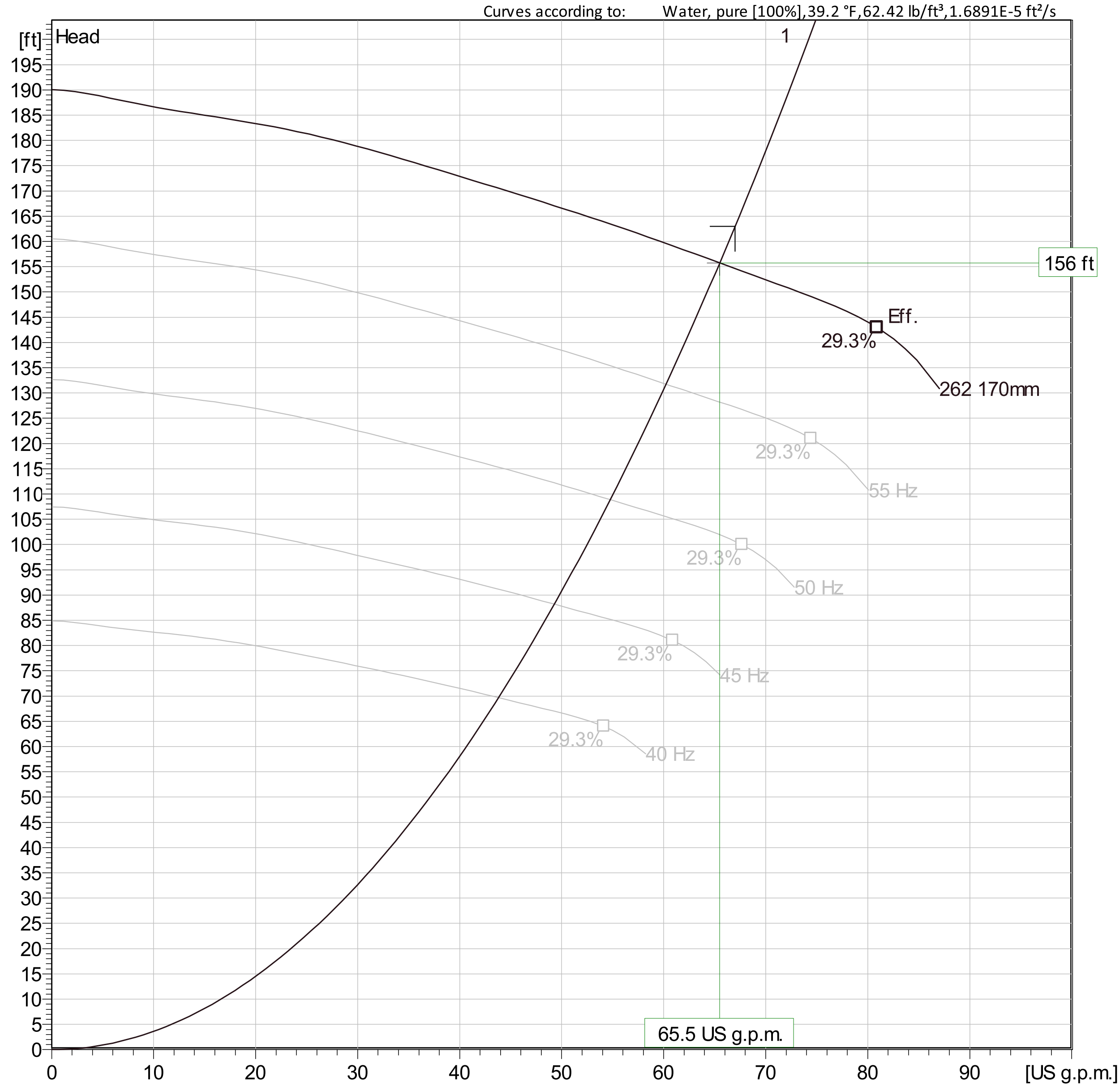
Project		**Created by**		**Last update**
Block	0	**Created on**	3/4/2020	

5-PP-2020
9/28/2020

MP 3127 HT 3~ 262

VFD Analysis

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Operating Characteristics

Pumps/Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific Energy	NPSHr
1	59.9 Hz	65.5 US g.p.m	156 ft	9.44 hp	65.5 US g.p.m	156 ft	9.44 hp	27.3 %	2030 kWh/US M	
1	55 Hz	60.2 US g.p.m	132 ft	7.35 hp	60.2 US g.p.m	132 ft	7.35 hp	27.3 %	1720 kWh/US M	
1	50 Hz	54.8 US g.p.m	109 ft	5.52 hp	54.8 US g.p.m	109 ft	5.52 hp	27.3 %	1430 kWh/US M	
1	45 Hz	49.3 US g.p.m	88.2 ft	4.02 hp	49.3 US g.p.m	88.2 ft	4.02 hp	27.3 %	1180 kWh/US M	
1	40 Hz	43.8 US g.p.m	69.7 ft	2.83 hp	43.8 US g.p.m	69.7 ft	2.83 hp	27.3 %	965 kWh/US M	

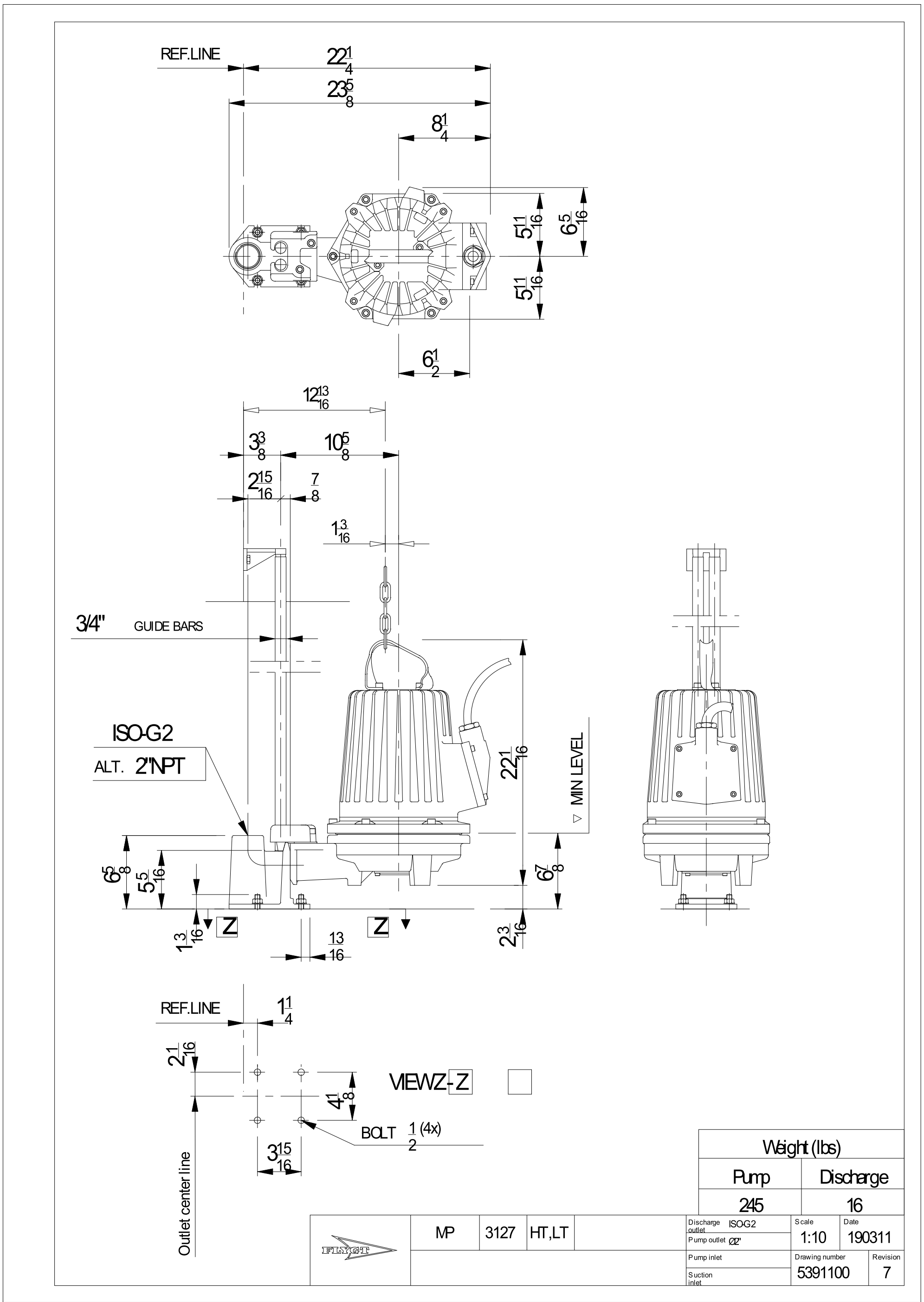
Project		**Created by**		**Last update**
Block	0	**Created on**	3/4/2020	

5-PP-2020
9/28/2020

MP 3127 HT 3~ 262

Dimensional Drawing

FLYGT
a xylem brand



Project		**Created by**		**Last update**	
Block	0	**Created on**	3/4/2020		

5-PP-2020
9/28/2020

Appendix C – Lift Station Report

FINAL LIFT STATION DESIGN REPORT

HV91

Southeast of Happy Valley Road and Pima Road
Scottsdale, Arizona

Prepared for:

Parolo, LLC
7775 E. Fledgling Drive
Scottsdale, Arizona 85255

Prepared by:

Kimley-Horn and Associates
1001 West Southern Avenue, Suite 131
Mesa, Arizona 85210
291203000
January 2018

5-PP-2020
9/28/2020

FINAL
LIFT STATION DESIGN REPORT

HV91

SOUTHEAST OF HAPPY VALLEY ROAD AND PIMA ROAD

SCOTTSDALE, ARIZONA

Registered Professional Engineer (Civil)
CERTIFICATE NO. 65836
JULIAN D. PESQUEIRA
DATE SIGNED 1/18/2019
ARIZONA U.S.A.
Expires: 3/31/2021

JANUARY 2018

Prepared By:

Kimley»Horn

5-PP-2020
9/28/2020

Contents

5-PP-2020
9/28/2020

Figures

Appendices

INTRODUCTION

SITE LOCATION

The purpose of this report is to provide preliminary design analysis for the construction of a new lift station serving HV91, a single-family development located southeast of Happy Valley Road and Pima Road in Scottsdale, Arizona (development). The purpose of this report is to provide for review and comment a preliminary design for the lift station layout, pumping alternatives, and associated pumping and force main options. The development is located within Section 7 of Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. Refer to **Figure 1** for the Vicinity Map.

PROJECT SIZE AND TYPE

The development is a proposed 17-unit single family residential subdivision. The proposed buildings are one-story units. The development is approximately 20 acres.

PURPOSE AND OBJECTIVES

This report presents the basis of design criteria that will be used for engineering design of the proposed public lift station.

- Demonstrate compliance with the City's Design Standards & Polices Manual (DSPM) & Lift Station Design Criteria.
- Identify lift station site and preliminary site layout.
- Determine preliminary design for lift station equipment including: pump, wet-well, and forcemain.

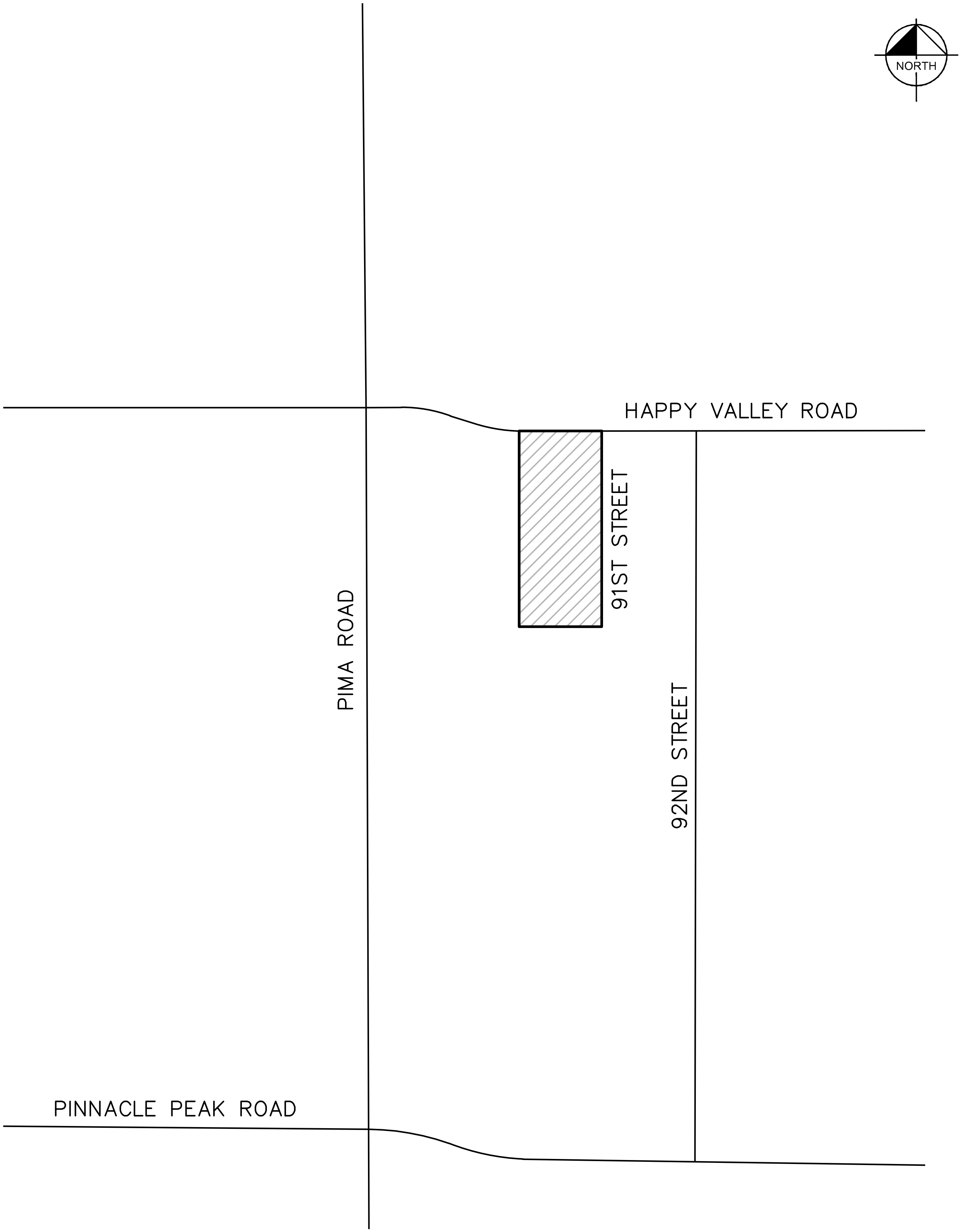


FIGURE 1
VICINITY MAP

Kimley»Horn

K:\EAV_Civil\191069030 – 70th and Continental\Reports\Drainage\Zoning\Figures\Figure 1 Vicinity Map.dwg Nov 25, 2017 zach.hill

5-PP-2020
9/28/2020

DESIGN CRITERIA

COLLECTION SYSTEM

The Preliminary SewerBOD for HV91 establishes the design criteria for the gravity sewer collection system, per City of Scottsdale Design Standards and Policies Manual (DS&PM).

LIFT STATIONS

In selecting a site for the sewage lift station, considerations included accessibility, drainage patterns, visual impact, function and design constraints. The station's equipment must be protected from damage and remain operable during a 100-year flood plain. The proposed site is located outside the 100-year flood plain. Unless otherwise agreed to in writing by the City's rights-of-way agent, the tract or lot dedicated to the City will be conveyed by a general warranty deed and accompanied by a title policy in favor of the City, both to the satisfaction of the City.

Arizona Administrative Code, Title 18, Chapter 9, "Water Pollution Control," contains minimum requirements for a wastewater lift station. At a minimum, telemetry, dual pumps, backup power supply, three-phase power, provisions for future odor control, and perimeter walls will be required. The site will also be large enough to contain all the equipment and service equipment for repairs. Additionally, the lift station design will confirm to City of Scottsdale DS&PM and Lift Station Design Criteria.

A final design report prepared by a registered professional engineer, licensed in the State of Arizona, must accompany all pump station design drawings and specifications submitted to the City for review.

FORCEMAIN

City of Scottsdale staff has indicated that force mains smaller than 4 inches will require a parallel force main with interconnecting valves.

The flow velocity in the force main must be between 3 and 6 feet per second (fps).

All pipe material used in design of the force mains must have established ASTM, ANSI, AWWA and NSF standards of manufacture or seals of approval and shall be designated as pressure sanitary sewer pipe. Force mains must be identified as such with marking tape 1 foot above the pipe. All ductile iron force mains shall be lined.

Air release valves designed for sewage must be provided on force mains at all peaks.

Two-way cleanouts shall be provided every 1,300 feet apart or 1-way cleanouts every 650 feet. Single cleanouts must be provided at all horizontal bends oriented in line with the downstream pipe.

Where a force main crosses a water main or transmission line, protection must be provided as per ADEQ Engineering Bulletin No. 10 and the Arizona Administrative Code, Title 18, Chapter 9, "Water Pollution

Control.” At a minimum, the force main should be constructed of ductile iron pipe for a distance of 10 feet on each side of the water line.

See COS Standard Detail No. 2402 for details regarding discharge into a manhole from a force main.

The minimum separation between the force mains and water lines should be 2 feet wall-to-wall vertically and 6 feet horizontally under all conditions. Where a force main crosses above or less than 6 feet below a water line, the force main shall be encased in at least 6 inches of concrete for 10 feet on either side of the water line. Fittings should not fall within the encasement.

The engineer must evaluate the potential for odor to develop from a force main downstream of the receiving manhole. One-way valves on building service lines shall be specified where there is potential for gasses to strip from the waste stream. The valves should be located at or near the building

FINAL LIFT STATION DESIGN

SITE LAYOUT

The proposed lift station is located at the southwest end of the site, adjacent to the cul-de-sac of the private roadway tract. The lift station is located on a parcel of land approximately 0.16 acres in size. The land for the proposed lift station will be deeded to the City of Scottsdale as part of the final plat for the development. The site will consist of a six-foot diameter wet well, valve vault, meter vault, electrical control pad, transformer, concrete pad for a future chemical feed system, and a gas-powered generator. Refer to **Figure 2** for Final Lift Station Layout.

LIFT STATION DESIGN

Final pump design criteria has been developed for the proposed lift station. Pumps are required to convey the peak design flow rate at the total dynamic head calculated. In order to mitigate low design flow rates, the City has accepted the use of supplementing demands with potable water that can be entered into the gravity sewer system upstream of the proposed lift station. The proposed lift station will need to meet the following calculated pump requirements:

Lift station Design Summary					
Site	**Gravity Collection Peak Flow (gpm)**	**Swimming pool Drainage (gpm)**	**Total Lift Station Pumped Flow (gpm)**	**Static Head (ft)**	**Total Dynamic Head (ft)**
Lift Station	17	35	47	35	101

*Assumes a Hazen-Williams C value of 130

A “xylem FLYGT model MP 3102 HT” pump has been preliminarily selected to convey the peak design flow. Refer to **Appendix A** for pump information.

Final wet well sizes have been calculated for the proposed lift stations. Wet well volume calculations are based on the following criteria and assumptions:

- Minimum flow to lift station = 0 gpm
- Minimum pump running time = 2 minutes
- Minimum pump cycle time = 10 minutes
- Wet well diameter = 5 feet

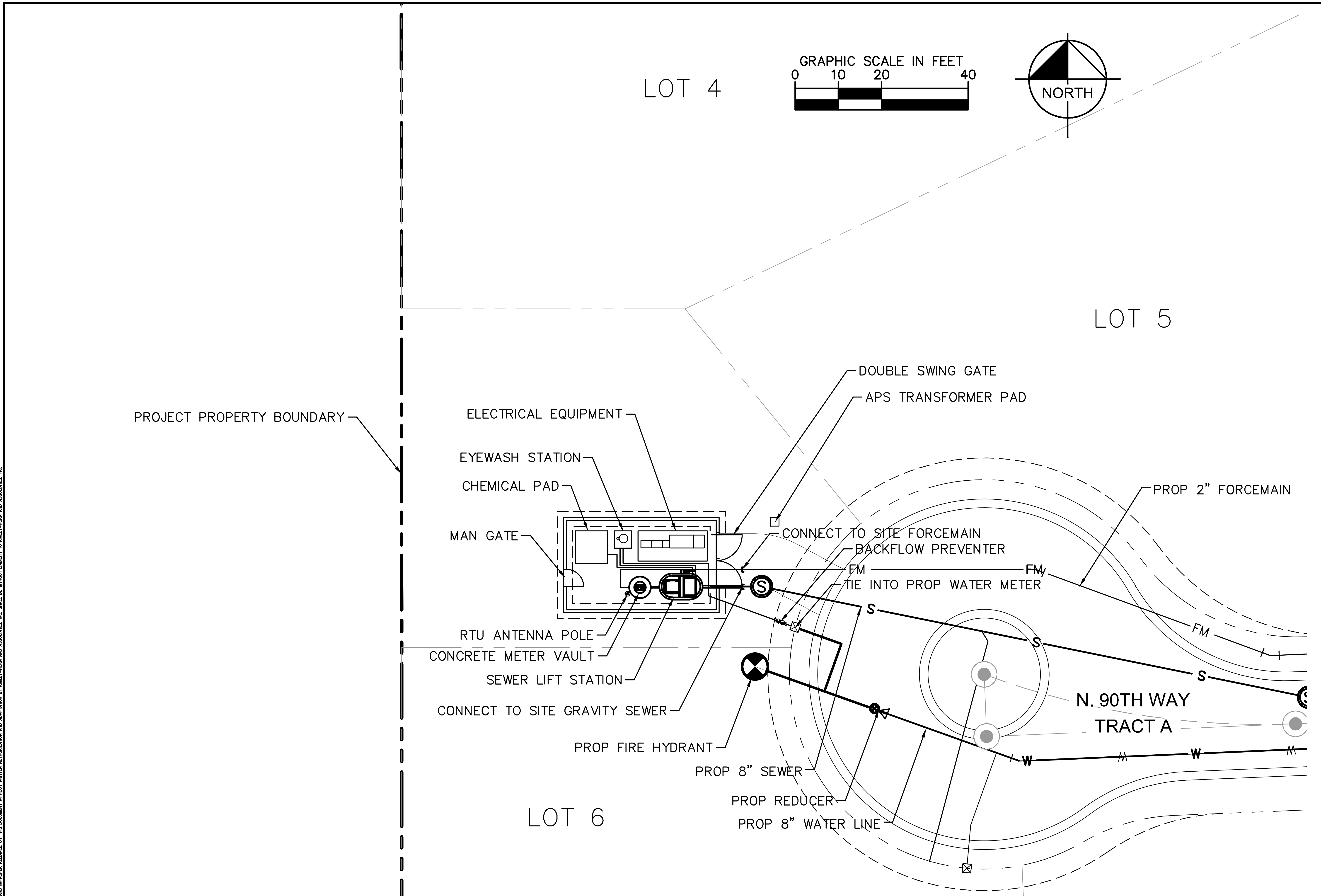
5-PP-2020
9/28/2020

Based on the above criteria wet well volumes are as follows:

	Lift Station
Wet Well Volume (ft^3)	40
Operational Depth (ft)	0.81

FORCEMAIN DESIGN

The proposed forcemain is designed to convey the pumped flow within the accepted velocity range per the City Design Criteria. A 2-inch PVC pipe was selected to convey the pumped flow. The proposed pumped flow of 47gpm is conveyed through a 2-inch force main line with a velocity of 4.8 ft/s. **See Appendix B – Forcemain Calculations**.



NO.	REVISION	DATE

Kimley»Horn

SCALE (H): 1"=20'
SCALE (V): NONE
DESIGNED BY: ZJH
DRAWN BY: ZJH
CHECKED BY: JMB
DATE: JAN 2019

HV91
FINAL LIFT STATION REPORT
LIFT STATION LAYOUT
SCOTTSDALE, ARIZONA

PROJECT NO.
291203000
DRAWING NAME

5-PP-2020
9/28/2020

SITEWORK

SITE OPTIONS

The proposed development will consist of high end residential homes. The development is conscious of the potential negative aspects associated with a lift station (e.g. how the site looks, controlling odors, noise, etc.). This report present options to reduce these hindrances and shield the properties from the proposed lift station. Options for the site development of the lift station are as follows:

- Develop a decorative wall high enough to shield immediate neighbors from both views of the lift station, as well as prevent excess noise. Wall articulation that matches the theme of the neighborhood would help maintain an attractive look to the neighborhood.
- Decorative sun shades could be utilized to shield the site from above. Shades could be constructed for both the individual pieces of equipment, as well as for the whole site.
- Landscaping could be utilized, including large trees and native vegetation, and/or well placed earth with retaining walls to give a more natural look and obstruct views of the station equipment.
- Depending on the topography of the area, parts of the lift station can be constructed into sunk areas with retaining walls, creating a larger difference between the top of the walls and the top of the equipment
- The developers could look at constructing a house or architectural building matching area homes.

SITE WALL

Per Section 7-1.205 of the *City of Scottsdale Design Standards & Policies Manual*, a perimeter wall will be required to be constructed around the site, but maintaining enough room inside of the site that all equipment and service equipment will be easily accessible for repair. As such, a 10-foot block wall is proposed around the site, with gate access located on the northwest corner of the site. As discussed in the previous section, there are several different options available to improve the aesthetics of the wall.

ODOR CONTROL

~~Per discussions with the City, odor control is not typically installed at new lift station sites~~. However, provisions for odor control chemical additional shall be provided at the lift station site in case the City deems it necessary to have installed. Installation will include a concrete pad for a future chemical storage tank, as well as electrical hook ups for future installation. not correct

The City will require an odor control system at the force main outfall into the gravity system. Various options for outfall odor control include:

- Installing a sealed manhole at the sewer outfall with a ‘blower’ to send the air through a filter that absorbs the H2S. See **Appendix C – Odor Control** for examples of a Hartzell Blower, as well as a both a Vapex and Ecoair filter.

- Installing a chemical feed at the lift station to help treat the sewage for H2S. The bioxide chemical used in this process is non-toxic, which means secondary containment on-site is unnecessary and chemical refilling procedures are greatly simplified. The chemical would be added before the sewage enters the force main, allowing the chemical to work as it works its way towards the outfall.

GENERATOR

The site power will be supplemented with a standby generator. Similar sites (using combined motor Hp under 100Hp) utilize generators in size from 60KVA to 150KVA. This site will utilize a 60KVA generator that is switched via ATS in an emergency condition.

CONTROLS

Per Scottsdale Sewer Lift Station Design Criteria (Revision 10/15/15) the lift station will include controls of the station pumps and control its overall operation. City design standards will dictate flow sensing, telemetry, alarm systems and safety precautions, and associated hardware to ensure reliable communication with existing radio systems. Overall functionality and sequence of lift station's operations will be confirmed with City personnel in cases of specific operations for this lift station.

SITE LIGHTING

Perimeter lighting will be installed per applicable City of Scottsdale standards. We will first design lighting in accord with lift station design requirements. In absence of specific lighting requirements for lift stations, IES (Illuminating Engineering Society) suggestions will be supplemented. Site lighting will be placed in locations that maintenance personnel agree with, and will be controlled using a hierarchy that is dictated by site management. We will conduct a basic calculation (AGI32 or approved software) to determine light levels and provide verification of fixture number and positioning.

PUMP ENCLOSURE

Various options exist for the wet well on the Lift Station development site, which will vary based on the required volume and maximum depth of the wet well. As stated in Section - Lift Station Design, the size of the wet well will be 6' diameter with approximately a 3' operational depth. Additional vender information regarding the layout of the wet well and associated piping can be found in **Appendix D**.

An additional option for the wet well construction would be a OneLift wet well, which is pre-constructed to include pumps, valve box, and water meter all in the construction of the wet well itself. This particular wet well would have a smaller foot print, which would assist in minimizing the size of the overall lift station site. Example plans of the OneLift wet well can be found in **Appendix E**.

Job Number	291203000
Job Description	HV91
Date	1/18/2019
Designed By	ZJH
Checked By	REL
Pump Type	MP3102 HT3-267

HAZEN-WILLIAMS EQUATION FOR TDH CALCULATIONS

System Elevations:

Pumps Off Elevation		**2070.00**	ft
Flow Line of Force Main at High Point		**2105.00**	ft
Calculated Static Head	ΔZ =	**35.00**	ft

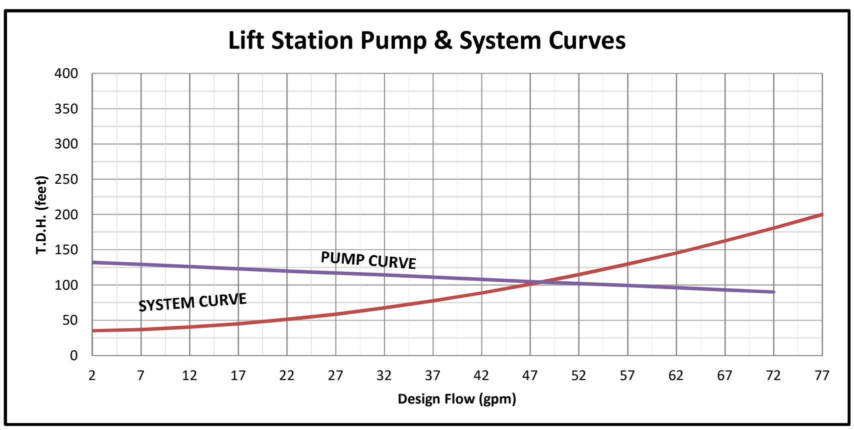
Hazen-Williams Parameters:

Dia. of Discharge Piping	D =	**2**	inches
Length of Discharge Piping	L =	**10**	ft
Dia. of Force Main	D =	**2.000**	inches
Length of Force Main	L =	**1200**	ft
Hazen Williams Coefficients	C =	**130**	
Minor Losses - Sum of Coefficients for Discharge Piping	K_D =	**1**	taken from Minor Losses tab
Minor Losses - Sum of Coefficients for Force Main	K_{FM} =	**6.87**	taken from Minor Losses tab

Flow Interval for Tables	**5**	gpm

C = 130 for Discharge Piping, C = 130 for Proposed Force Main

Flow (GPM)	Friction Head (Discharge Piping) (ft.)	Minor Losses (Discharge Piping) (ft.)	Friction Head (Force Main) (ft.)	Minor Losses (Force Main) (ft.)	T.D.H. (ft.)	Pressure (PSI)	Force Main Flow Velocity (fps)	Pump Curve (ft.)
2	0.00	0.00	0.19	0.00	35.19	15.23	0.20	135
7	0.02	0.01	1.93	0.05	36.95	16.00	0.71	132
12	0.04	0.02	5.22	0.16	40.28	17.44	1.23	129
17	0.08	0.05	9.94	0.32	45.07	19.51	1.74	126
22	0.13	0.08	16.01	0.54	51.23	22.18	2.25	123
27	0.19	0.12	23.39	0.81	58.70	25.41	2.76	120
32	0.27	0.17	32.03	1.14	67.46	29.20	3.27	117
37	0.35	0.22	41.90	1.52	77.47	33.54	3.78	114
42	0.44	0.29	52.97	1.96	88.70	38.40	4.29	111
47	0.54	0.36	65.22	2.46	101.12	43.78	4.80	108
52	0.66	0.44	78.64	3.01	114.73	49.67	5.31	105
57	0.78	0.53	93.19	3.62	129.50	56.06	5.82	102
62	0.91	0.62	108.88	4.28	145.41	62.95	6.33	99
67	1.05	0.73	125.68	5.00	162.45	70.33	6.84	96
72	1.20	0.84	143.58	5.77	180.61	78.19	7.35	93
77	1.35	0.96	162.57	6.60	199.88	86.53	7.86	90



Approximate Capacity at C = 130: 47 gpm

5-PP-2020
9/28/2020

Worksheet for Force main

Project Description

Friction Method	Manning Formula
Solve For	Pressure at 1

Input Data

Pressure 2	0.00	psi
Elevation 1	2070.00	ft
Elevation 2	2105.00	ft
Length	1200.00	ft
Roughness Coefficient	0.010	
Diameter	2.00	in
Discharge	47.00	gpm

Results

Pressure 1	52.75	psi
Headloss	86.68	ft
Energy Grade 1	2192.04	ft
Energy Grade 2	2105.36	ft
Hydraulic Grade 1	2191.68	ft
Hydraulic Grade 2	2105.00	ft
Flow Area	0.02	ft²
Wetted Perimeter	0.52	ft
Velocity	4.80	ft/s
Velocity Head	0.36	ft
Friction Slope	0.07223	ft/ft

5-PP-2020
9/28/2020

Fiberglass Backward Curved Centrifugal Fans

Type FA Series 41 Series 41P

BUILT WITH HONOR
Hartzell®
HARTZELL FAN, INC
PIQUA, OHIO USA

amca CERTIFIED RATINGS
SOUND AND AIR PERFORMANCE
AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

HARTZELL®

Hartzell Fan, Inc., Piqua, Ohio 45356
www.hartzellfan.com

Bulletin A-160
5-PP-2020
9/28/2020

Index

amca CERTIFIED RATINGS SOUND AND AIR PERFORMANCE ® AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

Certified Ratings for Air and Sound

Hartzell Fan, Inc. certifies that the Series 41, Fiberglass Backward Curved Centrifugal Fans, Type FA shown on pages 7–11 and 14–21, and Series 41P, Fiberglass Backward Curved Centrifugal Fan, Packaged, shown on pages 12–20, are licensed to bear the AMCA Seal for Air and Sound Performance. The ratings shown are based on tests and procedures performed in accordance with AMCA Standard 211 and AMCA Standard 311 and comply with the requirements of the AMCA Certified Ratings Program.

Sound Performance data is available upon request. Please contact the factory and ask for Engineering Publication #SD-160.

Hartzell Model Code Explanation

Hartzell Model Code

A 41 – 9 – 33 1 FA 100 FG OP M 3

- Type (A)
  - A – Production Item
  - S – Stock Item
  - Q – Special Quote
- Product Series (41)
- Arrangement (centrifugals only) (9)
- Size (nominal wheel diameter, inches) (33)
- Class (1)
- Wheel Code (FA)
- Wheel Width (entries represent percents) (100)
- Material of Construction (FG)
- Motor Enclosure (OP)
- Motor Horsepower (M)
- Motor RPM/Phase (3)

Motor RPM/Phase Code

3 Phase	1 Phase
2 = 3450	B = 3450
3 = 1750	C = 1750
4 = 1140	D = 1140
5 = 870	E = 870
6 = 690	F = 690
7 = 575	G = 575

Motor Horsepower

Horsepower	1/4	1/3	1/2	3/4	1	1 1/2	2	3	5	7 1/2	10	15	20	25	30	40	50	60	75	100	125	150	200
Code Letter	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

Example:

Assume a needed performance of 12,000 CFM at 5" SP, standard air. Reading the 33" rating table for 100% width on page 17, we find a fan RPM of 1,168 and brake horsepower (BHP) of 12.3. Required motor horsepower is 15. The model code can be constructed as follows: Type will be a production item (code A), product series for the Fiberglass Backward Curved Fans is 41, arrangement is 9 (code 9), size of the wheel is 33", class of construction is I (code 1), wheel code for this item is FA, wheel width is 100% (code 100), material of construction is fiberglass (code FG), motor enclosure is open protected drip-proof (code OP), motor horsepower is 15 (code O), and motor RPM/phase is 1750 (code 3).

Note: All other informational fields must be filled with hyphens/dashes (-) if they are not applicable to the fan being considered.

This bulletin lists Hartzell's line of Fiberglass Backward Curved Centrifugal Fans, Type FA and accessories. More than 70 Hartzell offices can provide specific performance and installation data to meet your requirements. Call your Hartzell representative for assistance. Visit our website **(www.hartzellfan.com)** or call toll-free **(1-800-336-3267)** for the name of your Hartzell representative.

General Fiberglass Construction Features

A variety of corrosion problems plague industry today. Fans and blowers made of coated steel or metals such as stainless and monel can handle some problem areas. Please refer to the corrosion resistance table on page 5 of this bulletin. Fiberglass centrifugal blowers can be used in most applications where corrosive elements exist in fume and vapor form. The resistance to corrosive elements is a major advantage, but the physical properties of fiberglass equipment offer these additional advantages:

- Fiberglass equipment is corrosion resistant.
- Fiberglass equipment weighs 25% less than comparable equipment made of carbon steel.
- Fiberglass has an extremely high strength-to-weight ratio, stronger than steel on a per-pound basis.
- Dimensional stability of fiberglass is excellent.
- Fiberglass air moving equipment will not become brittle at low temperatures and at 0°F the laminated fiberglass will be stronger than at room temperature.

Hartzell Fan, Inc. conforms to ASTM D4167-97, Standard Specification for fiber-reinforced plastic fans and blowers, when optional surfacing veil, electrical grounding, and dynamic balancing to ASTM D4167-97 levels, are added to the fan.

The following are standard Hartzell fiberglass construction features:

- Corrosion resistant polyester resin, having a Class I flame spread rate of 25 or less is used for all housings. Vinylester resin having a Class I flame spread rate of 25 or less is used for all wheels.
- All structural parts in the airstream are fiberglass and resin. All fiberglass surfaces are protected with a minimum 10-mil thickness of chemical, flame, and ultraviolet resistant resin.
- Shafts are turned, ground, polished, and keyed at both ends with a fiberglass sleeve in the airstream. Shafts are sized to operate well below critical speed. 304 or 316 Stainless steel or monel shafting is available as an option at extra cost.
- Internal hardware (airstream) is Type 304 stainless steel. All internal hardware (airstream) is encapsulated. All external hardware (out of airstream) is zinc plated as standard. Where metal is subject to attack by the corrosive elements being handled, all metal parts can be resin-coated after assembly.
- A fiberglass and neoprene shaft seal is placed where the shaft leaves the housing along with a neoprene shaft slinger between the seal and wheel on belt drive units (seal is not gas tight).

Series 41P

Series 41

Fiberglass Centrifugal Fans

- Bearings on belt drive units are heavy duty, deep row radial ball or double row spherical roller type self-aligning and shielded in cast iron housings. Long inner races ensure even load distribution, providing a high radial and thrust load capacity. Bearings are relubricable for continuous service with lubrication tubes extended to the exterior of fan base as necessary.
- V-Belt Drives are oversized for long life and continuous duty as standard. Fixed pitch or variable pitch drives are available upon request. Belts are oil, heat, and static resistant type.

Type FA Wheel

Type FA Wheel Features

The Type FA wheel is unique in the fan and blower industry. It is available in diameters from 12" to 60" in both clockwise and counter-clockwise rotations. The wheel is airfoil design and solid fiberglass die formed and coated with Dow Derakane 510-A corrosion resistant vinylester resin. The manufactured wheel is a single piece, removed from the pattern whole. This ensures each wheel is aerodynamically identical and provides reliable repeatable performance without the variability of hand made and taped components. The design is the result of a substantial investment in research, development, tooling, and manufacturing methods by Hartzell Fan, Inc.

The type FA wheel is highly efficient, with tapered inlet side and airfoil blades. It has non-overloading horsepower characteristic curve. When used in conjunction with a precision inlet cone it **efficiently moves large volumes of air at high pressures with low noise characteristics at low RPM.**

The fiberglass resin has a Class I flame spread rate of 25 or less. The wheel is electronically statically and dynamically balanced to the requirements of Fan Application Category BV-3 of AMCA ANSI Std. 204-96 and receives an Operational Test and Inspection before shipment. Special constructions are available for abrasive environments or extremely corrosive environments.

5-PP-2020
9/28/2020

Hartzell Selection Guide

The Hartzell Fiberglass Backward Curved Centrifugal Fan performances on the following pages are based on standard air conditions (sea level, 70°F, and 29.92 inches barometric pressure). Performance data does not include drive losses on belt drive units.

How to use Performance Tables

1. Select a model for a given air delivery and pressure by looking up the required flow vertically along the left column of the performance table and moving to the required pressure. The model is identified with each table.
2. Note the required RPM and BHP. Refer to page 2 Hartzell Model Code Explanation for additional details.
3. If non-standard temperature or altitude is involved, correct to standard air density (see Temperature/Altitude Applications).

When placing your order, be sure to specify the Hartzell Model Code. Be sure to include fan model, performance requirements, operating temperature, motor data (enclosure, voltage, mounting position, etc.), and a list of required accessory items. (See pages 22 and 23.) For selection assistance and additional data contact your local Hartzell Sales Representative for assistance.

Temperature/Altitude Applications

When a fan operates in ambient conditions, generally it is handling standard air at 70°F, 29.92" barometric pressure, weighing 0.075-lbs./cu. ft. For an application where the fan operates at other than ambient conditions (temperature, altitude, or both), correction factors must be applied to the selection of the fan. In addition, the standard construction of the fan must be modified.

Correction factors for temperatures and altitudes are provided in Table 1. When a fan operates at other than ambient conditions, the correction factors in Table 1 will be required to correct static pressure and horsepower.

Table 2 shows the maximum safe operating speeds for each size fan wheel. At high temperatures, these maximum safe operating speeds should be derated.

Table 3 provides maximum safe speed correction factors by temperature and material construction. An example on the use of these tables appears at the bottom of this page.

Table 1 Altitude/Temperature Correction Factors

Temp.*(°F)	-50	-25	0	25	50	70	100	125	150	175	200	250
Factor	0.77	0.82	0.87	0.91	0.96	1.00	1.06	1.10	1.15	1.20	1.25	1.34

Alt.** (Ft.)	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
Factor	1.00	1.04	1.08	1.12	1.16	1.20	1.25	1.30	1.35	1.40	1.46

Above table has inverted values. Actual density is the reciprocal of the above values.
***At sea level. **At 70°F.**
For corrections involving both temperature and altitude, correction factors should be multiplied.
Example: 150°F at 7000 ft.: Temperature factor 1.15 x altitude factor 1.30 = 1.50 combined correction factor.

Table 2 Maximum Safe Speeds @70°F

Fan Size	100% Width	66% Width
12	4,520	5,320
15	3,600	4,340
18	2,990	3,610
22	2,440	2,950
24	2,240	2,710
27	2,000	2,410
30	1,840	2,220
33	1,670	2,020
36	1,530	1,850
40	1,370	1,660
44	1,240	1,500
49	1,130	1,360
54	1,020	1,230
60	920	1,110

Table 3 Maximum Safe Speed Correction Factors*

Temp. (°F)	0	70	100	150	175	200	225	250
FRP	1.00	1.00	1.00	0.98	0.95	0.91	0.82	0.70

*** To correct maximum safe operating speeds (Table 2) for high temperatures, multiply those speeds by correction factors from Table 3.**

Use of Correction Factors and Tables

First select size, RPM and BHP of the blower needed.

If temperature or altitude is involved, correct to standard air.

Example: Assume the required performance to be 12,000 CFM at 4.62" SP, 175°F and 2000 feet altitude.

1. Temperature factor 1.20 x altitude factor 1.08 = 1.30 combined correction factor.
2. Correct SP to standard 4.62" SP x 1.30 = 6" SP for 70°F at sea level.
3. A Series 41, size 33" class II 66% width belt drive backward curved centrifugal, selected from the rating tables (page 17) for the new condition shows 12,000 CFM at 6" SP, 1,398 RPM and 15.5 BHP.
4. Correct the horsepower and static pressure in item 3 to non-standard performance by dividing by factor: 6" SP divided by 1.30 = 4.62" SP; 15.5 BHP divided by 1.30 = 11.9 BHP.
5. Check the maximum safe speed. Maximum speed at 70°F for fan size 33" 66% width, 2,020 RPM. Using the maximum safe speed factor table for fiberglass construction yields a safe speed factor of .95. The maximum safe speed is 2,020 x .95 = 1,919 RPM; thus operation at 1,438 RPM at 175°F is satisfactory.
6. Final performance of the unit at the assumed conditions: 12,000 CFM at 4.62" SP, 1,398 RPM, 11.9 BHP at 175°F and 2000 feet altitude.
7. Size motor for cold startups and use a special high altitude motor if altitude exceeds 3300 feet.

Corrosion Resistance Guide

Temperature values shown are for immersion or condensate contact applications. Where temperature values are shown, resin is suitable for hood and duct type applications for the full operating temperature range of the product. See product specifications for materials of construction and maximum operating temperature limits.

Environment	Hetron 693 Ashland F.	6694 Reichold F.	510A Dow F.
ACIDS			
Acetic to 10%	180	200	210
Acetic to 50%	90	160	180
Acetic to 100%		NR	NR
Acrylic to 25%	–	100	100
Benzene Sulfonic to 25%	180	210	150
Benzene Sulfonic 25% up	90	210	NR
Benzoic	250	220	210
Boric	180	220	210
Butyric to 50%	150	150	210
Butyric 50% up	–	100	80
Carbonic	160	220	NR
Chloroacetic to 25%	NR	*180	*150
Chloroacetic 25% to 50%	NR	*150	*120
Chromic to 5%	100	110	150
Chromic to 10% to 20%	–	NR	150
Citic	*200	*220	*210
Fluoboric	*S90	*S220	*S210
Gluosilicic up to 10%	S100	S150	S180
Formic up to 10%	200	150	180
Gluconic to 50%	120	180	180
Hydrobromic to 25%	*160	*170	*180
Hydrochloric to 15%	*230	*210	*180
Hydrocyanic to 10%	200	170	210
Hydrofluoric to 10%	***S100	***S150	***S150
Hydrofluorsilicic up to 10%	*S100	*S150	*S180
Hypochlorous to 20%	90	110	NR
Lactic	*200	*220	*210
Maleic	170	210	210
Nitric to 5%	200	170	150
Nitric 5% to 20%	–	140	120
Oleic	200	220	210
Oxalic	*220	*220	*210
Perchloric to 10%	H&D	**150	**150
Phosphoric	*220	*S210	*S210
Phosphoric, super	–	*S210	*S210
Phthalic Anhydride	*150	*210	*210
Picric to 10%	100	170	NR
Silicic	–	220	NR
Stearic	200	220	210
Sulfamic to 25%	160	150	NR
Sulfuric to 25%	*200	*220	*210
Sulfuric to 50%	*200	*200	*180
Sulfuric to 70%	*150	*180	*100
Sulfuric to 80%	NR	80	NR
Sulfurous to 10%	90	110	120
Tannic	200	220	210
Tartaric	220	220	210
Trichoroacetic to 50%	*90	*220	*200
ALCOHOLS			
Amyl	200	210	120
Benzyl	NR	100	NR
Butyl	190	150	120
Ethyl	90	120	80
Methyl	90	80	NR
GASES AND VAPORS			
Ammonia, Dry	90	170	100
Ammonia, Wet	90	NR	NR
Bromine, Wet	90	*100	NR
Carbon Dioxide	250	250	250
Carbon Monoxide	200	250	250
Chlorine, Dry	*200	*210	NR
Florine	–	NR	80
Hydrogen Fluoride, Vapor	*90	*S180	*S180
Hydrogen Sulfide to 5%	250	240	180
Sulfur Dioxide, Dry	200	250	210
Sulfur Dioxide, Wet	200	250	210
Sulfur Trioxide, Wet	–	220	210
ALKALIES (Synthetic Veil)			
Ammonium Bicarbonate to 50%	140	S170	160
Ammonium Carbonate	120	S140	150
Ammonium Hydroxide to 5%	S90	S180	S180
Ammonium Hydroxide to 10%	S90	S170	S150
Ammonium Hydroxide to 29%	NR	S100	S100
Barium Carbonate	180	S240	210
Barium Hydroxide to 10%	–	S170	150
Calcium Hydroxide to 15%	160	S210	S180
Magnesium Carbonate	160	S210	180
Potassium Bicarbonate to 10%	90	S170	S150
Potassium Carbonate to 10%	90	S180	S150
Potassium Hydroxide to 25%	NR	S120	S150
Sodium Bicarbonate to 10%	140	S210	S180
Sodium Carbonate to 35%	90	S180	S180
Sodium Hydroxide to 10%	NR	S160	S180
Sodium Hydroxide to 25%	NR	S160	S180
Sodium Sulfide	90	S220	S210
Trisodium Phosphate to 50%	–	S175	210
SALTS			
Aluminum Chloride	*120	*240	*210
Aluminum Potassium Sulfate	160	240	210
Aluminum Sulfate	250	240	210
Ammonium Chloride	*200	*220	*210
Ammonium Nitrate	200	220	220
Ammonium Persulfate	150	200	180
Ammonium Persulfate, saturate	150	NR	NR
Ammonium Sulfate	200	220	220
Aniline Sulfate to 25%	150	220	210
Aniline Sulfate, saturated	150	220	NR
Barium Chloride	200	240	210
Barium Sulfide	NR	S210	180
Calcium Chlorate	180	220	220
Calcium Chloride	250	240	220
Calcium Sulfate	*200	*240	*210
Copper Chloride	*250	*220	*220
Copper Cyanide	90	S220	210
Copper Fluoride	NR	S170	NR
Copper Sulfate	250	240	210
Ferric Chloride	*250	*220	*210
Ferric Nitrate	170	220	210
Ferric Sulfate	200	220	210
Ferrous Chloride	*220	*220	*210
Ferrous Nitrate	160	220	210
Ferrous Sulfate	220	220	210
Lead Acetate	160	220	210
Magnesium Chloride	220	240	210
Magnesium Hydroxide	–	S210	210
Magnesium Sulfate	200	210	210
Mercuric Chloride	*210	*220	*210
Mercurous Chloride	210	220	210
Nickel Chloride	220	220	210
Nickel Nitrate	220	220	210
Nickel Sulfate	220	220	210
Potassium Chloride	200	240	210
Potassium Dichromate	200	220	210
Potassium Ferricyanide	200	220	210
Potassium Nitrate	200	220	210
Potassium Permangnate	150	210	210
Potassium Persulfate	90	220	210
Potassium Sulfate	200	240	210
Silver Nitrate	200	220	210
Sodium Acetate	150	220	210
Sodium Bisulfate	200	220	210
Sodium Chloride	200	240	180
Sodium Chlorite to 10%	175	170	150
Sodium Cyanide	100	220	210
Sodium Dichromate	160	220	210
SALTS (cont'd.)			
Sodium Ferricyanide	220	220	210
Sodium Floride	–	S180	S180
Sodium Nitrate	220	220	210
Sodium Nitrite		220	NR
Sodium Silicate PH less than 1	160	210	NR
Sodium Sulfate	180	240	210
Sodium Sulfite	–	220	210
Stannic Chloride	*180	*220	*210
Stannous Chloride	*200	*220	*210
Zinc Chloride	200	*220	*210
Zinc Nitrate	180	220	210
Zinc Sulfite	150	220	NR
SOLVENTS			
Acetone to 10%	NR	180	180
Benzene	90	80	NR
Carbon Disulfide	NR	NR	NR
Carbon Tetrachloride	90 VAPOR	110	150
Chlorobenzene	NR	NR	NR
Ethyl Acetate	NR	NR	NR
Ethyl Chloride	90 VAPOR	NR	NR
Ethylene Dibromide	NR	NR	NR
Ethylene Glycol	250	220	210
n-Heptane	120	210	210
Hexane	–	150	160
Methyl Ethyl Ketone to 10%	NR	80	NR
Naphtha	200	210	180
Naphthalene	130	220	210
Tetrachloroethylene	NR	100	80
Toluene	90	NR	80
Xylene	90	80	80
BLEACHES			
Calcium Chlorate	180	220	220
Calcium Hypochlorite	100	NR	S160
Chlorine Dioxide up to 15%	–	160	*200
Chlorine Water	*125	*210	*200
Hydrogen Peroxide to 30%	120	100	150
Sodium Chlorate	90	210	210
Sodium Hypochlorite to 15%	NR	125	S180
OTHERS			
Alum. Chlorohydroxide to 50%	–	220	210
Ammonium Phosphate	150	210	210
Aqua Rega	NR	*80	NR
Detergents	120	170	150
Glycerine	200	220	210
Kerosene	120	210	180
Photographic Solutions	–	80	NR
Perchlorethylene	NR	100	80
Sodium Tetraborate	180	S210	180
Sodium Tripolyphosphate	125	210	210
Sodium Xylene Sulfonate	–	170	160
Sorbitol Solutions	180	220	160
Urea	90	170	150
Urea-Ammonium-Nitrate	–	120	120
Fertilizer Fumes	100	120	150
Shell-D-D	NR	100	NR
Steam Vapor	180	210	180

Reference
C.R.G.1.1

NOTES: **NR = Not Recommended S = Synthetic surfacing veil or mat required. Contact factory. "–" = No test data available**

- ***** **Special shaft and hardware required, contact factory.**
- ****** **Special design considerations required (explosive environment), contact factory.**
- ******* **Do not use HartKoate. Special shaft and hardware required, contact factory.**

For environments not shown, or when temperatures exceed the maximum listed, contact factory.
Hydrocarbon fuel environments may require static grounding, contact factory.

Do not use HartKoate (Alum. Oxide) with Hydrofluoric acid.

Series 41 Backward Curved Centrifugal Fan, Type FA

Series 41 Hartzell Fiberglass Backward Curved Centrifugal Fans offers **non-overloading, high efficiency, low noise,** and economy for corrosive atmospheres. This fan is unique in the fan and blower industry. The fan incorporates the proven, highly efficient, backward curved, airfoil-bladed, solid fiberglass, Type FA wheel in a solid fiberglass housing. This design incorporates the airfoil centrifugal wheel, centrifugal fan housing, and inlet cone to produce a compact, highly efficient unit with low noise characteristics.

- **Applications** – Developed for compatible corrosive applications where it is advantageous to have fiberglass materials and have the motor out of the airstream with the versatility of a belt drive fan.
- **Performance** – Type FA fiberglass airfoil wheel with inlet cone and aerodynamically designed housing produces from **800 CFM to 90,000 CFM at pressures from free delivery to 14" W.G.** at high efficiencies with non-overloading horsepower, low noise, and low RPM. Maximum temperature capability is 250°F.

Series 41

Hartzell Fan, Inc. certifies that the Series 41, Fiberglass Backward Curved Centrifugal Fans, Type FA, shown herein are licensed to bear the AMCA seal for air and sound performance. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.

Sound Performance data is available upon request. Please contact the factory and ask for Engineering Publication #SD-160.

Type FA Wheel

Features

- **Sizes** – 12", 15", 18", 22", 24", 27", 30", 33", 36", 40", 44", 49", 54", and 60" wheel diameters. Available in Class I and II in 100% width and Class I, II, and III in 66% width. Available in Belt Drive Arrangements #1, #9, and #10, Direct Drive Arr. #4 and Direct Coupled Arr. #8. Contact Factory for Arr. #8 dimensions and for other arrangements.
- **FRP Materials** – Solid fiberglass wheel molded with Dow Derakane 510-A corrosion resistant vinylester resin having a Class I flame spread rate of 25 or less. The housing and other standard FRP components are constructed of fiberglass and Ashland Hertron 693 corrosive resistant polyester resin having a Class I flame spread rate of 25 or less. No metal parts are exposed in the airstream. See Corrosion Resistance Guide on page 5 for resin characteristics. Other resins are available.
- **Type FA Wheel** – **High efficiency**, **airfoil** design with **one-piece**, **solid fiberglass**, construction. Tapered inlet side design efficiently moves large volumes of air at high pressures. Wheel has non-overloading horsepower characteristic curve.
- **Rotation and Discharge Positions** – Available in both clockwise and counterclockwise rotations and in all standard discharge positions. Housing discharge position can be changed on fan sizes 12" through 36". Larger size housings are non-rotatable.
- **Easy Installation and Maintenance** – Motor, drives, and bearings are readily accessible for ease in wiring, installation, adjustment, and lubrication.
- **Shafts** – Shafts are turned ground and polished, keyed at both ends with fiberglass sleeve in the airstream and sized to operate well below critical speed.
- **Bearings** – Bearings are heavy duty, self-aligning, ball or roller type, in cast iron pillow block housings, selected for minimum L-50 Life of 250,000 hours, and include extended lubrication fittings as standard.
- **Standard Shaft Seal** – A fiberglass and neoprene shaft seal is placed where the shaft leaves the housing along with a neoprene shaft slinger between the seal and wheel. Seal is not gas tight.
- **Hardware** – Airstream hardware is Type 304 stainless steel and encapsulated.
- **Motor Out of the Airstream** – Exterior mounting of Drip-Proof Protected motor on an adjustable motor slide base in belt drive models is standard. Motors can be furnished as TEFC, Mill and Chemical Duty, or to specifications upon request. Motor HP and frame size limits are identified in Dimensions and Material Specifications table.
- **Drives (Belt Drive Fans)** – V-Belt Drives are oversized for long life and continuous duty and are fixed pitch as standard option. Variable pitch drives are available upon request. Belts are oil, heat, and static resistant type.
- **Balancing** – The fan is electronically statically and dynamically balanced to the requirements of Fan Application Category BV-3 of AMCA ANSI Std. 204-96. All fans receive an inspection prior to shipment and, whenever possible, an operational test.
- **Flanged Duct Connections** – Outlet flange is standard, inlet flange is optional. Flange bolt holes are optional.
- **Bases** – Heavy gauge, welded, hot rolled steel with epoxy coating are standard.
- **Options and Accessories** – See pages 22 and 23.
- **Spark Resistant Construction and Protective Coatings** – Spark resistant construction for fiberglass equipment is optional, and for abrasive environments or extremely corrosive environments, special construction is available, see page 23.

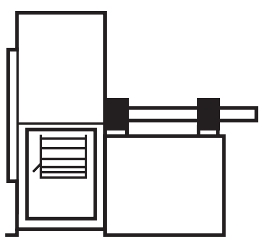
Hartzell Centrifugal Fan Classifications

Hartzell Series 41 Fiberglass Backward Curved Centrifugal Fans, Type FA, 100% width, are designed and classified to perform within the centrifugal fan classification parameters established by AMCA Standard No. 2408; AMCA Publication 99. Hartzell Series 41 Fiberglass Backward Curved Centrifugal Fans, Type FA, 100% width are available in Class I and II construction. Hartzell Series 41 in 66% width are available in Class I, II, and III construction. Series 41P are available in Class I construction only. See performance tables for specific ratings. These parameters are explained in the following table.

FAN CLASS	PERFORMANCE RANGE*	TABLE SHADING
I	5" @ 2300 FPM To 2 1/2" @ 3200 FPM	
II	8 1/2" @ 3000 FPM To 4 1/4" @ 4175 FPM	
III	13 1/2" @ 3780 FPM To 6 3/4" @ 5260 FPM	

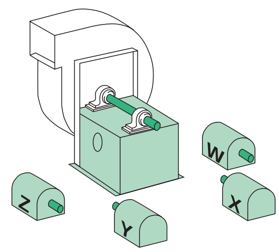
*** At standard air conditions (70°F, 29.92 in. HG barometric pressure, .075 lbs./ft.3). Static pressure shown in inches of water; outlet velocity shown in feet per minute. Performance Ranges apply only to 100% width construction.**

Centrifugal Fan Arrangements



Arrangement 1

Unit furnished with shaft and bearings, less motor and drive. Designed to be driven by a separately mounted motor. Impeller is overhung – two bearings on base. Temperature limitations: 250°F.

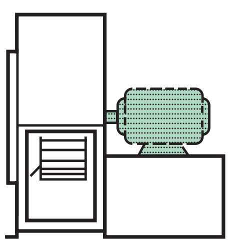


Motor Position Designation

Motor position designation is necessary when ordering the following for Arrangement 1 fans –

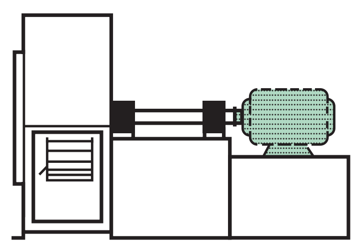
1 – V Belt Drive.
2 – Vibration Bases.
3 – Belt Guards.

Note: Location of motor is determined by facing the drive side of the fan and designating the motor position by letters W, X, Y, or Z. Consider discharge location and height when specifying.



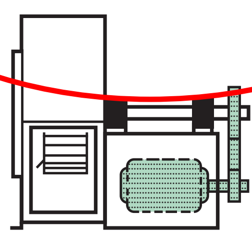
Arrangement 4

Direct drive packaged unit, wheel is overhung and attached to the shaft of the electric motor. No bearings on fan. Temperature limitations: 200°F.



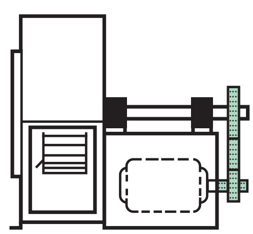
Arrangement 8

Direct coupled configuration with motor mounted to common fan base. Impeller is overhung and supported by two bearings on fan base. Temperature Limitations: 250°F.



Arrangement 9

Belt drive configuration with motor mounted on outside of bearing base support. Packaged unit, wheel is overhung, slide rail motor base permits easy adjustment of belt tension. Available on either left or right hand side of base (when facing drive end of shaft). Temperature limitations: 250°F.



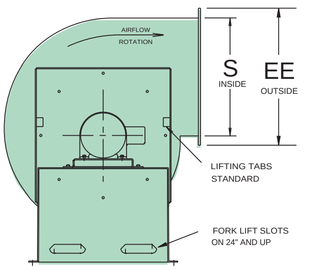
Arrangement 10

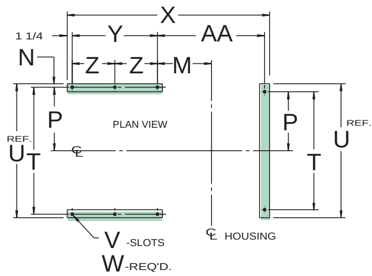
Belt drive configuration with motor mounted inside base. Packaged unit, wheel is overhung. Temperature limitations: 250°F.

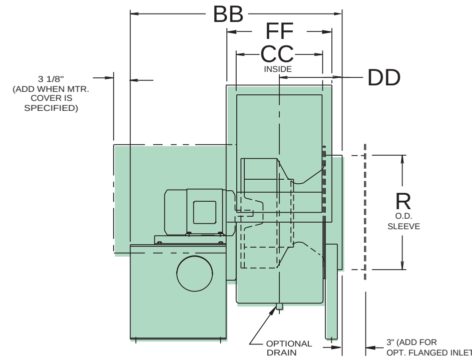
Adapted from AMCA Standard 99-2404-03, *Drive Arrangements for Centrifugal Fans*, and AMCA Standard 99-2407-03, *Motor Positions for Belt or Chain Drive Centrifugal Fans*, with written permission from Air Movement and Control Association International, Inc.

Dimensions – Arrangement 4

SERIES 41, Type FA
Sizes 12" Through 33", Rotatable Housing
Standard Construction – Classes I, II and III, Maximum Temperature – 200°F.







Principal Dimensions (Inches) – Sizes 12" – 33"

Fan Size	A	B		C	D	E	F	G	H	J	M		N
		Class I/II	Class III								100% Width	66% Width	
12	16	15 1/2	15 1/2	13	11 1/2	12 1/4	20 1/8	10 3/4	10	11 1/16	8 7/16	7 7/8	5/8
15	18 3/4	18 5/8	19 5/8	16 3/16	15 7/8	16 11/16	25 1/2	14 15/16	14	13 1/16	9 11/16	9	5/8
18	22	21 15/16	22 7/8	19	18 7/16	19 9/16	28 1/2	17 5/16	16 3/16	15 1/16	10 15/16	10 1/8	5/8
22	26 3/4	26 1/4	27 3/16	21 1/8	22 11/16	24 1/16	34 3/8	21 5/16	19 15/16	18 9/16	12 7/8	11 9/16	5/8
24	28 1/2	28 5/16	29 1/4	23	24 7/16	25 15/16	37 3/16	22 15/16	21 7/16	19 15/16	13 3/8	12 1/4	7/8
27	32 1/4	32 1/2	32 1/2	24	27 7/16	29 1/8	40 3/16	25 13/16	24 1/8	22 7/16	14 5/8	13 3/8	7/8
30	34 3/4	35	35	28 1/2	29 9/16	31 3/8	43 7/16	27 3/4	25 13/16	24 1/16	15 11/16	14 5/16	7/8
33	38	38 3/16	38 3/16	28 11/16	33 1/4	35 1/4	47 9/16	31 1/4	29 1/4	27 3/16	16 13/16	15 5/16	7/8

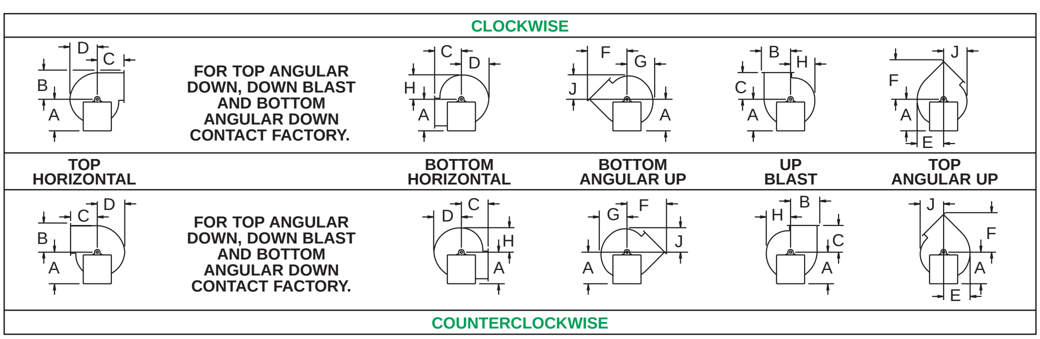
Fan Size	P	R	S	T	U	V	W	X		Y	Z	AA	
								100% Width	66% Width			100% Width	66% Width
12	9 1/8	12 1/4	12 7/8	18 1/4	19 1/2	9/16 x 1 1/16	6	26 7/16	25 9/32	9 1/2	–	14 11/16	13 17/32
15	10 3/4	16 1/2	16 1/8	21 1/2	22 3/4	9/16 x 1 1/16	6	36	34 5/8	16 1/2	–	17 1/4	15 13/16
18	12 3/8	19 1/2	19 3/8	24 3/4	27 3/4	9/16 x 1 1/16	6	40 5/16	39 1/4	19	–	19 11/16	18
22	14 1/2	23 7/8	23 5/8	29	30 1/4	9/16 x 1 1/16	6	44 1/4	42 3/16	19	–	23	21
24	15 7/8	25 7/8	25 3/4	31 3/4	33 1/2	11/16 x 1 3/16	6	45 13/16	43 5/8	19	–	24 9/16	22 3/8
27	17 5/8	28 3/4	29	35 1/4	37	11/16 x 1 3/16	6	48 1/2	46	19	–	27 1/4	24 3/4
30	18 7/8	31 3/16	31 1/2	37 3/4	39 1/2	11/16 x 1 3/16	8	52 5/16	50 1/4	21 1/2	10 3/4	29 3/16	26 1/2
33	20 5/8	34 3/16	34 11/16	41 1/4	43	11/16 x 1 3/16	8	57 1/2	54 9/16	23 3/4	11 7/8	31 1/2	28 9/16

Fan Size	BB		CC		DD		EE				FF			
	100% Width	66% Width	100% Width	66% Width	100% Width	66% Width	100% Width		66% Width		100% Width		66% Width	
							Class I/II	Class III	Class I/II	Class III	Class I/II	Class III	Class I/II	Class III
12	27 3/16	26 1/32	9 9/32	8 5/8	8	7 7/16	18 1/8	18 1/8	18 1/8	18 1/8	14 3/8	14 3/8	13 1/2	13 1/2
15	36 11/16	35 1/4	11 11/16	10 5/16	9 1/4	8 1/2	21 1/16	23 1/8	21 1/16	23 1/8	16 5/8	18 11/16	15 1/4	17 5/16
18	41 5/8	39 3/4	14	12 5/16	10 7/16	9 3/8	24 1/2	26 3/8	24 1/2	26 3/8	19 1/16	21	17 3/8	19 5/16
22	45 1/8	42 13/16	17 1/8	15 1/16	12	11	28 3/4	30 5/8	28 3/4	30 5/8	22 1/4	24 1/8	20 3/16	22 1/16
24	46 7/16	44 3/16	18 5/8	16 3/8	12 13/16	11 11/16	30 13/16	32 3/4	30 13/16	32 3/4	23 11/16	25 5/8	21 7/16	23 3/8
27	49	46 1/2	21	18 1/2	14 1/8	12 7/8	36	36	36	36	28	28	25 1/2	25 1/2
30	53 1/2	50 3/4	22 13/16	20 1/16	15 1/16	13 11/16	38 1/2	38 1/2	38 1/2	38 1/2	29 13/16	29 13/16	27 1/16	27 1/16
33	58 1/16	52 13/16	25 1/8	22 1/8	16 1/4	14 3/4	41 11/16	41 11/16	41 11/16	41 11/16	32 1/8	32 1/8	29 1/8	29 1/8

Dimensions and specifications are subject to change. Clockwise rotation is shown. Certified prints are available.

Fan Discharges

TAD, BAD, and DB discharge must have discharge extension. Contact factory.



5-PP-2020
9/28/2020

Material Specifications/Weights

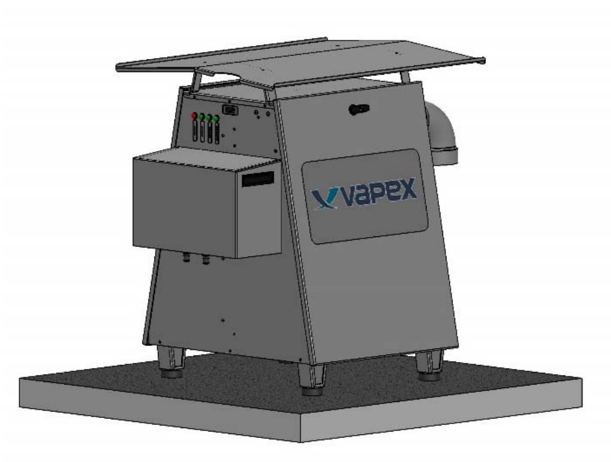
Series 41

Class	Fan Size	Flanges: Inlet Thickness	Flanges: Inlet Holes	Flanges: Outlet Thickness	Flanges: Outlet Holes 100% & 66%	Shaft & Bearings: Size	Shaft & Bearings: Type	FA Type Wheel WR^2 (Lbs.-Ft.^{2})	Motor Frames: Minimum Arr. #4	Motor Frames: Maximum Arr. #4	Motor Frames: Maximum Arr. #9 & #10	Installation Weights (Lbs. Less Motor): Arr. #4	Installation Weights (Lbs. Less Motor): Arr. #9 & #10
I	12	1/8	7/16 x 8	1/4	7/16 x 10	1 3/16	P3U219	1.6	56	184T	182T	160	193
	15	3/16	7/16 x 8	1/4	7/16 x 14	1 3/16	P3U219	4.7	143T	215T	184T	235	230
	18	3/16	7/16 x 8	1/4	7/16 x 14	1 7/16	P3U223	11	143T	256T	213T	350	355
	22	1/4	7/16 x 8	1/4	7/16 x 18	1 7/16	P3U223	29	182T	286T	215T	490	490
	24	1/4	7/16 x 8	1/4	7/16 x 18	1 7/16	P3U223	44	182T	286T	254T	580	605
	27	5/16	7/16 x 8	3/8	7/16 x 18	2 3/16	P3U235	78	182T	286T	254T	660	770
	30	5/16	7/16 x 8	3/8	7/16 x 18	2 7/16	P3U239	119	213T	326T	256T	935	975
	33	5/16	7/16 x 8	3/8	7/16 x 22	2 7/16	P3U239	160	254T	365T	284T	1145	1185
	36	5/16	7/16 x 8	3/8	7/16 x 22	2 11/16	P3U243	251	—	—	286T	—	1550
	40	5/16	7/16 x 8	1/2	7/16 x 26	2 15/16	P3U247	423	—	—	324T	—	2015
	44	3/8	7/16 x 8	1/2	7/16 x 30	2 15/16	P3U247	717	—	—	324T	—	2515
	49	3/8	9/16 x 16	1/2	7/16 x 34	2 15/16	P3U247	1180	—	—	326T	—	2940
	54	7/16	9/16 x 16	1/2	7/16 x 34	2 15/16	PB22447	1810	—	—	364T	—	3340
	60	7/16	9/16 x 16	1/2	7/16 x 38	2 15/16	PB22447	2875	—	—	365T	—	3670
II	12	1/8	7/16 x 8	1/4	7/16 x 10	1 7/16	P3U223	1.6	56	184T	184T	160	202
	15	3/16	7/16 x 8	1/4	7/16 x 14	1 7/16	P3U223	4.7	143T	215T	215T	235	235
	18	3/16	7/16 x 8	1/4	7/16 x 14	1 11/16	P3U227	11	143T	256T	256T	350	355
	22	1/4	7/16 x 8	1/4	7/16 x 18	1 11/16	PB22427	29	182T	286T	256T*	490	505
	24	1/4	7/16 x 8	1/4	7/16 x 18	1 11/16	PB22427	44	182T	286T	286T*	580	625
	27	5/16	9/16 x 8	3/8	7/16 x 18	2 3/16	PB22435	78	182T	286T	286T*	660	800
	30	5/16	9/16 x 8	3/8	7/16 x 18	2 7/16	PB22439	119	213T	326T	286T*	935	995
	33	5/16	9/16 x 8	3/8	7/16 x 22	2 7/16	PB22439	160	254T	365T	326T*	1145	1195
	36	5/16	9/16 x 8	3/8	7/16 x 22	2 11/16	PB22443	251	—	—	326T*	—	1620
	40	5/16	9/16 x 8	1/2	7/16 x 26	2 15/16	PB22447	423	—	—	365T*	—	2060
	44	3/8	9/16 x 8	1/2	7/16 x 30	2 15/16	PB22447	717	—	—	365T*	—	2560
	49	3/8	11/16 x 16	1/2	7/16 x 34	2 15/16	PB22447	1180	—	—	405T*	—	3040
	54	7/16	11/16 x 16	1/2	7/16 x 34	2 15/16	PB22447	1810	—	—	405T*	—	3480
	60	7/16	11/16 x 16	1/2	7/16 x 38	2 15/16	PB22447	2875	—	—	405T*	—	3670
III	12	1/8	9/16 x 8	1/4	7/16 x 10	1 11/16	P3U227	1.6	56	184T	184T	160	213
	15	3/16	9/16 x 8	1/4	7/16 x 14	1 11/16	P3U227	4.7	143T	215T	215T*	235	250
	18	3/16	9/16 x 8	1/4	7/16 x 14	1 15/16	P3U231	11	143T	256T	256T*	350	375
	22	1/4	9/16 x 8	1/4	7/16 x 18	1 15/16	PB22431	29	182T	286T	256T*	490	525
	24	1/4	9/16 x 8	1/4	7/16 x 18	1 15/16	PB22431	44	182T	286T	286T*	580	635
	27	5/16	9/16 x 16	3/8	7/16 x 18	2 3/16	PB22435	78	182T	286T	286T*	660	820
	30	5/16	9/16 x 16	3/8	7/16 x 18	2 7/16	PB22439	119	213T	326T	286T*	935	1040
	33	5/16	9/16 x 16	3/8	7/16 x 22	2 7/16	PB22439	160	254T	365T	326T*	1145	1210
	36	5/16	9/16 x 16	3/8	7/16 x 22	2 11/16	PB22443	251	—	—	326T*	—	1630
	40	5/16	9/16 x 16	1/2	7/16 x 26	2 15/16	PB22447	423	—	—	365T*	—	2080
	44	3/8	9/16 x 16	1/2	7/16 x 30	2 15/16	PB22447	717	—	—	365T*	—	2580
	49	3/8	11/16 x 16	1/2	7/16 x 34	2 15/16	PB22447	1180	—	—	405T*	—	3110
	54	7/16	11/16 x 16	1/2	7/16 x 34	2 15/16	PB22447	1810	—	—	405T*	—	3500
	60	7/16	11/16 x 16	1/2	7/16 x 38	2 15/16	PB22447	2875	—	—	405T*	—	3800

*** Motor Frames exceeding these values must be Arrangement 9M, Arrangement 1, or Arrangement 8.**
For other Arrangement maximum motor frame size and dimensions, please contact factory.

Series 41P

Class	Fan Size	Flanges: Inlet Thickness	Flanges: Inlet Holes	Flanges: Outlet Thickness	Flanges: Outlet Holes 100% & 66%	Shaft & Bearings: Size	Shaft & Bearings: Drive Side	Shaft & Bearings: Inlet Side	FA Type Wheel WR^2 (Lbs.-Ft.^{2})	Maximum Motor Frame Arr. #10	Installation Weights (Lbs. Less Motor)
II	12	1/8	7/16 x 8	1/4	7/16 x 10	1 11/16	P3U-227	P3U-227	1.6	215T	188
	15	3/16	7/16 x 8	1/4	7/16 x 14	1 11/16	P3U-227	P3U-227	4.7	215T	215
	18	3/16	7/16 x 8	1/4	7/16 x 14	1 15/16	P3U-231	P3U-231	11	254T	309
	22	1/4	7/16 x 8	1/4	7/16 x 18	1 11/16	P3U-227	P3U-227	29	256T	397
	24	1/4	7/16 x 8	1/4	7/16 x 18	1 15/16	P3U-231	P3U-231	44	256T	554
	27	5/16	9/16 x 8	3/8	7/16 x 18	2 3/16	P3U-235	P3U-235	78	286T	728
	30	5/16	9/16 x 8	3/8	7/16 x 18	2 3/16	PB-22435	P3U-235	119	324T	878
	33	5/16	9/16 x 8	3/8	7/16 x 22	2 3/16	P3U-235	P3U-235	160	324T	1013
	36	5/16	9/16 x 8	3/8	7/16 x 22	2 3/16	P3U-235	P3U-235	251	326T	1131



Main Features

- Eliminates H_2S and other odorous compounds
- Reduce or eliminate some forms of Fats, Oils, and Grease (FOG)
- Reduce or eliminate biofilm or bacterial growth in the treatment area
- Reduce the rate of corrosion typically associated with low pH
- Impart a residual oxidant to the defined space to absorb unexpected spikes of odors

Specifications

System

Oxidant Output: ≤ 1.5 lbs/day
Number of Nozzles: 1-3
Standard 500 Nozzle
20 CFM
5 to 10 GPH
Low Volume Nozzle
1 CFM
1 to 2 GPH
Treatment Area
Up to 18,000 ft^3
Low Volume Nozzle – up to 1,000 ft^3

Power supply

220 VAC, 30A, 60 Hz, Single Phase or
110 VAC, 30A, 60 Hz

Physical

Aluminum Powder Coated with TGIC polyester
Dimensions
41.6"L × 29.5" W × 39.4" H
Unit Weight
150 to 165 lbs avg

Operating environment

20°F to 100°F

Description

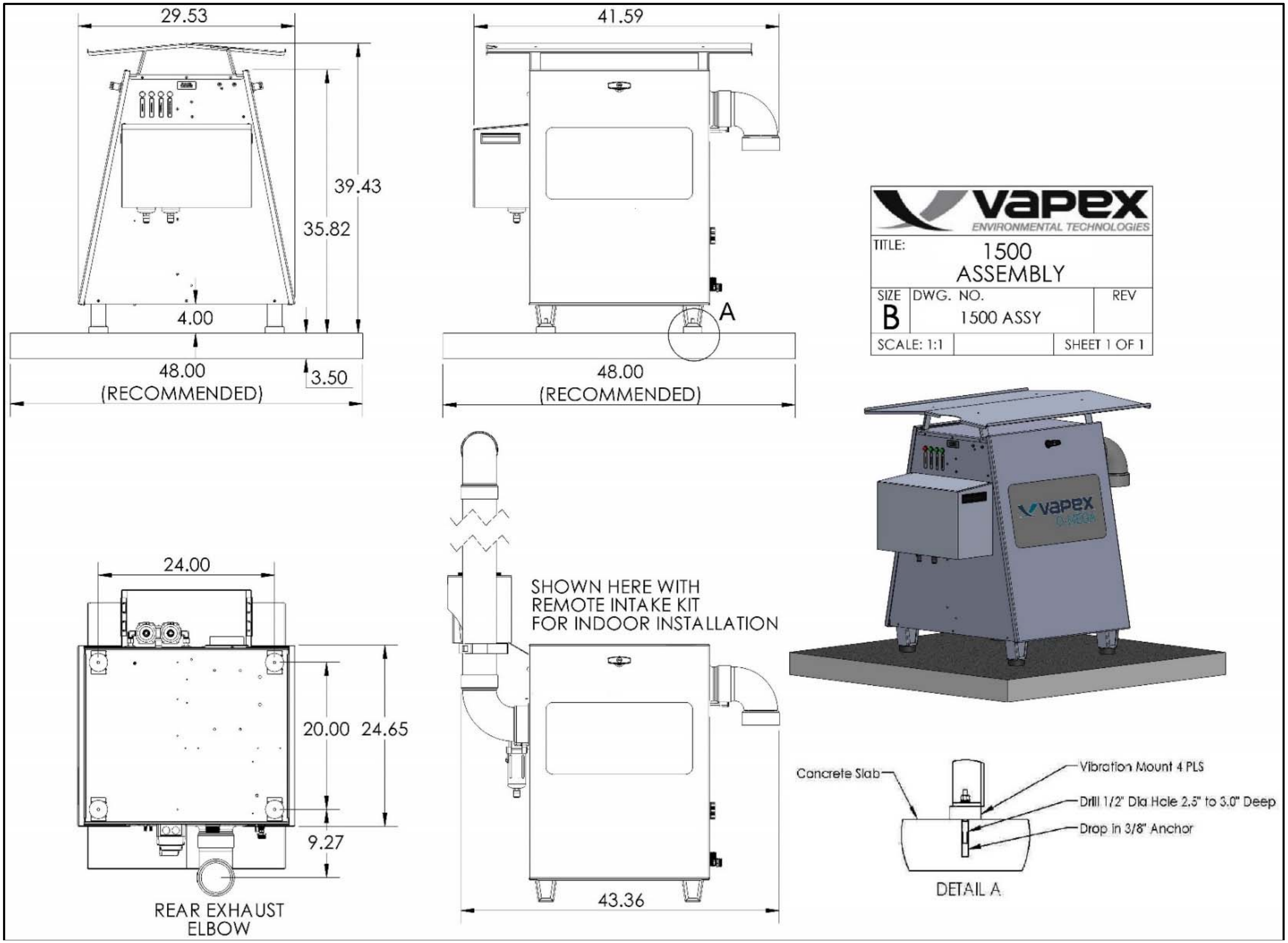
The Vapex 1500 is an odor control system specifically designed to treat H_2S, mercaptans, amines, and other odorous compounds in enclosed spaces. It combines ozone, water, and air using a patented 3-fluid nozzle to atomize the water molecules to create hydroxyl radicals. The odorous air is not extracted instead the odors are treated at the same space where they are generated.

Applications

- Lift Stations/Pump Stations
- Wet Wells
- Holding Tanks
- Headworks
- Covered Clarifiers

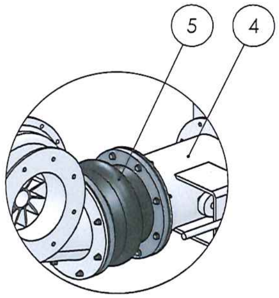
Contact Information

- Contact your local Vapex rep
- Call Vapex – 407-977-7250
- Email Vapex – Info@vapex.com

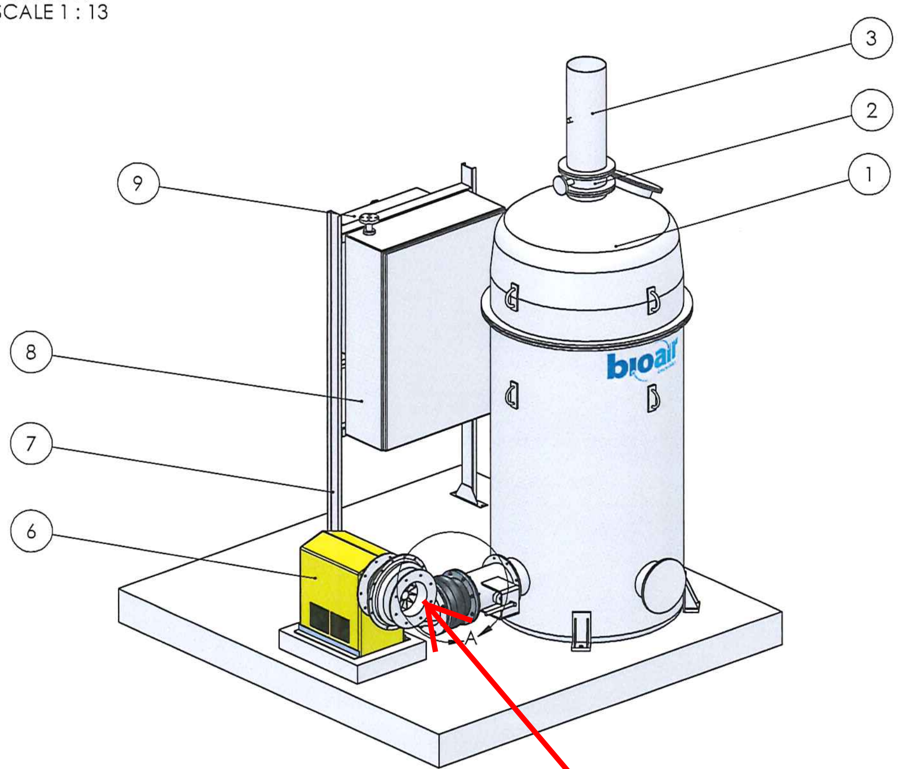


Vapex Environmental Technologies
Product Cut Sheet, August 2014
www.vapex.com

REV.	DATE	ECN#	REVISION RECORD	DR	CK
A	10/24/2011			KZ	



DETAIL A
SCALE 1 : 13



ITEM	PART NUMBER	QTY	DESCRIPTION	OPERATING WEIGHT (LBS)
1	RE031000	1	EF31 REACTOR ASSEMBLY WITH Ø2" ANSI 150 DRAIN	1725
2	NA081000	1		
3	ST082400	1	FRP STACK Ø8 PS1569 x 24"	
4	DV081000	1	FRP CONTROL DAMPER VALVE Ø8" PS15-69	10
5	FC080000	1	FLEX CONNECTOR SINGLE ARCH Ø8" PS15-69	10
6	BL200000	1	CAST ALUMINUM BLOWER	150
7	PS000100	1	STAINLESS STEEL PANEL STAND	49
8	WP101000	1	FRP WATER PANEL	65
9	CP000100	1	FRP ELECTRICAL PANEL	60

MATERIAL
SEE TABLE

FINISH

bioair
Breathe Better.

DRAWN BY: KZ   DATE: 10/24/2011   ENG APPR.   DATE   QC APPR.   DATE

PART NAME
GENERAL ARRANGEMENT ECOFILTER™ 31

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
ANGULAR: ±1°
FRACTIONS: ±1/4
TWO PLACE DECIMAL: ±.060
THREE PLACE DECIMAL: ±.030

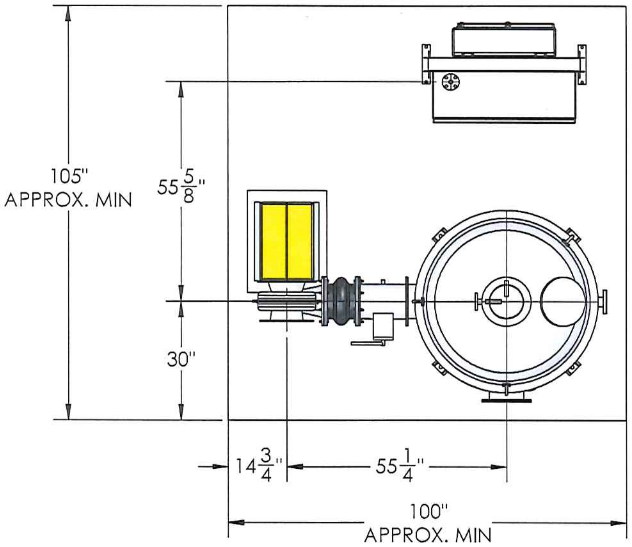
SIZE: B   DWG. NO.: EF31_GA   REV: A

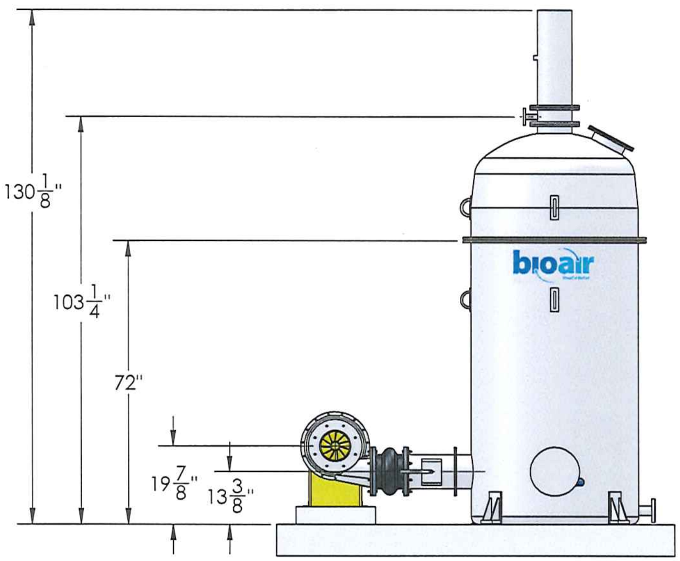
SCALE: 1 : 26   SHEET 1 OF 2

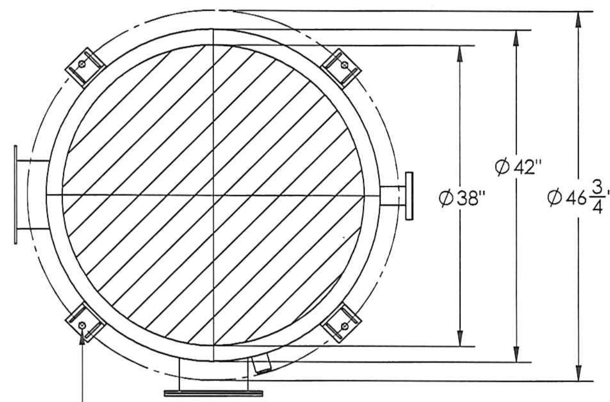
this is the connection port, right ?

5-PP-2020
9/28/2020

NOTES:
1. FOUNDATION PAD MUST BE FABRICATED UNIFORM IN TEXTURE AND APPEARANCE AND MEET A SURFACE PLANE TOLERANCE OF 1/8" IN 10'.
2. REACTOR TO BE SET ON 30LB FELT PAPER
3. LOAD DISTRIBUTION AREA = 1134 in^2
4. SHIPPING WEIGHT = 872 LBS, OPERATING WEIGHT = 1725 LBS





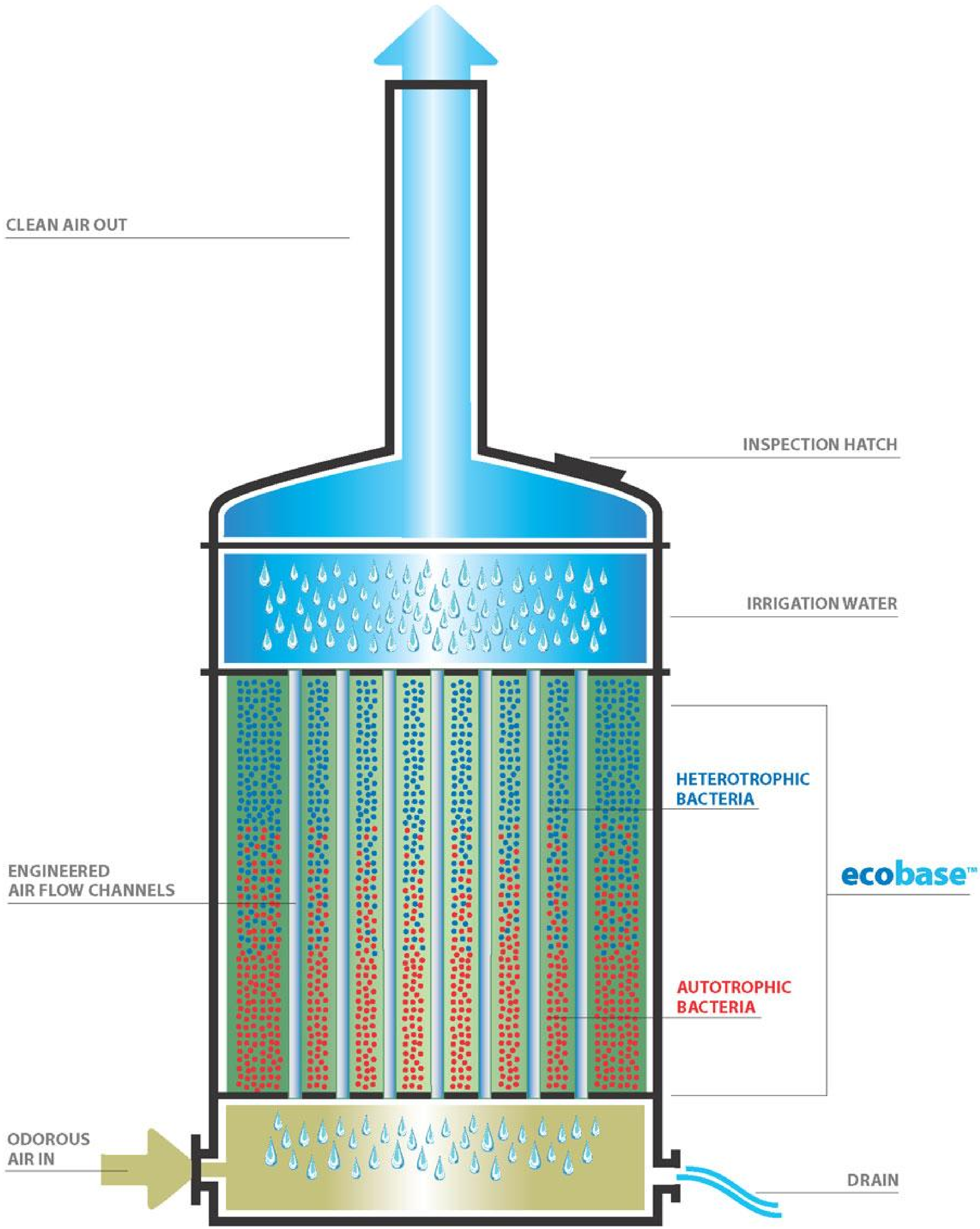


Ø 7/8" MOUNTING HOLE
EQUALLY SPACED ON
46 3/4" B.C.

LOADING DIAGRAM
SCALE: 1 : 15

SIZE	DWG. NO.	REV
B	EF31_GA	A
SCALE: 1 : 30	SHEET 2 OF 2	

5-PP-2020
9/28/2020



5-PP-2020
9/28/2020

PUMP ONE® LIFT STATION

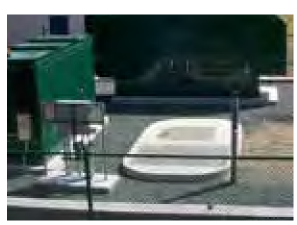
Oldcastle Precast®

5-PP-2020
9/28/2020

PUMP ONE LIFT STATION

5-PP-2020
9/28/2020

Created from more than 25 years of experience.



The OneLift™ by Oldcastle Precast, provides a standard turnkey submersible pump station product with the distinction of having a sole-source point of responsibility. The OneLift Pump Station is designed with an integral valve vault built into the unused top portion of the wet well, which yields a single-structure product, that solves the problems of differential settlement found with the conventional 2-structure systems. In addition; the single-structure design significantly reduces the product footprint for sites with tight area restrictions, and reduces complexity, size and cost of the excavation. The OneLift has proven to significantly reduce the time required for site installation.

OneLift's standard innovative design allows for quicker project documentation, faster product delivery and repetitive high quality manufacturing. Oldcastle Precast's turnkey obligation means that the OneLift Pump Station will be factory preassembled with all mechanical and electrical components prior to delivery, and that Oldcastle Precast, or our licensed distributors, are responsible for product commissioning, training and complete package warranty.

You can depend on the name and quality of Oldcastle Precast

TURNKEY PACKAGE station from a single supplier and installed in less than a day.

INNOVATION

Single Structure design

The factory built OneLift pump station offers a monolithically cast valve vault, in what is typically an unused portion of the pump station. This results in a significantly smaller footprint – up to 50% smaller than conventional 2 structure pump stations – allowing it to fit tight sites. The innovative shape and structural design provides ample space for the interior valve vault, while increasing workable system volumes and decreasing the depth of the excavation. The single structure of the OneLift pump station eliminates any potential differential settlement issues, allows for a quick and easy installation by eliminating the typical two-tier excavation of conventional stations, and is proven to be a cost-effective method of providing a high quality pump station solution with rapid and reliable delivery. With the OneLift pump station you get fast turnaround time on submittals; which include standard structural and mechanical components.

Design Features:

- Rounded-corner design – allows for thinner/ lighter walls and prevents solids accumulation
- Near rectangular shape – provides more storage volume in the bottom and more space in the top to integrate the valve chamber
- Single structure design – provides a smaller footprint, simpler excavation, rapid installation, and eliminates potential for differential settlement
- Standard design – allows for stockable components for quicker turnaround and a rapid submittal package

STOCKED
COMPONENTS
of various
heights to
fit specific
jobsite needs.

QUALITY CONSTRUCTION

Factory built to rigid Oldcastle Precast quality standards

With the OneLift pump station you get quick submittal turnaround and high quality repetitive factory outfitting. Assembly of mechanical and electrical components in controlled factory conditions means a consistently higher quality product than site assembled stations. The OneLift pump station is factory preassembled and then partially disassembled for shipping. This prepackaged solution allows for field erection and reassembly in less than four hours. You get standard structural and mechanical components that allow for factory stocking, resulting in quicker station deliveries.

Construction Features:

- Standardized/stockable components that allow for fast production
- Packaging in controlled factory vs. variable field conditions
- Oldcastle quality and local availability
- Quick project turnaround

5-PP-2020
9/28/2020

5-PP-2020
9/28/2020

PREASSEMBLED equipment package providing rapid installation and factory built quality.

Valve Assembly in Valve Vault, pre-assembled in factory.

Technical info:

- Station height 10'-10' to 24'-10'"
- Top slab with hatches: 300# pedestrian, or H20 design loading
- Valve vault extension risers (2' & 4')
- Integral valve vault section (4'-8 high)
- Wet well riser sections (2', 3', & 4' high)
- Base section 4'-8' w/ mono fillet & collar
- Factory preassembly of equipment provides: factory assembled quality which further accelerates installation to ½ day

Pump Station during factory assembly.

BENEFITS TO . . .

the Design Engineer

- Smaller footprint on site
- Accommodates multiple pump manufacturers
- Turn-key package from one supplier
- AutoCAD drawings and specs readily available
- Timely and accurate budget estimates
- Can be considered a "standard off-the-shelf product"

the Owner

- Rapid project cycle (design & construct)
- Smaller footprint on site
- Standardized and repeatable
- Overall cost savings
- Reliability and quality of Oldcastle Precast

the Site Contractor

- Quick delivery timeline and rapid installation process
- Single smaller excavation (possibly shallower)
- Rapid installation limits the dewatering process
- Preassembled-requires only minor reassembly on site
- Safer below grade construction process
- Competitive installed cost
- Greater value and knowr

5-PP-2020
9/28/2020

TYPICAL 1/2-DAY INSTALLATION

As a prepackaged solution, the OneLift pump station arrives at your job site preassembled and ready for installation. The preassembly of the OneLift pump station allows for a simplified construction process reducing installation time to 3-4 hours or just half a day. The single structure of the OneLift pump station is significantly easier to install.

9:30 am
Flat bed trucks arrive with pump station components. Contractor has excavation ready for pump station installation.

10:15 am
Crane off-loads base section into excavation, additional sections are set at a rate of approximately one every thiry minutes.

5-PP-2020
9/28/2020

A single tier excavation is all that is required which improves job site safety as assembly time in the excavation is reduced. Dewatering time and costs are reduced as well. ***Case study: RC509 delivered and installed in North Truro, MA.***

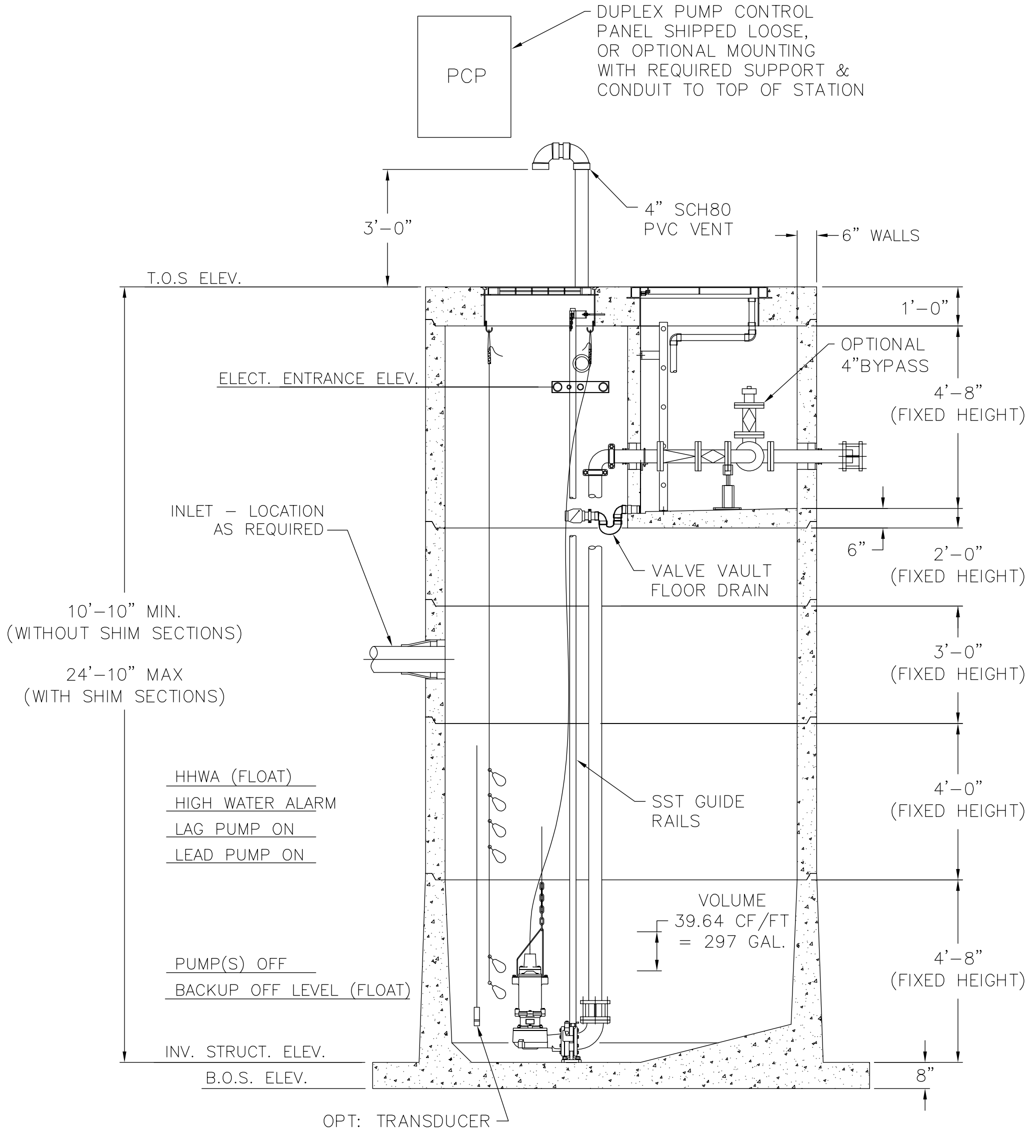
11:15 am

Crane sets long discharge pipes and pump guide rails (shipped loose) into station. Pump station top section with integral vault is set.

12:00 Noon

Minor reassembly of shipped loose items are completed in two hours and backfill begins.

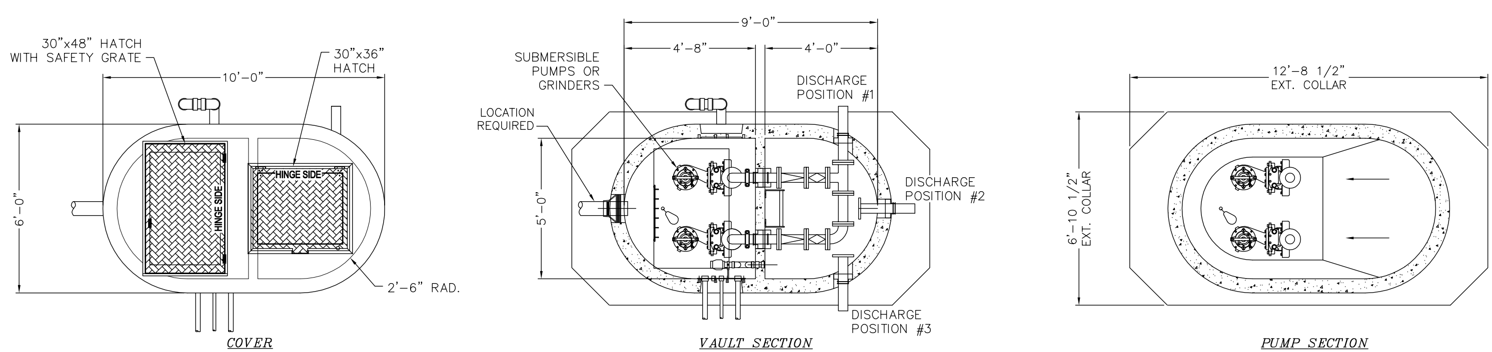
SPECIFICATIONS



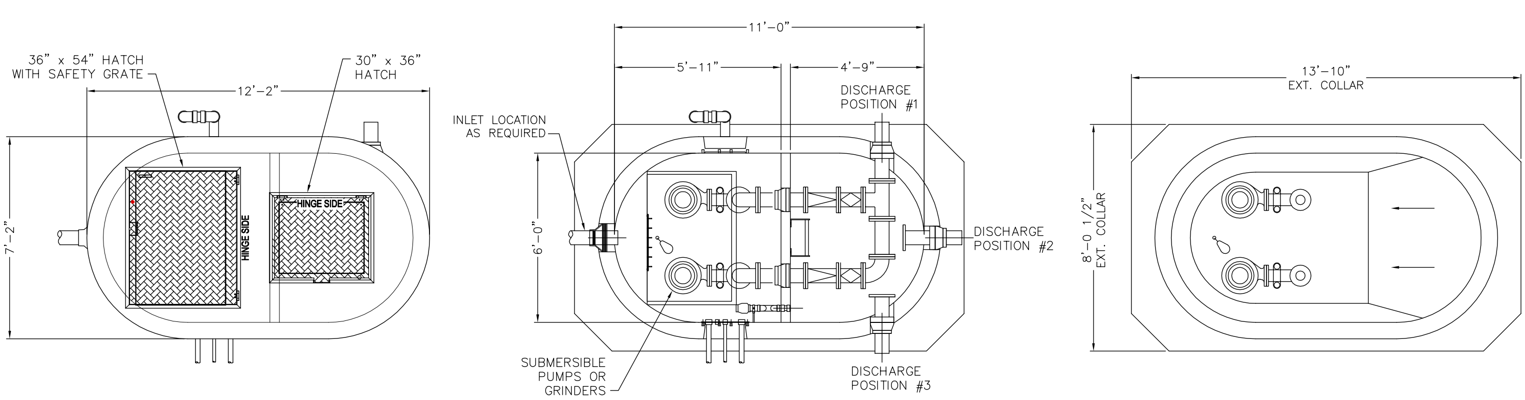
INTERIOR ELEVATION VIEW
RC509 x 10'-10" to 24'-10"

PUMP STATION SIZING CHART

Model Number	RC509	RC611
Interior Width	5'-0"	6'-0"
Interior Length	9'-0"	11'-0"
Min/Max Height (T.O.S. to floor)	10'-10"/ 24'-10"	10'-10"/ 24'-10"
Volume (gal/vertical foot)	297 gal	436 gal
Standard DI Piping & Discharge Size*	4"	6"
Replaces Conventional Pump Stations	6' diameter & 8' diameter	8' diameter & 10' diameter

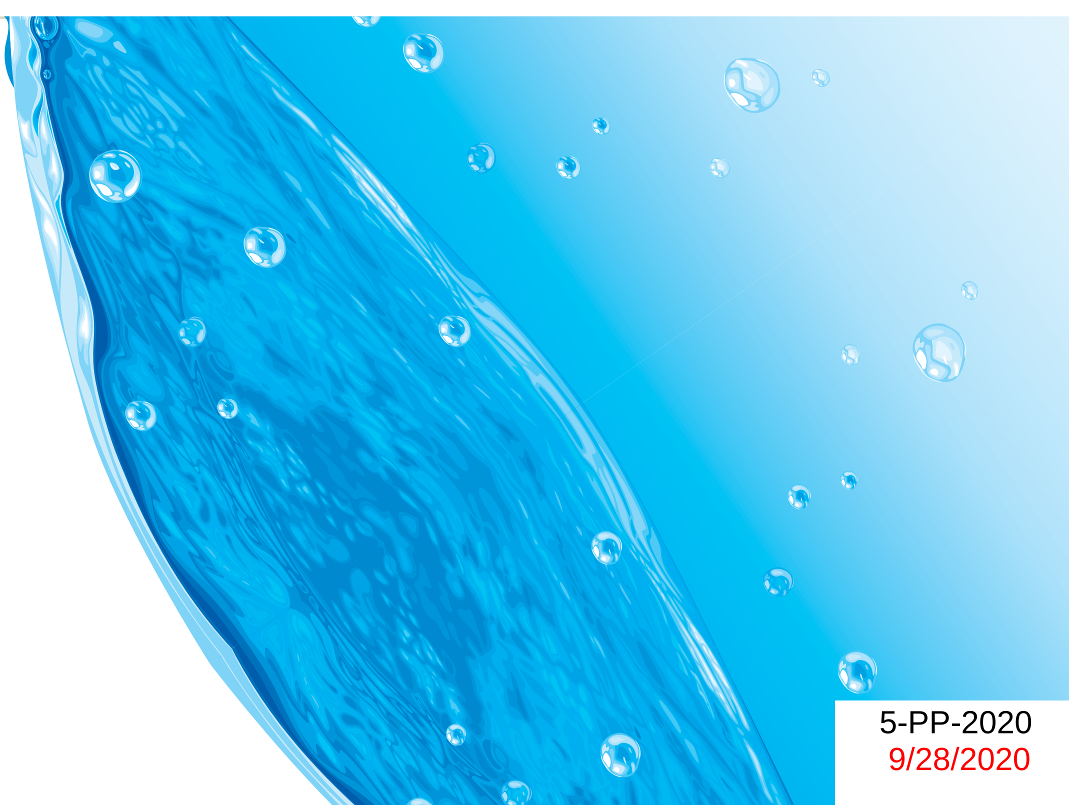


RC509 PLAN VIEWS



RC611 PLAN VIEWS

PUMP ONE LIFT STATION



5-PP-2020
9/28/2020

PUMP ONE LIFT STATION

Oldcastle Precast

www.onelift.com
888-965-3227

5-PP-2020
9/28/2020