APPENDIX H

HYDROLOGY STUDY REPORT

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2019-285

6400 Katella Ave

6400 Katella Ave
City of Cypress, CA

Hydrology Study Report

Prepared For:

Duke Realty
200 Spectrum Center Drive, Suite 1600
Irvine, CA, 92618

Prepared By:
WestLAND Group, Inc.
4150 Concours, Suite 100
Ontario, CA 91764
909-989-9789

WestLAND Group, Inc.

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1. INTRODUCTION

1.1. PROJECT OVERVIEW, PURPOSE & SCOPE

The project is proposed to redevelop an industrial site within North Orange County in the City of Cypress for industrial purposes. The project site measures approximately 22.3-acres and is located on 6400 Katella Avenue.

The purpose of this Hydrology Study is to evaluate the post-development and pre-development hydrological conditions of the site and provides the 25-year storm peak flows for design of the on-site storm drain systems for flood protection of the facility structures. It also provides the runoff volume from a 25-year 24-hour storm.

2. EXISTING SITE DESCRIPTION

2.1. EXISTING SITE TOPOGRAPHY & HYDROLOGIC PATTERNS

The proposed project site is currently developed for industrial purposes except for the southeast portion of the site which remains undeveloped.

The project site is bounded by Katella Avenue towards the north and Holder Street towards the east. Towards the south is the Stanton Storm Channel which the site discharges to via a storm drain connection along Holder Street and another towards the Southwesterly of the site.

The existing conditions show that water sheet flows towards gutters that route the water into inlets spread across the site. The inlets connect to storm drain systems that discharge the water into one of three outlets: 1. To the Stanton Storm Channel towards the Southwesterly portion of the site, 2. To a public storm drain system running through Holder St towards the Northeastern half of the site, and 3. To a public storm drain system running through Holder St towards the Southeastern half of the site. The public storm drain system along Holder St. will ultimately discharge the water into the Stanton Storm Channel. Please refer to the Pre-Development Hydrology Exhibit in Appendix D.

2.2. GEOTECHNICAL CONDITIONS

As noted in the geotechnical report, groundwater was determined to be 5-6.5' below finished surface. Due to the high groundwater levels, infiltration will not be feasible for the project. Refer to the WQMP Report for more information.

3. PROJECT SITE DESCRIPTION

3.1. PROPOSED PROJECT DESCRIPTION

The project is located at 6400 Katella Ave, Cypress, CA. The proposed project site is bounded by Katella Avenue to the North and Holder Street to the East. To the west of the project site is an existing developed site and to the south is the Stanton Storm Channel. The project proposes to redevelop the site for industrial use. The proposed development will consist of a parking lot, loading docks, landscape area, drive aisles, and two warehouses. The proposed development will end up increasing the impervious ratio of the site from 72% to 86%.

3.2. PROPOSED HYDROLOGIC PATTERNS/CONNECTIONS

The proposed project site can be characterized by eight (8) drainage areas. Runoff will be conveyed via gutters and routed to a local catch basin w/ filter insert. Underground piping will then convey stormwater runoff to an Underground CMP Detention System designed to detain the water quality volume which for this project is the Design Capture Volume (DCV). The underground detention system is not the point of termination. The water is then directed to a pump where it will be pumped into a Modular Wetland System for biotreatment. Treated water will be directed into the final pump location which will then discharge to the existing 42" storm drain. The offsite drainage is directed to the existing 7'x4' RCB Storm Drain along Holder Street, so no offsite run-on is anticipated to convey into the site.

The Underground Detention System and Modular Wetland System are designed to accommodate and treat the Design Capture Volume resulting from the 85th percentile, 24-hr storm. In the event where flows exceed those from the 85th percentile, 24-hr storm, an emergency overflow has been integrated to bypass the Modular Wetland System and route directly to the second pump and discharge to the existing 42" Storm Drain.

4. RESULTS & ANALYSIS

4.1. METHODOLOGY

The methodology described in the Orange County Hydrology Manual was used to compute storm water flow rates from the project site. A 25-year frequency storm is used for this study, and the Civil Design Rational Method for Orange County module was used to generate the 25-year peak discharge and time of concentration. In addition, the Civil Design Unit Hydrograph Method for Orange County module was used to generate the runoff volumes for a 25-Year, 24-hour storm using the Time of Concentration and other pertinent information obtained from the rational method analysis. Refer to Appendix A for the Rational Method calculations and Appendix B for the Unit Hydrograph calculations.

The existing soil classification for the area consists of Hydrologic Soil Group "A" per the USDA Web Soil Survey (Appendix C), and the on-site areas were analyzed as commercial land cover except for DA3 DMA1 in the Pre-Development Exhibit which was analyzed as an undeveloped area with poor cover. In addition, the entire site was analyzed to be below 2000 feet in elevation. Calculations were performed for the 25-Year Storm with the purpose of designing the storm drain system. In order to meet the North Orange County Stormwater quality requirement, the Design Capture Volume (DCV) was calculated for sizing BMP's & LID devices. Refer to the WQMP for more information regarding the BMPs chosen for this project.

To determine whether or not flows will need to be attenuated, the full-flow capacity for the existing 42" storm drain was first computed using Bentley FlowMaster. This full-flow capacity is the maximum flow that can be discharged by a 42" RCP and is not equivalent to the allowable flow rate. To obtain the allowable flow rates, the flow rates from a 25-year, 24-hr storm were then analyzed and compared to the flow rates that are currently discharging into the storm drain system for a 25-year storm as provided by the city's Master Plan of Drainage (Appendix C). The Master Plan of Drainage provides the flow rates corresponding to a certain boundary, and the allowable flow rate for the project site was computed by comparing the area of the project site within the boundary with the area and corresponding flow rate for the entire boundary. The 25-year flow rates obtained from the Master Plan of Drainage will be referred to as the allowable flow rates for this project ($Q_{allowable}$).

The Master Plan of Drainage also provides the flow rates for a 10-year storm, but it is not applicable for this project since the entire storm drain system will be designed to accommodate a 25-year storm.

4.2. HYDROLOGY & HYDRAULIC ANALYSIS

From the Master Plan of Drainage, an allowable flow rate of 32.4 cfs is able to be discharged at the existing 42" Storm Drain towards the Southwestern portion of the site. Furthermore, an additional 9.43 cfs is able to be discharged at the storm drain system along Holder St. For calculations, please refer to Table 4.2(a) below. Note that the discharge at node 21.08 was computed by subtracting the flow rates between Node 21.08 and 21.07 (N). This corresponds to the allowable flow rate from only the boundary containing Node 21.08.

Table 4.2(a): Allowable Flow Rates

6400 KATELLA AVENUE PROJECT				
Allowable Flow Rates (25-Year Storm)				
Node	Tributary Area (ac)	Area of Project Site (ac)	Q_{25}, cfs (At node)	Allowable Q_{25}, cfs (From portion of project site)
22.04	14.68	14.68	32.4	32.4
21.08	28.53	7.62	35.3	9.43
Total	**-**	**-**	**-**	**41.83**

For this project, although Nodes 22.04 and 21.08 correspond to different storm drain systems, both storm drain systems discharge downstream into the Stanton Storm Channel. Therefore, the two flow rates were summed to obtain the total allowable discharge rate for the entire project site. In addition, the existing 42" Storm Drain was computed to be able to discharge up to 71.14 cfs at full flow, showing that it can accommodate the total allowable discharge. Refer to Appendix C for capacity calculations.

The on-site Q_{25} design storm was used to analyze proposed stormwater flows to size the storm drain system. The difference in peak flow at the existing 42" Storm Drain towards the Southwestern portion of the site is analyzed to be 33.29 cfs.

$$Q_{25} \text{ PRE-DEVELOPED} = 43.48 \text{ cfs (DA2)}$$

$$Q_{25} \text{ POST-DEVELOPED} = 76.77 \text{ cfs}$$

$$\Delta Q_{25} = \mathbf{33.29\ CFS} = Q_{POST} - Q_{PRE} = 76.77 - 43.48$$

Only the peak flow at DA2 of the Pre-Developed conditions was considered in calculating the ΔQ_{25} because only DA2 shares the same outlet point as the Post-Developed conditions. Per the results shown above, the ΔQ_{25} demonstrates that the proposed development will increase the flow rate. For the distribution of flows between each subarea, please refer to the summary tables (Tables 4.2(b), 4.2(c), and 4.2(d)) in the following section.

When referring to Table 4.2(c), the total peak flow rate does not equate to the sum of the peak flow at each individual subarea. This is due to the rational method confluence analysis that occurs at the junction nodes of two or more streams. The confluence analysis was performed using the Civil Design Rational Method for Orange County module and the total flow rate was computed to be 76.77 cfs as listed in Table 4.2(c). Refer to Appendix A for the rational method calculations.

In addition, the runoff volume was also calculated to increase for a 25-year storm. In particular, calculations for the post-development and pre-existing conditions revealed that the runoff volume will increase by 38,250 CF due to the redevelopment.

V_{25} PRE-DEVELOPED = 236,706 CF

V_{25} POST-DEVELOPED = 274,959 CF

ΔV_{25} = **38,250 ft^3**= V_{POST} - V_{PRE} = 274,959 – 236,709

However, the WQMP study revealed that the required Design Capture Volume (DCV) is 54,757 CF. Therefore, analysis concluded that since the DCV is greater than the volume increase, the DCV will determine on-site storage capacity. To accommodate the required DCV, an Underground CMP Detention System will be used to detain and route the required DCV a Modular Wetland System for biotreatment via a pump. A second pump will then release the water to the point of connection with the existing 42" Storm drain. The Underground CMP Detention System is designed to be able to detain 54,840 CF. Refer to the WQMP Report for additional information.

To determine whether flows will need to be attenuated, an analysis of the Unit Hydrograph for a 25-year storm was conducted and compared with the allowable flow rate. From the Unit Hydrograph Analysis, the peak flow rate from a 25-year storm will be 35.84 cfs for the proposed conditions. Since the peak flow rate is lower than the allowable discharge, the pumping system can be designed to pump at a rate 35.84 cfs, which will be the maximum flow rate for the proposed site after accounting for the BMPs.

Table 4.2(b): Pre-Development Summary Table (Refer to Pre-Development Exhibit)

6400 KATELLA AVENUE PROJECT						
Pre-Development Conditions (25-Year Storm)						
DA	DMA	Area, ac	T_c, min	Q_{25}, cfs	Total Q_{25}, cfs	$Volume_{100}$, cf
DA1	DMA1	4.86	5.14	20.59	20.59	52,167
DA2	DMA1	6.95	11.87	18.24	43.48	92,308
	DMA2	8.88	10.34	25.24		79,231
DA3	DMA3	1.62	14.47	3.27	3.27	13,003
Total	**-**	**22.3**	**-**	**-**	**-**	**236,709**

Table 4.2(c): Post-Development Summary Table (Refer to Post-Development Exhibit)

6400 KATELLA AVENUE PROJECT					
Post-Developed Conditions (25-Year Storm)					
DMA	Area, ac	T_c, min	Q_{25}, cfs (Rational Method)	Q_{25}, cfs (Unit Hydrograph)	$Volume_{100}$, cf
A	1.74	7.66	5.87	2.97	22,677
B	2.92	8.23	9.46	5.07	43,904
C	2.93	5.79	11.60	5.36	41,652
D	4.77	5.60	19.24	8.89	68,455
E	2.50	4.69	11.17	0	0
F	2.60	5.51	10.59	4.81	36,277
G	3.37	5.63	13.56	6.10	42,637
H	1.47	6.24	5.58	2.64	19,358
Total	**22.3**	**-**	**76.77**	**35.84**	**274,959**

Table 4.2(d): Flow Summary Table

6400 KATELLA AVENUE PROJECT				
Post-Developed Conditions (25-Year Storm)				
Area, ac	Q_{25}, cfs (Existing)	Q_{25}, cfs (Proposed, Storm Drain Design)	Q_{25}, cfs (Proposed, with BMPs)	Q_{25}, cfs (Allowable)
A	43.48	76.77	35.84	41.83

4.3. RESULTS

PROJECT DESIGN CRITERIA	
Hydrology Results & Analysis Summary Table:	Project Site Disturbed Area **= 22.3 Ac** ΔV_{25} = **38,250 ft³** DCV = **54,757 ft³** DCV > ΔV_{25}, DCV = site design storage requirement $V_{PROVIDED}$ = 54,840 ft³ *(Underground CMP Detention System)* Q_{25} = **76.77 cfs** = Q_{POST} Q_{25} = **43.48 cfs** = Q_{PRE} (DA2) ΔQ_{25} = **33.29 cfs** Q_{25} = **35.84 cfs** = Q_{POST} (With BMPs) $Q_{allowable}$ = **41.83 cfs**

The ΔV_{25} results indicate that the proposed development will result in an increase of stormwater runoff from the project site. Therefore, retention/detention is necessary, while subsequently provisioning for WQMP storage. The results conclude that the Underground Detention System will accommodate the ΔV_{25} as well as satisfy the design capture volume and the Modular Wetland System will be able to treat it (Refer to WQMP Report). In addition, the resulting flow rate for a 25-year storm due to redevelopment is shown to be less than the allowable flow rate.

5. CONCLUSION

The storm drain systems will be designed to accommodate a 25-year storm event. The ΔQ_{25} results indicate that the proposed development will result in an increase in peak flow rates due to the redevelopment. Furthermore, the ΔV_{25} results indicate that there will also be an increase in stormwater runoff. Therefore, retention/detention will be necessary and an Underground Detention System and Modular Wetland System will be used to store and treat the required DCV. Furthermore, the allowable discharge rate of 41.83 cfs into the existing 42" storm drain will be met and the flows will not need to be attenuated.

APPENDIX A

RATIONAL METHOD ANALYSIS (25-YEAR STORM)

POST-DEVELOPMENT CONDITION

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 07/04/20 File Name: 2019285.roc

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2019-285 6400 Katella Avenue
Rational Method for 25 Year Storm

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 25.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

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Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fp)= 0.400(In/Hr)
Max Catchment Loss (Fm) = 0.040(In/Hr)
Initial subarea data:
Initial area flow distance = 242.370(Ft.)
Top (of initial area) elevation = 41.320(Ft.)
Bottom (of initial area) elevation = 39.920(Ft.)
Difference in elevation = 1.400(Ft.)
Slope = 0.00578 s(%)= 0.58
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.662 min.
Rainfall intensity = 3.788(In/Hr) for a 25.0 year storm

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Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff =      5.870(CFS)
Total initial stream area =        1.740(Ac.)


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Process from Point/Station        1.200 to Point/Station        9.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =    36.920(Ft.)
Downstream point/station elevation =    33.880(Ft.)
Pipe length  =   607.55(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.870(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.870(CFS)
Normal flow depth in pipe =   12.07(In.)
Flow top width inside pipe =   16.92(In.)
Critical Depth =   11.22(In.)
Pipe flow velocity =      4.66(Ft/s)
Travel time through pipe =    2.17 min.
Time of concentration (TC) =     9.83 min.


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Process from Point/Station        9.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.740(Ac.)
Runoff from this stream =      5.870(CFS)
Time of concentration =    9.83 min.
Rainfall intensity =     3.289(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        3.100 to Point/Station        3.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.400(In/Hr)
Max Catchment Loss (Fm) =     0.040(In/Hr)
Initial subarea data:
Initial area flow distance =   145.890(Ft.)
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Top (of initial area) elevation =    41.690(Ft.)
Bottom (of initial area) elevation =    40.450(Ft.)
Difference in elevation =     1.240(Ft.)
Slope =    0.00850  s(%)=       0.85
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.789 min.
Rainfall intensity =      4.440(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =     11.602(CFS)
Total initial stream area =        2.930(Ac.)


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Process from Point/Station        3.200 to Point/Station        9.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =    34.010(Ft.)
Downstream point/station elevation =    33.880(Ft.)
Pipe length  =    25.42(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.602(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.602(CFS)
Normal flow depth in pipe =   15.04(In.)
Flow top width inside pipe =   23.22(In.)
Critical Depth =   14.68(In.)
Pipe flow velocity =      5.60(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     5.86 min.


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Process from Point/Station        9.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.930(Ac.)
Runoff from this stream =     11.602(CFS)
Time of concentration =    5.86 min.
Rainfall intensity =     4.407(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      1.74     5.870      9.83    0.040      3.289
2      2.93    11.602      5.86    0.040      4.407
Qmax(1) =
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           1.000 *    1.000 *     5.870) +
           0.744 *    1.000 *    11.602) + =      14.502
Qmax(2) =
           1.344 *    0.596 *     5.870) +
           1.000 *    1.000 *    11.602) + =      16.307

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.870      11.602
Maximum flow rates at confluence using above data:
       14.502       16.307
Area of streams before confluence:
        1.740        2.930
Effective area values after confluence:
        4.670        3.968
Results of confluence:
Total flow rate =     16.307(CFS)
Time of concentration =     5.865 min.
Effective stream area after confluence =      3.968(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.040(In/Hr)
Study area total (this main stream) =       4.67(Ac.)


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Process from Point/Station        9.000 to Point/Station       10.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =    33.880(Ft.)
Downstream point/station elevation =    32.070(Ft.)
Pipe length  =   362.52(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.307(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    16.307(CFS)
Normal flow depth in pipe =   17.37(In.)
Flow top width inside pipe =   25.87(In.)
Critical Depth =   16.90(In.)
Pipe flow velocity =      6.03(Ft/s)
Travel time through pipe =    1.00 min.
Time of concentration (TC) =     6.87 min.


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Process from Point/Station       10.000 to Point/Station       10.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.968(Ac.)
Runoff from this stream =     16.307(CFS)
Time of concentration =    6.87 min.
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Rainfall intensity =     4.031(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        4.100 to Point/Station        4.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.400(In/Hr)
Max Catchment Loss (Fm) =     0.040(In/Hr)
Initial subarea data:
Initial area flow distance =   222.840(Ft.)
Top (of initial area) elevation =    41.530(Ft.)
Bottom (of initial area) elevation =    36.330(Ft.)
Difference in elevation =     5.200(Ft.)
Slope =    0.02334  s(%)=       2.33
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.604 min.
Rainfall intensity =      4.522(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =     19.243(CFS)
Total initial stream area =        4.770(Ac.)


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Process from Point/Station        4.200 to Point/Station       10.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =    32.300(Ft.)
Downstream point/station elevation =    32.070(Ft.)
Pipe length  =    46.45(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.243(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    19.243(CFS)
Normal flow depth in pipe =   19.71(In.)
Flow top width inside pipe =   23.97(In.)
Critical Depth =   18.41(In.)
Pipe flow velocity =      6.19(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     5.73 min.


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Process from Point/Station       10.000 to Point/Station       10.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      4.770(Ac.)
Runoff from this stream =     19.243(CFS)
Time of concentration =    5.73 min.
Rainfall intensity =     4.466(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      3.97    16.307      6.87    0.040      4.031
2      4.77    19.243      5.73    0.040      4.466
Qmax(1) =
           1.000 *    1.000 *    16.307) +
           0.902 *    1.000 *    19.243) + =      33.658
Qmax(2) =
           1.109 *    0.834 *    16.307) +
           1.000 *    1.000 *    19.243) + =      34.332

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.307      19.243
Maximum flow rates at confluence using above data:
       33.658       34.332
Area of streams before confluence:
        3.968        4.770
Effective area values after confluence:
        8.738        8.080
Results of confluence:
Total flow rate =     34.332(CFS)
Time of concentration =     5.729 min.
Effective stream area after confluence =      8.080(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.040(In/Hr)
Study area total (this main stream) =       8.74(Ac.)


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Process from Point/Station       10.000 to Point/Station       11.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =    32.070(Ft.)
Downstream point/station elevation =    29.390(Ft.)
Pipe length  =   534.99(Ft.)   Manning's N = 0.013
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No. of pipes = 1  Required pipe flow  =    34.332(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    34.332(CFS)
Normal flow depth in pipe =   24.87(In.)
Flow top width inside pipe =   28.43(In.)
Critical Depth =   23.41(In.)
Pipe flow velocity =      7.15(Ft/s)
Travel time through pipe =    1.25 min.
Time of concentration (TC) =     6.98 min.


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Process from Point/Station       11.000 to Point/Station       11.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.080(Ac.)
Runoff from this stream =     34.332(CFS)
Time of concentration =    6.98 min.
Rainfall intensity =     3.995(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


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Process from Point/Station        8.100 to Point/Station        8.200
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.400(In/Hr)
Max Catchment Loss (Fm) =     0.040(In/Hr)
Initial subarea data:
Initial area flow distance =   187.610(Ft.)
Top (of initial area) elevation =    41.870(Ft.)
Bottom (of initial area) elevation =    40.050(Ft.)
Difference in elevation =     1.820(Ft.)
Slope =    0.00970  s(%)=       0.97
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.235 min.
Rainfall intensity =      4.257(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =      5.580(CFS)
Total initial stream area =        1.470(Ac.)
```

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Process from Point/Station        8.200 to Point/Station       11.100
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =    33.160(Ft.)
Downstream point/station elevation =    29.760(Ft.)
Pipe length  =   679.04(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.580(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.580(CFS)
Normal flow depth in pipe =   11.64(In.)
Flow top width inside pipe =   17.21(In.)
Critical Depth =   10.93(In.)
Pipe flow velocity =      4.62(Ft/s)
Travel time through pipe =    2.45 min.
Time of concentration (TC) =     8.69 min.


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Process from Point/Station       11.100 to Point/Station       11.100
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.470(Ac.)
Runoff from this stream =      5.580(CFS)
Time of concentration =    8.69 min.
Rainfall intensity =     3.529(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        2.100 to Point/Station        2.200
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.400(In/Hr)
Max Catchment Loss (Fm) =     0.040(In/Hr)
Initial subarea data:
Initial area flow distance =   248.650(Ft.)
Top (of initial area) elevation =    41.510(Ft.)
Bottom (of initial area) elevation =    40.450(Ft.)
Difference in elevation =     1.060(Ft.)
```

```
Slope =    0.00426  s(%)=       0.43
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.226 min.
Rainfall intensity =      3.639(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff =      9.459(CFS)
Total initial stream area =        2.920(Ac.)


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Process from Point/Station        2.200 to Point/Station       11.100
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =    29.800(Ft.)
Downstream point/station elevation =    29.760(Ft.)
Pipe length  =     7.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.459(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.459(CFS)
Normal flow depth in pipe =   14.07(In.)
Flow top width inside pipe =   19.75(In.)
Critical Depth =   13.73(In.)
Pipe flow velocity =      5.52(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     8.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.100 to Point/Station       11.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.920(Ac.)
Runoff from this stream =      9.459(CFS)
Time of concentration =    8.25 min.
Rainfall intensity =     3.634(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      1.47     5.580      8.69    0.040      3.529
2      2.92     9.459      8.25    0.040      3.634
Qmax(1) =
           1.000 *    1.000 *     5.580) +
           0.971 *    1.000 *     9.459) + =      14.762
Qmax(2) =
```

```
           1.030 *    0.949 *     5.580) +
           1.000 *    1.000 *     9.459) + =      14.916

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.580       9.459
Maximum flow rates at confluence using above data:
       14.762       14.916
Area of streams before confluence:
        1.470        2.920
Effective area values after confluence:
        4.390        4.316
Results of confluence:
Total flow rate =     14.916(CFS)
Time of concentration =     8.247 min.
Effective stream area after confluence =      4.316(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.040(In/Hr)
Study area total (this main stream) =       4.39(Ac.)


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Process from Point/Station       11.100 to Point/Station       11.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =    29.760(Ft.)
Downstream point/station elevation =    29.390(Ft.)
Pipe length  =    74.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.916(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    14.916(CFS)
Normal flow depth in pipe =   18.36(In.)
Flow top width inside pipe =   20.36(In.)
Critical Depth =   16.71(In.)
Pipe flow velocity =      5.79(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =     8.46 min.


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Process from Point/Station       11.000 to Point/Station       11.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.316(Ac.)
Runoff from this stream =     14.916(CFS)
Time of concentration =    8.46 min.
Rainfall intensity =     3.582(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
```

```
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      8.08    34.332      6.98    0.040      3.995
2      4.32    14.916      8.46    0.040      3.582
Qmax(1) =
           1.000 *    1.000 *    34.332) +
           1.117 *    0.825 *    14.916) + =      48.067
Qmax(2) =
           0.896 *    1.000 *    34.332) +
           1.000 *    1.000 *    14.916) + =      45.662

Total of 2 main streams to confluence:
Flow rates before confluence point:
      35.332      15.916
Maximum flow rates at confluence using above data:
       48.067       45.662
Area of streams before confluence:
        8.080        4.316
Effective area values after confluence:
       11.639       12.396


Results of confluence:
Total flow rate =     48.067(CFS)
Time of concentration =     6.976 min.
Effective stream area after confluence  =     11.639(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.040(In/Hr)
Study area total =      12.40(Ac.)


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Process from Point/Station       11.000 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =    29.390(Ft.)
Downstream point/station elevation =    26.530(Ft.)
Pipe length  =   572.41(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    48.067(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    48.067(CFS)
Normal flow depth in pipe =   26.96(In.)
Flow top width inside pipe =   36.03(In.)
Critical Depth =   26.54(In.)
Pipe flow velocity =      7.86(Ft/s)
```

```
Travel time through pipe =    1.21 min.
Time of concentration (TC) =     8.19 min.


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Process from Point/Station       12.000 to Point/Station       12.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     11.639(Ac.)
Runoff from this stream =     48.067(CFS)
Time of concentration =    8.19 min.
Rainfall intensity =     3.648(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        5.100 to Point/Station        5.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.400(In/Hr)
Max Catchment Loss (Fm) =     0.040(In/Hr)
Initial subarea data:
Initial area flow distance =    96.720(Ft.)
Top (of initial area) elevation =    40.490(Ft.)
Bottom (of initial area) elevation =    39.450(Ft.)
Difference in elevation =     1.040(Ft.)
Slope =    0.01075  s(%)=       1.08
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.686 min.
Rainfall intensity =      5.004(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.893
Subarea runoff =     11.170(CFS)
Total initial stream area =        2.500(Ac.)


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Process from Point/Station        5.200 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =    26.650(Ft.)
Downstream point/station elevation =    26.530(Ft.)
Pipe length  =    23.09(Ft.)   Manning's N = 0.013
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```
No. of pipes = 1  Required pipe flow  =    11.170(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.170(CFS)
Normal flow depth in pipe =   16.81(In.)
Flow top width inside pipe =   16.79(In.)
Critical Depth =   14.95(In.)
Pipe flow velocity =      5.41(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     4.76 min.


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Process from Point/Station       12.000 to Point/Station       12.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.500(Ac.)
Runoff from this stream =     11.170(CFS)
Time of concentration =    4.76 min.
Rainfall intensity =     4.962(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1     11.64    48.067      8.19    0.040      3.648
2      2.50    11.170      4.76    0.040      4.962
Qmax(1) =
           1.000 *    1.000 *    48.067) +
           0.733 *    1.000 *    11.170) + =      56.255
Qmax(2) =
           1.364 *    0.581 *    48.067) +
           1.000 *    1.000 *    11.170) + =      49.250

Total of 2 streams to confluence:
Flow rates before confluence point:
      48.067      11.170
Maximum flow rates at confluence using above data:
       56.255       49.250
Area of streams before confluence:
       11.639        2.500
Effective area values after confluence:
       14.139        9.260
Results of confluence:
Total flow rate =     56.255(CFS)
Time of concentration =     8.190 min.
Effective stream area after confluence =     14.139(Ac.)
```

```
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.040(In/Hr)
Study area total (this main stream) =      14.14(Ac.)


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Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =    26.530(Ft.)
Downstream point/station elevation =    25.940(Ft.)
Pipe length  =   118.15(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    56.255(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    56.255(CFS)
Normal flow depth in pipe =   30.78(In.)
Flow top width inside pipe =   31.82(In.)
Critical Depth =   28.73(In.)
Pipe flow velocity =      8.01(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =     8.44 min.


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Process from Point/Station       13.000 to Point/Station       13.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     14.139(Ac.)
Runoff from this stream =     56.255(CFS)
Time of concentration =    8.44 min.
Rainfall intensity =     3.588(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


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Process from Point/Station        6.100 to Point/Station        6.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.400(In/Hr)
Max Catchment Loss (Fm) =     0.040(In/Hr)
```

```
Initial subarea data:
Initial area flow distance =   145.840(Ft.)
Top (of initial area) elevation =    40.630(Ft.)
Bottom (of initial area) elevation =    39.040(Ft.)
Difference in elevation =     1.590(Ft.)
Slope =    0.01090  s(%)=       1.09
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.507 min.
Rainfall intensity =      4.567(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =     10.593(CFS)
Total initial stream area =        2.600(Ac.)


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Process from Point/Station        6.200 to Point/Station       13.100
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =    30.940(Ft.)
Downstream point/station elevation =    28.300(Ft.)
Pipe length  =   528.22(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.593(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    10.593(CFS)
Normal flow depth in pipe =   16.27(In.)
Flow top width inside pipe =   17.55(In.)
Critical Depth =   14.55(In.)
Pipe flow velocity =      5.30(Ft/s)
Travel time through pipe =    1.66 min.
Time of concentration (TC) =     7.17 min.


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Process from Point/Station       13.100 to Point/Station       13.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.600(Ac.)
Runoff from this stream =     10.593(CFS)
Time of concentration =    7.17 min.
Rainfall intensity =     3.934(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station        7.100 to Point/Station        7.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
```

```
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.400(In/Hr)
Max Catchment Loss (Fm) =     0.040(In/Hr)
Initial subarea data:
Initial area flow distance =   170.150(Ft.)
Top (of initial area) elevation =    41.470(Ft.)
Bottom (of initial area) elevation =    39.210(Ft.)
Difference in elevation =     2.260(Ft.)
Slope =    0.01328  s(%)=       1.33
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.631 min.
Rainfall intensity =      4.510(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =     13.558(CFS)
Total initial stream area =        3.370(Ac.)


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Process from Point/Station        7.200 to Point/Station       13.100
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =    28.330(Ft.)
Downstream point/station elevation =    28.300(Ft.)
Pipe length  =     5.91(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.558(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    13.558(CFS)
Normal flow depth in pipe =   16.86(In.)
Flow top width inside pipe =   21.94(In.)
Critical Depth =   15.92(In.)
Pipe flow velocity =      5.75(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     5.65 min.


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Process from Point/Station       13.100 to Point/Station       13.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.370(Ac.)
Runoff from this stream =     13.558(CFS)
Time of concentration =    5.65 min.
Rainfall intensity =     4.502(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
```

Summary of stream data:

Stream No.	Area (Ac.)	Flow rate (CFS)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	2.60	10.593	7.17	0.040	3.934
2	3.37	13.558	5.65	0.040	4.502

```
Qmax(1) =
           1.000 *    1.000 *    10.593) +
           0.873 *    1.000 *    13.558) + =      22.424
Qmax(2) =
           1.146 *    0.788 *    10.593) +
           1.000 *    1.000 *    13.558) + =      23.122

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.593      13.558
Maximum flow rates at confluence using above data:
       22.424       23.122
Area of streams before confluence:
        2.600        3.370
Effective area values after confluence:
        5.970        5.418
Results of confluence:
Total flow rate =     23.122(CFS)
Time of concentration =     5.648 min.
Effective stream area after confluence =      5.418(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.040(In/Hr)
Study area total (this main stream) =       5.97(Ac.)


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Process from Point/Station       13.100 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =    28.300(Ft.)
Downstream point/station elevation =    25.940(Ft.)
Pipe length  =   471.08(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    23.122(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    23.122(CFS)
Normal flow depth in pipe =   20.23(In.)
Flow top width inside pipe =   28.12(In.)
Critical Depth =   19.64(In.)
Pipe flow velocity =      6.57(Ft/s)
Travel time through pipe =    1.20 min.
Time of concentration (TC) =     6.84 min.
```

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Process from Point/Station       13.000 to Point/Station       13.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.418(Ac.)
Runoff from this stream =     23.122(CFS)
Time of concentration =    6.84 min.
Rainfall intensity =     4.039(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1     14.14    56.255      8.44    0.040      3.588
2      5.42    23.122      6.84    0.040      4.039
Qmax(1) =
           1.000 *    1.000 *    56.255) +
           0.887 *    1.000 *    23.122) + =      76.769
Qmax(2) =
           1.127 *    0.811 *    56.255) +
           1.000 *    1.000 *    23.122) + =      74.558

Total of 2 main streams to confluence:
Flow rates before confluence point:
      57.255      24.122
Maximum flow rates at confluence using above data:
       76.769       74.558
Area of streams before confluence:
       14.139        5.418
Effective area values after confluence:
       19.557       16.888


Results of confluence:
Total flow rate =     76.769(CFS)
Time of concentration =     8.436 min.
Effective stream area after confluence  =     19.557(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.040(In/Hr)
Study area total =      19.56(Ac.)


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Process from Point/Station       13.000 to Point/Station       14.000
```

**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 25.940(Ft.)
Downstream point/station elevation = 25.470(Ft.)
Pipe length = 94.70(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 76.769(CFS)
Nearest computed pipe diameter = 45.00(In.)
Calculated individual pipe flow = 76.769(CFS)
Normal flow depth in pipe = 33.41(In.)
Flow top width inside pipe = 39.36(In.)
Critical Depth = 32.38(In.)
Pipe flow velocity = 8.73(Ft/s)
Travel time through pipe = 0.18 min.
Time of concentration (TC) = 8.62 min.
End of computations, total study area = 22.30 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number (AMC 2) = 32.0

PRE-DEVELOPMENT CONDITION

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 07/04/20 File Name: 2019285PreDA1.roc

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2019-285 6400 Katella Avenue
Pre 25Yr Rational Method

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 25.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

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Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fp)= 0.400(In/Hr)
Max Catchment Loss (Fm) = 0.040(In/Hr)
Initial subarea data:
Initial area flow distance = 162.050(Ft.)
Top (of initial area) elevation = 44.400(Ft.)
Bottom (of initial area) elevation = 41.330(Ft.)
Difference in elevation = 3.070(Ft.)
Slope = 0.01894 s(%)= 1.89
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.143 min.

```
Rainfall intensity =      4.747(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =     20.589(CFS)
Total initial stream area =        4.860(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.100 to Point/Station        2.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.400(In/Hr)
Max Catchment Loss (Fm) =     0.040(In/Hr)
Initial subarea data:
Initial area flow distance =   399.230(Ft.)
Top (of initial area) elevation =    41.690(Ft.)
Bottom (of initial area) elevation =    40.990(Ft.)
Difference in elevation =     0.700(Ft.)
Slope =    0.00175  s(%)=       0.18
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.874 min.
NOTE: Distance EXCEEDS recommended maximum value of   328.084(Ft.)
for this Development Type
Rainfall intensity =      2.957(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.888
Subarea runoff =     18.243(CFS)
Total initial stream area =        6.950(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        2.400
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.400(In/Hr)
Max Catchment Loss (Fm) =     0.040(In/Hr)
Initial subarea data:
Initial area flow distance =   483.080(Ft.)
Top (of initial area) elevation =    42.500(Ft.)
Bottom (of initial area) elevation =    40.020(Ft.)
Difference in elevation =     2.480(Ft.)
Slope =    0.00513  s(%)=       0.51
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.337 min.
NOTE: Distance EXCEEDS recommended maximum value of   328.084(Ft.)
for this Development Type
Rainfall intensity =      3.198(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.889
Subarea runoff =     25.237(CFS)
Total initial stream area =        8.880(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.100 to Point/Station        3.200
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
SCS curve number for soil(AMC 2)  = 67.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.400(In/Hr)
Max Catchment Loss (Fm) =     0.400(In/Hr)
Initial subarea data:
Initial area flow distance =   263.520(Ft.)
Top (of initial area) elevation =    41.150(Ft.)
Bottom (of initial area) elevation =    40.000(Ft.)
Difference in elevation =     1.150(Ft.)
Slope =    0.00436  s(%)=       0.44
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.471 min.
Rainfall intensity =      2.643(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.764
Subarea runoff =      3.271(CFS)
Total initial stream area =        1.620(Ac.)
End of computations, total study area =           22.31 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.165
Area averaged SCS curve number (AMC 2) =  34.5
```

APPENDIX B

UNIT HYDROGRAPH ANALYSIS (25-YEAR STORM)

POST-DEVELOPMENT CONDITION

DMA A

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PostA.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Post 25 Yr Unit Hydrograph
DMA A

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	1.7	1.00	A	0.400	0.210	0.084

Area-averaged adjusted loss rate Fm (In/Hr) = 0.084

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.37	0.210	32.0	32.0	21.25	0.001
1.37	0.790	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.749
Area-averaged low loss fraction, Yb = 0.251
++

User entry of time of concentration = 0.130 (hours)
Watershed area = 1.74(Ac.)
Catchment Lag time = 0.104 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 240.3846
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.084(In/Hr)
Average low loss rate fraction (Yb) = 0.251 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 1.74(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 7.01 (CFS))	
1	56.417	3.957
2	100.000	3.057

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6441	0.1039
2	0.8699	0.0661
3	1.0242	0.0474
4	1.1499	0.0396
5	1.2788	0.0413
6	1.3947	0.0374
7	1.5009	0.0345
8	1.5994	0.0321
9	1.6917	0.0301
10	1.7787	0.0285

11	1.8613	0.0271
12	1.9400	0.0258
13	2.0163	0.0251
14	2.0897	0.0241
15	2.1604	0.0233
16	2.2287	0.0225
17	2.2948	0.0218
18	2.3589	0.0212
19	2.4213	0.0206
20	2.4819	0.0200
21	2.5410	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7100	0.0182
25	2.7506	0.0134
26	2.7902	0.0131
27	2.8288	0.0128
28	2.8665	0.0125
29	2.9034	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0433	0.0112
34	3.0765	0.0110
35	3.1092	0.0108
36	3.1412	0.0106
37	3.1727	0.0104
38	3.2037	0.0103
39	3.2342	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3227	0.0096
43	3.3512	0.0095
44	3.3794	0.0093
45	3.4072	0.0092
46	3.4346	0.0091
47	3.4616	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5405	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6655	0.0081
56	3.6897	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7605	0.0078
60	3.7836	0.0077

61	3.8064	0.0076
62	3.8290	0.0075
63	3.8514	0.0074
64	3.8736	0.0074
65	3.8955	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9812	0.0070
70	4.0021	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1238	0.0066
77	4.1434	0.0065
78	4.1630	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2206	0.0063
82	4.2395	0.0063
83	4.2582	0.0062
84	4.2768	0.0062
85	4.2953	0.0061
86	4.3137	0.0061
87	4.3319	0.0061
88	4.3499	0.0060
89	4.3679	0.0060
90	4.3857	0.0059
91	4.4034	0.0059
92	4.4209	0.0058
93	4.4384	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0043	0.0128
2	0.0173	0.0043	0.0129
3	0.0175	0.0044	0.0131
4	0.0176	0.0044	0.0132
5	0.0178	0.0045	0.0133
6	0.0180	0.0045	0.0135
7	0.0182	0.0046	0.0136
8	0.0184	0.0046	0.0138
9	0.0186	0.0047	0.0139

10	0.0188	0.0047	0.0141
11	0.0191	0.0048	0.0143
12	0.0193	0.0048	0.0144
13	0.0195	0.0049	0.0146
14	0.0198	0.0050	0.0148
15	0.0200	0.0050	0.0150
16	0.0203	0.0051	0.0152
17	0.0206	0.0052	0.0154
18	0.0208	0.0052	0.0156
19	0.0211	0.0053	0.0158
20	0.0214	0.0054	0.0160
21	0.0217	0.0055	0.0163
22	0.0221	0.0055	0.0165
23	0.0224	0.0056	0.0168
24	0.0227	0.0057	0.0170
25	0.0231	0.0058	0.0173
26	0.0235	0.0059	0.0176
27	0.0239	0.0060	0.0179
28	0.0243	0.0061	0.0182
29	0.0247	0.0062	0.0185
30	0.0252	0.0063	0.0188
31	0.0257	0.0065	0.0192
32	0.0261	0.0066	0.0196
33	0.0267	0.0067	0.0200
34	0.0272	0.0068	0.0204
35	0.0278	0.0070	0.0208
36	0.0284	0.0071	0.0213
37	0.0291	0.0073	0.0218
38	0.0297	0.0075	0.0223
39	0.0305	0.0077	0.0228
40	0.0313	0.0079	0.0234
41	0.0321	0.0081	0.0241
42	0.0330	0.0083	0.0247
43	0.0340	0.0085	0.0254
44	0.0350	0.0088	0.0262
45	0.0362	0.0091	0.0271
46	0.0373	0.0094	0.0280
47	0.0387	0.0097	0.0290
48	0.0401	0.0101	0.0300
49	0.0552	0.0139	0.0413
50	0.0570	0.0143	0.0427
51	0.0593	0.0149	0.0444
52	0.0616	0.0155	0.0461
53	0.0644	0.0162	0.0482
54	0.0673	0.0169	0.0504
55	0.0710	0.0178	0.0531
56	0.0750	0.0189	0.0561
57	0.0791	0.0199	0.0592
58	0.0850	0.0210	0.0640
59	0.0929	0.0210	0.0719

60	0.1027	0.0210	0.0817
61	0.1174	0.0210	0.0964
62	0.1243	0.0210	0.1033
63	0.1647	0.0210	0.1437
64	0.3182	0.0210	0.2972
65	0.5412	0.0210	0.5202
66	0.1289	0.0210	0.1079
67	0.1014	0.0210	0.0804
68	0.0842	0.0210	0.0632
69	0.0744	0.0187	0.0557
70	0.0669	0.0168	0.0501
71	0.0612	0.0154	0.0458
72	0.0568	0.0143	0.0425
73	0.0399	0.0100	0.0299
74	0.0372	0.0093	0.0278
75	0.0348	0.0088	0.0261
76	0.0329	0.0083	0.0246
77	0.0312	0.0078	0.0233
78	0.0296	0.0075	0.0222
79	0.0283	0.0071	0.0212
80	0.0271	0.0068	0.0203
81	0.0261	0.0066	0.0195
82	0.0251	0.0063	0.0188
83	0.0242	0.0061	0.0181
84	0.0234	0.0059	0.0175
85	0.0227	0.0057	0.0170
86	0.0220	0.0055	0.0165
87	0.0214	0.0054	0.0160
88	0.0208	0.0052	0.0156
89	0.0202	0.0051	0.0152
90	0.0197	0.0050	0.0148
91	0.0193	0.0048	0.0144
92	0.0188	0.0047	0.0141
93	0.0184	0.0046	0.0138
94	0.0180	0.0045	0.0135
95	0.0176	0.0044	0.0132
96	0.0172	0.0043	0.0129

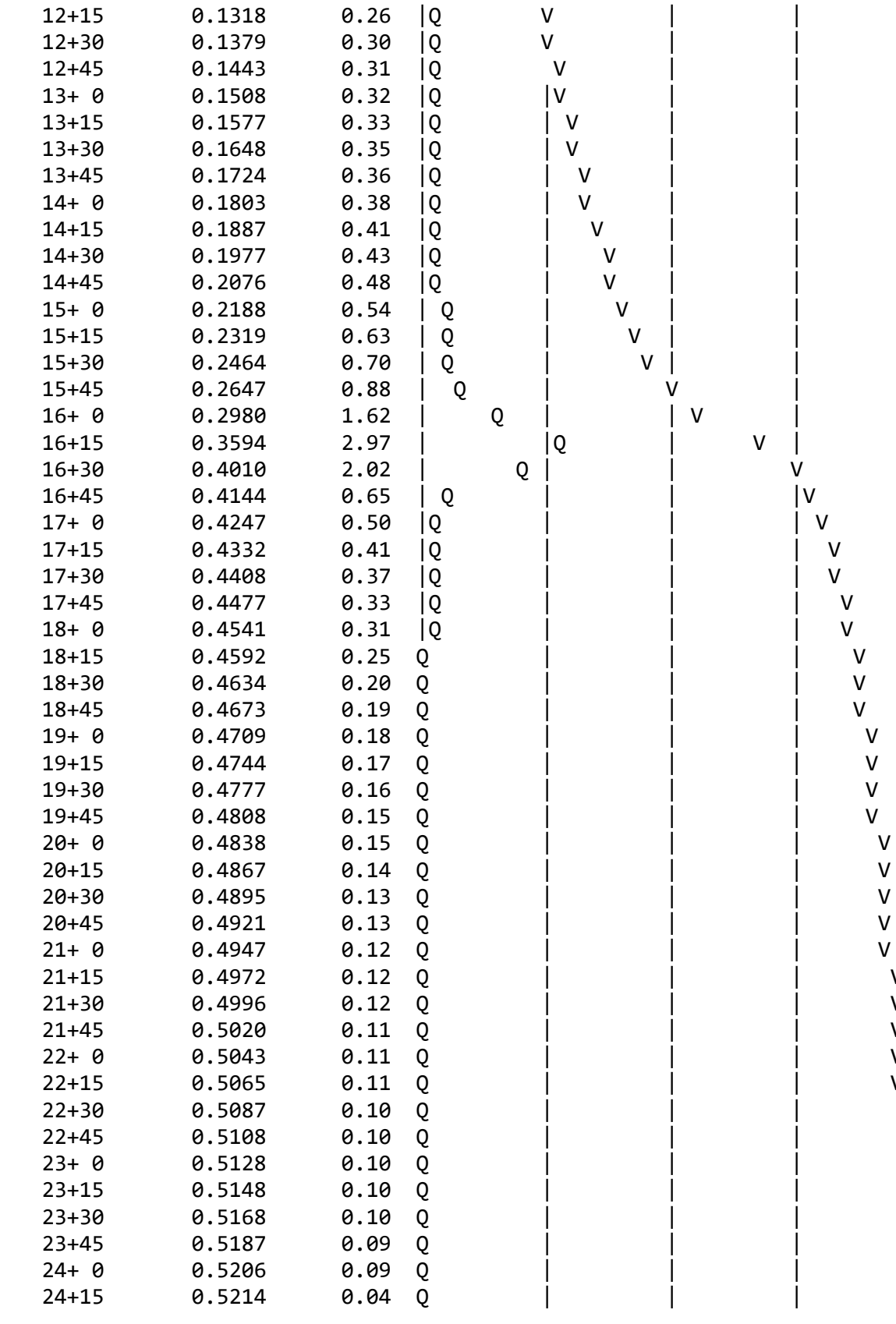
Total soil rain loss = 0.89(In)
Total effective rainfall = 3.60(In)
Peak flow rate in flood hydrograph = 2.97(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+15	0.0010	0.05	Q				
0+30	0.0029	0.09	Q				
0+45	0.0048	0.09	Q				
1+ 0	0.0067	0.09	Q				
1+15	0.0086	0.09	Q				
1+30	0.0106	0.09	Q				
1+45	0.0125	0.10	Q				
2+ 0	0.0145	0.10	QV				
2+15	0.0165	0.10	QV				
2+30	0.0186	0.10	QV				
2+45	0.0206	0.10	QV				
3+ 0	0.0227	0.10	QV				
3+15	0.0248	0.10	QV				
3+30	0.0270	0.10	Q V				
3+45	0.0291	0.10	Q V				
4+ 0	0.0313	0.11	Q V				
4+15	0.0335	0.11	Q V				
4+30	0.0358	0.11	Q V				
4+45	0.0380	0.11	Q V				
5+ 0	0.0404	0.11	Q V				
5+15	0.0427	0.11	Q V				
5+30	0.0451	0.12	Q V				
5+45	0.0475	0.12	Q V				
6+ 0	0.0499	0.12	Q V				
6+15	0.0524	0.12	Q V				
6+30	0.0550	0.12	Q V				
6+45	0.0575	0.12	Q V				
7+ 0	0.0602	0.13	Q V				
7+15	0.0628	0.13	Q V				
7+30	0.0655	0.13	Q V				
7+45	0.0683	0.13	Q V				
8+ 0	0.0711	0.14	Q V				
8+15	0.0740	0.14	Q V				
8+30	0.0769	0.14	Q V				
8+45	0.0799	0.14	Q V				
9+ 0	0.0829	0.15	Q V				
9+15	0.0861	0.15	Q V				
9+30	0.0893	0.15	Q V				
9+45	0.0925	0.16	Q V				
10+ 0	0.0959	0.16	Q V				
10+15	0.0993	0.17	Q V				
10+30	0.1029	0.17	Q V				
10+45	0.1065	0.18	Q V				
11+ 0	0.1103	0.18	Q V				
11+15	0.1141	0.19	Q V				
11+30	0.1181	0.19	Q V				
11+45	0.1223	0.20	Q V				
12+ 0	0.1266	0.21	Q V				



DMA B

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PostB.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Post 25yr Unit Hydrograph
DMA B

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	2.9	1.00	A	0.400	0.060	0.024

Area-averaged adjusted loss rate Fm (In/Hr) = 0.024

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.18	0.060	32.0	32.0	21.25	0.001
2.74	0.940	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.891
Area-averaged low loss fraction, Yb = 0.109
++

User entry of time of concentration = 0.140 (hours)
Watershed area = 2.92(Ac.)
Catchment Lag time = 0.112 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 223.2143
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.024(In/Hr)
Average low loss rate fraction (Yb) = 0.109 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 2.92(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 11.77 (CFS))	
1	53.245	6.268
2	100.000	5.504

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6440	0.1038
2	0.8699	0.0661
3	1.0241	0.0474
4	1.1498	0.0396
5	1.2787	0.0413
6	1.3947	0.0374
7	1.5009	0.0345
8	1.5994	0.0321
9	1.6917	0.0301
10	1.7787	0.0285

11	1.8612	0.0271
12	1.9400	0.0258
13	2.0163	0.0251
14	2.0897	0.0241
15	2.1604	0.0233
16	2.2287	0.0225
17	2.2948	0.0218
18	2.3589	0.0212
19	2.4212	0.0206
20	2.4819	0.0200
21	2.5410	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7100	0.0182
25	2.7506	0.0134
26	2.7901	0.0131
27	2.8288	0.0128
28	2.8665	0.0125
29	2.9033	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0432	0.0112
34	3.0765	0.0110
35	3.1092	0.0108
36	3.1412	0.0106
37	3.1727	0.0104
38	3.2037	0.0103
39	3.2342	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3226	0.0096
43	3.3512	0.0095
44	3.3794	0.0093
45	3.4072	0.0092
46	3.4346	0.0091
47	3.4616	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5405	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6655	0.0081
56	3.6897	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7605	0.0078
60	3.7836	0.0077

61	3.8064	0.0076
62	3.8290	0.0075
63	3.8514	0.0074
64	3.8736	0.0074
65	3.8955	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9811	0.0070
70	4.0021	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1238	0.0066
77	4.1434	0.0065
78	4.1629	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2206	0.0063
82	4.2395	0.0063
83	4.2582	0.0062
84	4.2768	0.0062
85	4.2953	0.0061
86	4.3137	0.0061
87	4.3319	0.0061
88	4.3499	0.0060
89	4.3679	0.0060
90	4.3857	0.0059
91	4.4034	0.0059
92	4.4209	0.0058
93	4.4384	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0019	0.0152
2	0.0173	0.0019	0.0154
3	0.0175	0.0019	0.0155
4	0.0176	0.0019	0.0157
5	0.0178	0.0019	0.0159
6	0.0180	0.0020	0.0160
7	0.0182	0.0020	0.0162
8	0.0184	0.0020	0.0164
9	0.0186	0.0020	0.0166

10	0.0188	0.0021	0.0168
11	0.0191	0.0021	0.0170
12	0.0193	0.0021	0.0172
13	0.0195	0.0021	0.0174
14	0.0198	0.0022	0.0176
15	0.0200	0.0022	0.0178
16	0.0203	0.0022	0.0181
17	0.0206	0.0022	0.0183
18	0.0208	0.0023	0.0186
19	0.0211	0.0023	0.0188
20	0.0214	0.0023	0.0191
21	0.0217	0.0024	0.0194
22	0.0221	0.0024	0.0196
23	0.0224	0.0025	0.0200
24	0.0227	0.0025	0.0203
25	0.0231	0.0025	0.0206
26	0.0235	0.0026	0.0209
27	0.0239	0.0026	0.0213
28	0.0243	0.0027	0.0216
29	0.0247	0.0027	0.0220
30	0.0252	0.0028	0.0224
31	0.0257	0.0028	0.0229
32	0.0261	0.0029	0.0233
33	0.0267	0.0029	0.0238
34	0.0272	0.0030	0.0242
35	0.0278	0.0030	0.0248
36	0.0284	0.0031	0.0253
37	0.0291	0.0032	0.0259
38	0.0297	0.0033	0.0265
39	0.0305	0.0033	0.0272
40	0.0313	0.0034	0.0278
41	0.0321	0.0035	0.0286
42	0.0330	0.0036	0.0294
43	0.0340	0.0037	0.0303
44	0.0350	0.0038	0.0312
45	0.0362	0.0040	0.0322
46	0.0373	0.0041	0.0333
47	0.0387	0.0042	0.0345
48	0.0401	0.0044	0.0357
49	0.0552	0.0060	0.0492
50	0.0570	0.0060	0.0510
51	0.0593	0.0060	0.0533
52	0.0616	0.0060	0.0556
53	0.0644	0.0060	0.0584
54	0.0673	0.0060	0.0613
55	0.0710	0.0060	0.0650
56	0.0750	0.0060	0.0690
57	0.0791	0.0060	0.0731
58	0.0850	0.0060	0.0790
59	0.0929	0.0060	0.0869

60	0.1027	0.0060	0.0967
61	0.1174	0.0060	0.1114
62	0.1243	0.0060	0.1183
63	0.1647	0.0060	0.1587
64	0.3182	0.0060	0.3122
65	0.5412	0.0060	0.5352
66	0.1289	0.0060	0.1229
67	0.1014	0.0060	0.0954
68	0.0842	0.0060	0.0782
69	0.0744	0.0060	0.0684
70	0.0669	0.0060	0.0609
71	0.0612	0.0060	0.0552
72	0.0568	0.0060	0.0508
73	0.0399	0.0044	0.0356
74	0.0372	0.0041	0.0331
75	0.0348	0.0038	0.0310
76	0.0329	0.0036	0.0293
77	0.0312	0.0034	0.0277
78	0.0296	0.0032	0.0264
79	0.0283	0.0031	0.0252
80	0.0271	0.0030	0.0242
81	0.0261	0.0029	0.0232
82	0.0251	0.0027	0.0224
83	0.0242	0.0026	0.0216
84	0.0234	0.0026	0.0209
85	0.0227	0.0025	0.0202
86	0.0220	0.0024	0.0196
87	0.0214	0.0023	0.0190
88	0.0208	0.0023	0.0185
89	0.0202	0.0022	0.0180
90	0.0197	0.0022	0.0176
91	0.0193	0.0021	0.0172
92	0.0188	0.0021	0.0168
93	0.0184	0.0020	0.0164
94	0.0180	0.0020	0.0160
95	0.0176	0.0019	0.0157
96	0.0172	0.0019	0.0154

Total soil rain loss = 0.34(In)
Total effective rainfall = 4.15(In)
Peak flow rate in flood hydrograph = 5.07(CFS)

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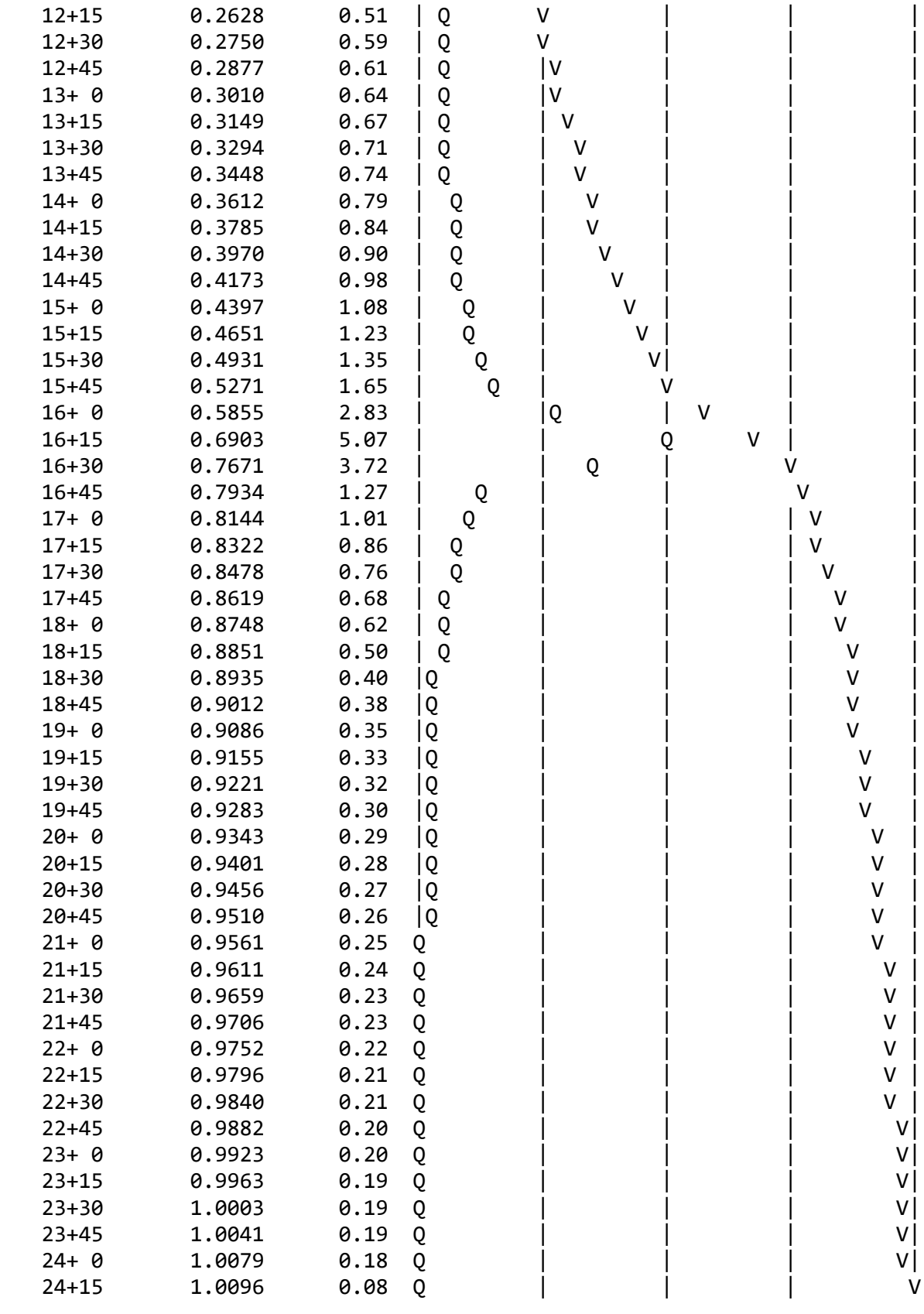
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+15	0.0020	0.10	Q				
0+30	0.0057	0.18	Q				
0+45	0.0095	0.18	Q				
1+ 0	0.0133	0.18	Q				
1+15	0.0171	0.19	Q				
1+30	0.0210	0.19	Q				
1+45	0.0249	0.19	Q				
2+ 0	0.0289	0.19	QV				
2+15	0.0329	0.19	QV				
2+30	0.0370	0.20	QV				
2+45	0.0411	0.20	QV				
3+ 0	0.0452	0.20	QV				
3+15	0.0494	0.20	QV				
3+30	0.0537	0.21	Q V				
3+45	0.0580	0.21	Q V				
4+ 0	0.0624	0.21	Q V				
4+15	0.0668	0.21	Q V				
4+30	0.0713	0.22	Q V				
4+45	0.0758	0.22	Q V				
5+ 0	0.0804	0.22	Q V				
5+15	0.0851	0.23	Q V				
5+30	0.0899	0.23	Q V				
5+45	0.0947	0.23	Q V				
6+ 0	0.0996	0.24	Q V				
6+15	0.1045	0.24	Q V				
6+30	0.1096	0.24	Q V				
6+45	0.1147	0.25	Q V				
7+ 0	0.1199	0.25	|Q V				
7+15	0.1253	0.26	|Q V				
7+30	0.1307	0.26	|Q V				
7+45	0.1362	0.27	|Q V				
8+ 0	0.1418	0.27	|Q V				
8+15	0.1475	0.28	|Q V				
8+30	0.1534	0.28	|Q V				
8+45	0.1593	0.29	|Q V				
9+ 0	0.1654	0.29	|Q V				
9+15	0.1716	0.30	|Q V				
9+30	0.1780	0.31	|Q V				
9+45	0.1846	0.32	|Q V				
10+ 0	0.1912	0.32	|Q V				
10+15	0.1981	0.33	|Q V				
10+30	0.2052	0.34	|Q V				
10+45	0.2124	0.35	|Q V				
11+ 0	0.2199	0.36	|Q V				
11+15	0.2276	0.37	|Q V				
11+30	0.2356	0.39	|Q V				
11+45	0.2438	0.40	|Q V				
12+ 0	0.2524	0.41	|Q V				


12+15 0.2628 0.51
12+30 0.2750 0.59
12+45 0.2877 0.61
13+ 0 0.3010 0.64
13+15 0.3149 0.67
13+30 0.3294 0.71
13+45 0.3448 0.74
14+ 0 0.3612 0.79
14+15 0.3785 0.84
14+30 0.3970 0.90
14+45 0.4173 0.98
15+ 0 0.4397 1.08
15+15 0.4651 1.23
15+30 0.4931 1.35
15+45 0.5271 1.65
16+ 0 0.5855 2.83
16+15 0.6903 5.07
16+30 0.7671 3.72
16+45 0.7934 1.27
17+ 0 0.8144 1.01
17+15 0.8322 0.86
17+30 0.8478 0.76
17+45 0.8619 0.68
18+ 0 0.8748 0.62
18+15 0.8851 0.50
18+30 0.8935 0.40
18+45 0.9012 0.38
19+ 0 0.9086 0.35
19+15 0.9155 0.33
19+30 0.9221 0.32
19+45 0.9283 0.30
20+ 0 0.9343 0.29
20+15 0.9401 0.28
20+30 0.9456 0.27
20+45 0.9510 0.26
21+ 0 0.9561 0.25
21+15 0.9611 0.24
21+30 0.9659 0.23
21+45 0.9706 0.23
22+ 0 0.9752 0.22
22+15 0.9796 0.21
22+30 0.9840 0.21
22+45 0.9882 0.20
23+ 0 0.9923 0.20
23+15 0.9963 0.19
23+30 1.0003 0.19
23+45 1.0041 0.19
24+ 0 1.0079 0.18
24+15 1.0096 0.08

DMA C

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PostC.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Post 25yr Unit Hydrograph
DMA C

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	2.9	1.00	A	0.400	0.120	0.048

Area-averaged adjusted loss rate Fm (In/Hr) = 0.048

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.35	0.120	32.0	32.0	21.25	0.001
2.58	0.880	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.834
Area-averaged low loss fraction, Yb = 0.166
++

User entry of time of concentration = 0.100 (hours)
Watershed area = 2.93(Ac.)
Catchment Lag time = 0.080 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 312.5000
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.048(In/Hr)
Average low loss rate fraction (Yb) = 0.166 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 2.93(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 11.81 (CFS))	
1	66.192	7.818
2	100.000	3.993

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6440	0.1038
2	0.8699	0.0661
3	1.0241	0.0474
4	1.1498	0.0396
5	1.2787	0.0413
6	1.3947	0.0374
7	1.5009	0.0345
8	1.5994	0.0321
9	1.6917	0.0301
10	1.7787	0.0285

11	1.8612	0.0271
12	1.9400	0.0258
13	2.0163	0.0251
14	2.0897	0.0241
15	2.1604	0.0233
16	2.2287	0.0225
17	2.2948	0.0218
18	2.3589	0.0212
19	2.4212	0.0206
20	2.4819	0.0200
21	2.5410	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7100	0.0182
25	2.7506	0.0134
26	2.7901	0.0131
27	2.8288	0.0128
28	2.8665	0.0125
29	2.9033	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0432	0.0112
34	3.0765	0.0110
35	3.1092	0.0108
36	3.1412	0.0106
37	3.1727	0.0104
38	3.2037	0.0103
39	3.2342	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3226	0.0096
43	3.3512	0.0095
44	3.3794	0.0093
45	3.4072	0.0092
46	3.4346	0.0091
47	3.4616	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5405	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6655	0.0081
56	3.6897	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7605	0.0078
60	3.7836	0.0077

61	3.8064	0.0076
62	3.8290	0.0075
63	3.8514	0.0074
64	3.8736	0.0074
65	3.8955	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9811	0.0070
70	4.0021	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1238	0.0066
77	4.1434	0.0065
78	4.1629	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2206	0.0063
82	4.2395	0.0063
83	4.2582	0.0062
84	4.2768	0.0062
85	4.2953	0.0061
86	4.3137	0.0061
87	4.3319	0.0061
88	4.3499	0.0060
89	4.3679	0.0060
90	4.3857	0.0059
91	4.4034	0.0059
92	4.4209	0.0058
93	4.4384	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0028	0.0143
2	0.0173	0.0029	0.0144
3	0.0175	0.0029	0.0146
4	0.0176	0.0029	0.0147
5	0.0178	0.0030	0.0149
6	0.0180	0.0030	0.0150
7	0.0182	0.0030	0.0152
8	0.0184	0.0031	0.0154
9	0.0186	0.0031	0.0155

10	0.0188	0.0031	0.0157
11	0.0191	0.0032	0.0159
12	0.0193	0.0032	0.0161
13	0.0195	0.0032	0.0163
14	0.0198	0.0033	0.0165
15	0.0200	0.0033	0.0167
16	0.0203	0.0034	0.0169
17	0.0206	0.0034	0.0171
18	0.0208	0.0035	0.0174
19	0.0211	0.0035	0.0176
20	0.0214	0.0036	0.0179
21	0.0217	0.0036	0.0181
22	0.0221	0.0037	0.0184
23	0.0224	0.0037	0.0187
24	0.0227	0.0038	0.0190
25	0.0231	0.0038	0.0193
26	0.0235	0.0039	0.0196
27	0.0239	0.0040	0.0199
28	0.0243	0.0040	0.0203
29	0.0247	0.0041	0.0206
30	0.0252	0.0042	0.0210
31	0.0257	0.0043	0.0214
32	0.0261	0.0043	0.0218
33	0.0267	0.0044	0.0223
34	0.0272	0.0045	0.0227
35	0.0278	0.0046	0.0232
36	0.0284	0.0047	0.0237
37	0.0291	0.0048	0.0243
38	0.0297	0.0049	0.0248
39	0.0305	0.0051	0.0254
40	0.0313	0.0052	0.0261
41	0.0321	0.0053	0.0268
42	0.0330	0.0055	0.0275
43	0.0340	0.0056	0.0283
44	0.0350	0.0058	0.0292
45	0.0362	0.0060	0.0302
46	0.0373	0.0062	0.0311
47	0.0387	0.0064	0.0323
48	0.0401	0.0067	0.0335
49	0.0552	0.0092	0.0460
50	0.0570	0.0095	0.0476
51	0.0593	0.0098	0.0494
52	0.0616	0.0102	0.0513
53	0.0644	0.0107	0.0537
54	0.0673	0.0112	0.0561
55	0.0710	0.0118	0.0592
56	0.0750	0.0120	0.0630
57	0.0791	0.0120	0.0671
58	0.0850	0.0120	0.0730
59	0.0929	0.0120	0.0809

60	0.1027	0.0120	0.0907
61	0.1174	0.0120	0.1054
62	0.1243	0.0120	0.1123
63	0.1647	0.0120	0.1527
64	0.3182	0.0120	0.3062
65	0.5412	0.0120	0.5292
66	0.1289	0.0120	0.1169
67	0.1014	0.0120	0.0894
68	0.0842	0.0120	0.0722
69	0.0744	0.0120	0.0624
70	0.0669	0.0111	0.0558
71	0.0612	0.0102	0.0510
72	0.0568	0.0094	0.0473
73	0.0399	0.0066	0.0333
74	0.0372	0.0062	0.0310
75	0.0348	0.0058	0.0291
76	0.0329	0.0055	0.0274
77	0.0312	0.0052	0.0260
78	0.0296	0.0049	0.0247
79	0.0283	0.0047	0.0236
80	0.0271	0.0045	0.0226
81	0.0261	0.0043	0.0217
82	0.0251	0.0042	0.0209
83	0.0242	0.0040	0.0202
84	0.0234	0.0039	0.0195
85	0.0227	0.0038	0.0189
86	0.0220	0.0037	0.0184
87	0.0214	0.0036	0.0178
88	0.0208	0.0035	0.0173
89	0.0202	0.0034	0.0169
90	0.0197	0.0033	0.0165
91	0.0193	0.0032	0.0161
92	0.0188	0.0031	0.0157
93	0.0184	0.0031	0.0153
94	0.0180	0.0030	0.0150
95	0.0176	0.0029	0.0147
96	0.0172	0.0029	0.0144

Total soil rain loss = 0.57(In)
Total effective rainfall = 3.92(In)
Peak flow rate in flood hydrograph = 5.36(CFS)

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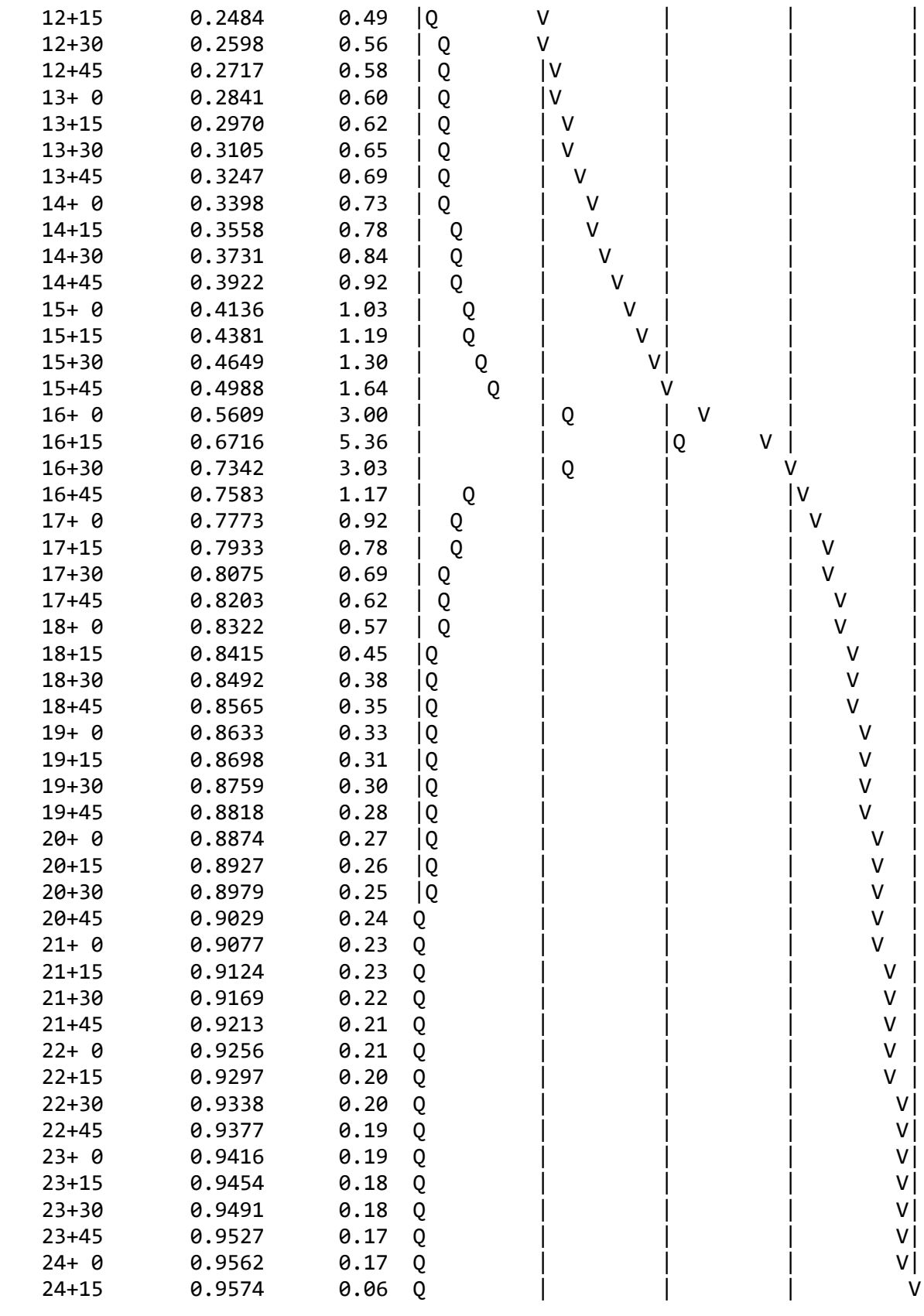
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+15	0.0023	0.11	Q				
0+30	0.0058	0.17	Q				
0+45	0.0093	0.17	Q				
1+ 0	0.0129	0.17	Q				
1+15	0.0165	0.17	Q				
1+30	0.0202	0.18	Q				
1+45	0.0239	0.18	Q				
2+ 0	0.0276	0.18	QV				
2+15	0.0314	0.18	QV				
2+30	0.0352	0.18	QV				
2+45	0.0391	0.19	QV				
3+ 0	0.0430	0.19	QV				
3+15	0.0469	0.19	QV				
3+30	0.0509	0.19	Q V				
3+45	0.0550	0.20	Q V				
4+ 0	0.0591	0.20	Q V				
4+15	0.0633	0.20	Q V				
4+30	0.0675	0.20	Q V				
4+45	0.0718	0.21	Q V				
5+ 0	0.0761	0.21	Q V				
5+15	0.0805	0.21	Q V				
5+30	0.0850	0.22	Q V				
5+45	0.0895	0.22	Q V				
6+ 0	0.0941	0.22	Q V				
6+15	0.0988	0.23	Q V				
6+30	0.1036	0.23	Q V				
6+45	0.1084	0.23	Q V				
7+ 0	0.1133	0.24	Q V				
7+15	0.1183	0.24	Q V				
7+30	0.1234	0.25	Q V				
7+45	0.1286	0.25	|Q V				
8+ 0	0.1339	0.26	|Q V				
8+15	0.1393	0.26	|Q V				
8+30	0.1448	0.27	|Q V				
8+45	0.1504	0.27	|Q V				
9+ 0	0.1561	0.28	|Q V				
9+15	0.1620	0.28	|Q V				
9+30	0.1680	0.29	|Q V				
9+45	0.1742	0.30	|Q V				
10+ 0	0.1805	0.31	|Q V				
10+15	0.1870	0.31	|Q V				
10+30	0.1936	0.32	|Q V				
10+45	0.2005	0.33	|Q V				
11+ 0	0.2075	0.34	|Q V				
11+15	0.2148	0.35	|Q V				
11+30	0.2223	0.36	|Q V|				
11+45	0.2301	0.38	|Q V|				
12+ 0	0.2382	0.39	|Q V|				



DMA D

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PostD.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Post 25yr Unit Hydrograph
DMA D

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	4.8	1.00	A	0.400	0.110	0.044

Area-averaged adjusted loss rate Fm (In/Hr) = 0.044

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.52	0.110	32.0	32.0	21.25	0.001
4.25	0.890	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.843
Area-averaged low loss fraction, Yb = 0.157

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User entry of time of concentration = 0.090 (hours)
Watershed area = 4.77(Ac.)
Catchment Lag time = 0.072 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 347.2222
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.044(In/Hr)
Average low loss rate fraction (Yb) = 0.157 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 4.77(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 19.23 (CFS))	
1	69.546	13.373
2	100.000	5.856

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6440	0.1038
2	0.8698	0.0661
3	1.0240	0.0474
4	1.1497	0.0396
5	1.2786	0.0413
6	1.3946	0.0374
7	1.5008	0.0345
8	1.5993	0.0321
9	1.6916	0.0301
10	1.7786	0.0285

11	1.8612	0.0271
12	1.9399	0.0258
13	2.0163	0.0251
14	2.0897	0.0241
15	2.1604	0.0233
16	2.2286	0.0225
17	2.2948	0.0218
18	2.3589	0.0212
19	2.4212	0.0206
20	2.4819	0.0200
21	2.5409	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7100	0.0182
25	2.7506	0.0134
26	2.7901	0.0131
27	2.8287	0.0128
28	2.8665	0.0125
29	2.9033	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0432	0.0112
34	3.0765	0.0110
35	3.1092	0.0108
36	3.1412	0.0106
37	3.1727	0.0104
38	3.2037	0.0103
39	3.2341	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3226	0.0096
43	3.3512	0.0095
44	3.3794	0.0093
45	3.4072	0.0092
46	3.4346	0.0091
47	3.4616	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5405	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6655	0.0081
56	3.6897	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7605	0.0078
60	3.7836	0.0077

61	3.8064	0.0076
62	3.8290	0.0075
63	3.8514	0.0074
64	3.8735	0.0074
65	3.8955	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9811	0.0070
70	4.0021	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1237	0.0066
77	4.1434	0.0065
78	4.1629	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2206	0.0063
82	4.2395	0.0063
83	4.2582	0.0062
84	4.2768	0.0062
85	4.2953	0.0061
86	4.3136	0.0061
87	4.3318	0.0061
88	4.3499	0.0060
89	4.3679	0.0060
90	4.3857	0.0059
91	4.4033	0.0059
92	4.4209	0.0058
93	4.4384	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0027	0.0144
2	0.0173	0.0027	0.0146
3	0.0175	0.0027	0.0147
4	0.0176	0.0028	0.0149
5	0.0178	0.0028	0.0150
6	0.0180	0.0028	0.0152
7	0.0182	0.0029	0.0154
8	0.0184	0.0029	0.0155
9	0.0186	0.0029	0.0157

10	0.0188	0.0030	0.0159
11	0.0191	0.0030	0.0161
12	0.0193	0.0030	0.0163
13	0.0195	0.0031	0.0165
14	0.0198	0.0031	0.0167
15	0.0200	0.0031	0.0169
16	0.0203	0.0032	0.0171
17	0.0206	0.0032	0.0173
18	0.0208	0.0033	0.0176
19	0.0211	0.0033	0.0178
20	0.0214	0.0034	0.0181
21	0.0217	0.0034	0.0183
22	0.0221	0.0035	0.0186
23	0.0224	0.0035	0.0189
24	0.0227	0.0036	0.0192
25	0.0231	0.0036	0.0195
26	0.0235	0.0037	0.0198
27	0.0239	0.0037	0.0201
28	0.0243	0.0038	0.0205
29	0.0247	0.0039	0.0209
30	0.0252	0.0039	0.0212
31	0.0257	0.0040	0.0216
32	0.0261	0.0041	0.0220
33	0.0267	0.0042	0.0225
34	0.0272	0.0043	0.0230
35	0.0278	0.0044	0.0235
36	0.0284	0.0045	0.0240
37	0.0291	0.0046	0.0245
38	0.0297	0.0047	0.0251
39	0.0305	0.0048	0.0257
40	0.0313	0.0049	0.0264
41	0.0321	0.0050	0.0271
42	0.0330	0.0052	0.0278
43	0.0340	0.0053	0.0287
44	0.0350	0.0055	0.0295
45	0.0362	0.0057	0.0305
46	0.0373	0.0059	0.0315
47	0.0387	0.0061	0.0327
48	0.0401	0.0063	0.0338
49	0.0552	0.0086	0.0465
50	0.0570	0.0089	0.0481
51	0.0593	0.0093	0.0500
52	0.0616	0.0096	0.0519
53	0.0644	0.0101	0.0543
54	0.0673	0.0105	0.0568
55	0.0710	0.0110	0.0600
56	0.0750	0.0110	0.0640
57	0.0792	0.0110	0.0682
58	0.0850	0.0110	0.0740
59	0.0930	0.0110	0.0820

60	0.1027	0.0110	0.0917
61	0.1174	0.0110	0.1064
62	0.1243	0.0110	0.1133
63	0.1647	0.0110	0.1537
64	0.3182	0.0110	0.3072
65	0.5412	0.0110	0.5302
66	0.1289	0.0110	0.1179
67	0.1014	0.0110	0.0904
68	0.0842	0.0110	0.0732
69	0.0744	0.0110	0.0634
70	0.0669	0.0105	0.0564
71	0.0612	0.0096	0.0516
72	0.0568	0.0089	0.0479
73	0.0399	0.0063	0.0337
74	0.0372	0.0058	0.0313
75	0.0348	0.0055	0.0294
76	0.0329	0.0051	0.0277
77	0.0312	0.0049	0.0263
78	0.0296	0.0046	0.0250
79	0.0283	0.0044	0.0239
80	0.0271	0.0043	0.0229
81	0.0261	0.0041	0.0220
82	0.0251	0.0039	0.0212
83	0.0242	0.0038	0.0204
84	0.0234	0.0037	0.0198
85	0.0227	0.0036	0.0191
86	0.0220	0.0034	0.0186
87	0.0214	0.0034	0.0180
88	0.0208	0.0033	0.0175
89	0.0202	0.0032	0.0171
90	0.0197	0.0031	0.0166
91	0.0193	0.0030	0.0162
92	0.0188	0.0029	0.0159
93	0.0184	0.0029	0.0155
94	0.0180	0.0028	0.0152
95	0.0176	0.0028	0.0148
96	0.0172	0.0027	0.0145

Total soil rain loss = 0.53(In)
Total effective rainfall = 3.96(In)
Peak flow rate in flood hydrograph = 8.89(CFS)

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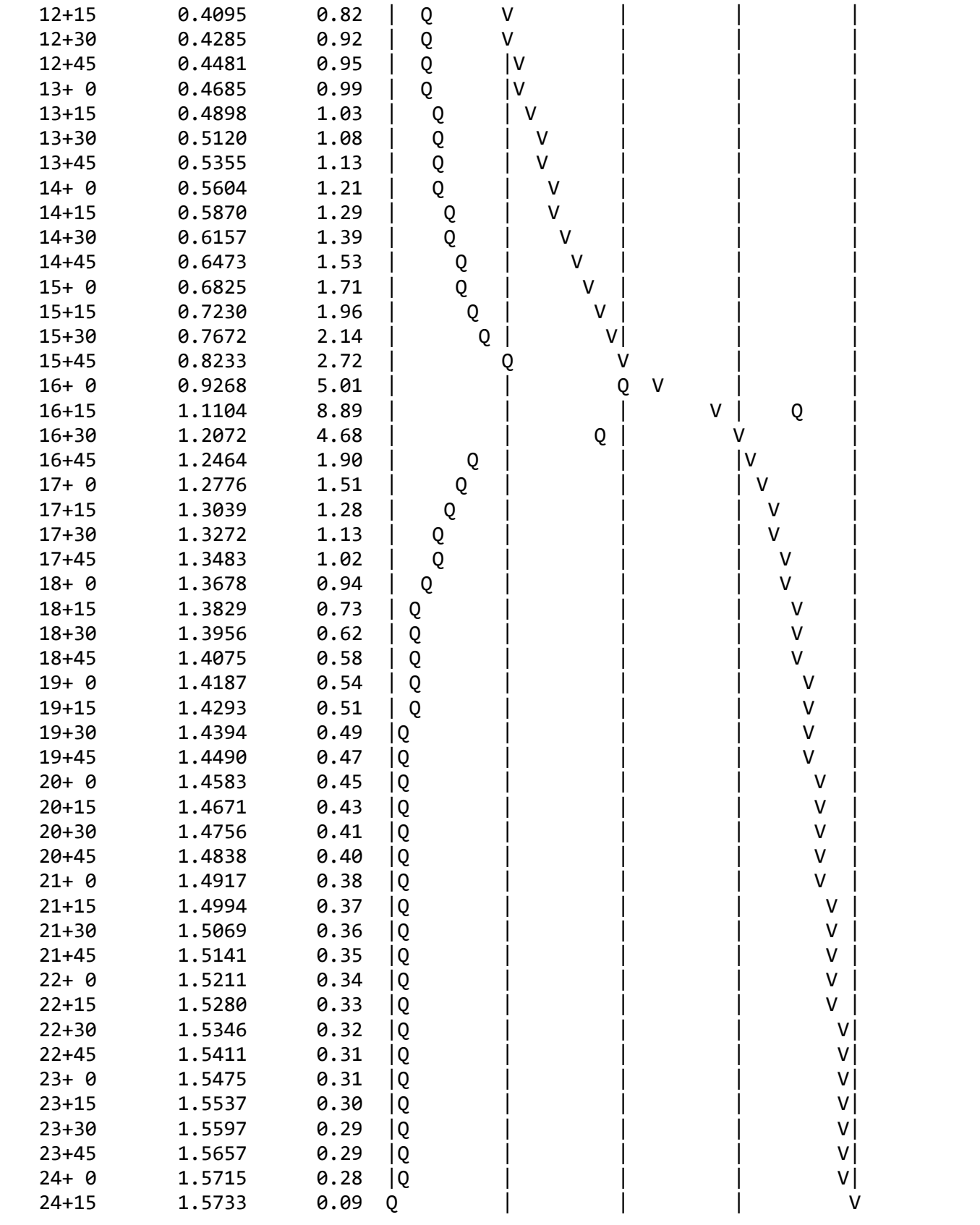
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+15	0.0040	0.19	Q				
0+30	0.0098	0.28	VQ				
0+45	0.0156	0.28	VQ				
1+ 0	0.0215	0.29	VQ				
1+15	0.0274	0.29	VQ				
1+30	0.0334	0.29	VQ				
1+45	0.0395	0.29	Q				
2+ 0	0.0457	0.30	|Q				
2+15	0.0519	0.30	|Q				
2+30	0.0582	0.30	|Q				
2+45	0.0645	0.31	|Q				
3+ 0	0.0710	0.31	|Q				
3+15	0.0775	0.32	|Q				
3+30	0.0841	0.32	|QV				
3+45	0.0908	0.32	|QV				
4+ 0	0.0976	0.33	|QV				
4+15	0.1044	0.33	|QV				
4+30	0.1114	0.34	|QV				
4+45	0.1184	0.34	|Q V				
5+ 0	0.1256	0.35	|Q V				
5+15	0.1328	0.35	|Q V				
5+30	0.1402	0.36	|Q V				
5+45	0.1477	0.36	|Q V				
6+ 0	0.1552	0.37	|Q V				
6+15	0.1630	0.37	|Q V				
6+30	0.1708	0.38	|Q V				
6+45	0.1787	0.39	|Q V				
7+ 0	0.1868	0.39	|Q V				
7+15	0.1951	0.40	|Q V				
7+30	0.2035	0.41	|Q V				
7+45	0.2120	0.41	|Q V				
8+ 0	0.2207	0.42	|Q V				
8+15	0.2296	0.43	|Q V				
8+30	0.2387	0.44	|Q V				
8+45	0.2479	0.45	|Q V				
9+ 0	0.2574	0.46	|Q V				
9+15	0.2671	0.47	|Q V				
9+30	0.2770	0.48	|Q V				
9+45	0.2871	0.49	|Q V				
10+ 0	0.2975	0.50	| Q V				
10+15	0.3082	0.52	| Q V				
10+30	0.3192	0.53	| Q V				
10+45	0.3304	0.55	| Q V				
11+ 0	0.3421	0.56	| Q V				
11+15	0.3541	0.58	| Q V				
11+30	0.3665	0.60	| Q V				
11+45	0.3793	0.62	| Q V				
12+ 0	0.3926	0.64	| Q V				



DMA E

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PostE.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Post 25yr Unit Hydrograph
DMA E

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	2.5	1.00	A	0.400	0.080	0.032

Area-averaged adjusted loss rate Fm (In/Hr) = 0.032

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.20	0.080	32.0	32.0	21.25	0.001
2.30	0.920	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.872
Area-averaged low loss fraction, Yb = 0.128
++

User entry of time of concentration = 0.080 (hours)
Watershed area = 2.50(Ac.)
Catchment Lag time = 0.064 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 390.6250
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.032(In/Hr)
Average low loss rate fraction (Yb) = 0.128 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 2.50(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 10.08 (CFS))	
1	100.000	0.000

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6441	0.1039
2	0.8699	0.0661
3	1.0241	0.0474
4	1.1499	0.0396
5	1.2787	0.0413
6	1.3947	0.0374
7	1.5009	0.0345
8	1.5994	0.0321
9	1.6917	0.0301
10	1.7787	0.0285
11	1.8613	0.0271

12	1.9400	0.0258
13	2.0163	0.0251
14	2.0897	0.0241
15	2.1604	0.0233
16	2.2287	0.0225
17	2.2948	0.0218
18	2.3589	0.0212
19	2.4212	0.0206
20	2.4819	0.0200
21	2.5410	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7100	0.0182
25	2.7506	0.0134
26	2.7901	0.0131
27	2.8288	0.0128
28	2.8665	0.0125
29	2.9034	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0433	0.0112
34	3.0765	0.0110
35	3.1092	0.0108
36	3.1412	0.0106
37	3.1727	0.0104
38	3.2037	0.0103
39	3.2342	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3226	0.0096
43	3.3512	0.0095
44	3.3794	0.0093
45	3.4072	0.0092
46	3.4346	0.0091
47	3.4616	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5405	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6655	0.0081
56	3.6897	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7605	0.0078
60	3.7836	0.0077
61	3.8064	0.0076

62	3.8290	0.0075
63	3.8514	0.0074
64	3.8736	0.0074
65	3.8955	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9811	0.0070
70	4.0021	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1238	0.0066
77	4.1434	0.0065
78	4.1630	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2206	0.0063
82	4.2395	0.0063
83	4.2582	0.0062
84	4.2768	0.0062
85	4.2953	0.0061
86	4.3137	0.0061
87	4.3319	0.0061
88	4.3499	0.0060
89	4.3679	0.0060
90	4.3857	0.0059
91	4.4034	0.0059
92	4.4209	0.0058
93	4.4384	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0022	0.0149
2	0.0173	0.0022	0.0151
3	0.0175	0.0022	0.0152
4	0.0176	0.0023	0.0154
5	0.0178	0.0023	0.0155
6	0.0180	0.0023	0.0157
7	0.0182	0.0023	0.0159
8	0.0184	0.0024	0.0161
9	0.0186	0.0024	0.0162
10	0.0188	0.0024	0.0164

11	0.0191	0.0024	0.0166
12	0.0193	0.0025	0.0168
13	0.0195	0.0025	0.0170
14	0.0198	0.0025	0.0172
15	0.0200	0.0026	0.0175
16	0.0203	0.0026	0.0177
17	0.0206	0.0026	0.0179
18	0.0208	0.0027	0.0182
19	0.0211	0.0027	0.0184
20	0.0214	0.0027	0.0187
21	0.0217	0.0028	0.0190
22	0.0221	0.0028	0.0192
23	0.0224	0.0029	0.0195
24	0.0227	0.0029	0.0198
25	0.0231	0.0030	0.0202
26	0.0235	0.0030	0.0205
27	0.0239	0.0031	0.0208
28	0.0243	0.0031	0.0212
29	0.0247	0.0032	0.0216
30	0.0252	0.0032	0.0219
31	0.0257	0.0033	0.0224
32	0.0261	0.0034	0.0228
33	0.0267	0.0034	0.0233
34	0.0272	0.0035	0.0237
35	0.0278	0.0036	0.0242
36	0.0284	0.0036	0.0248
37	0.0291	0.0037	0.0254
38	0.0297	0.0038	0.0259
39	0.0305	0.0039	0.0266
40	0.0313	0.0040	0.0273
41	0.0321	0.0041	0.0280
42	0.0330	0.0042	0.0288
43	0.0340	0.0044	0.0296
44	0.0350	0.0045	0.0305
45	0.0362	0.0046	0.0315
46	0.0373	0.0048	0.0325
47	0.0387	0.0050	0.0338
48	0.0401	0.0051	0.0350
49	0.0552	0.0071	0.0481
50	0.0570	0.0073	0.0497
51	0.0593	0.0076	0.0517
52	0.0616	0.0079	0.0537
53	0.0644	0.0080	0.0564
54	0.0673	0.0080	0.0593
55	0.0710	0.0080	0.0630
56	0.0750	0.0080	0.0670
57	0.0791	0.0080	0.0711
58	0.0850	0.0080	0.0770
59	0.0929	0.0080	0.0849
60	0.1027	0.0080	0.0947

61	0.1174	0.0080	0.1094
62	0.1243	0.0080	0.1163
63	0.1647	0.0080	0.1567
64	0.3182	0.0080	0.3102
65	0.5412	0.0080	0.5332
66	0.1289	0.0080	0.1209
67	0.1014	0.0080	0.0934
68	0.0842	0.0080	0.0762
69	0.0744	0.0080	0.0664
70	0.0669	0.0080	0.0589
71	0.0612	0.0079	0.0534
72	0.0568	0.0073	0.0495
73	0.0399	0.0051	0.0348
74	0.0372	0.0048	0.0324
75	0.0348	0.0045	0.0304
76	0.0329	0.0042	0.0286
77	0.0312	0.0040	0.0272
78	0.0296	0.0038	0.0258
79	0.0283	0.0036	0.0247
80	0.0271	0.0035	0.0237
81	0.0261	0.0033	0.0227
82	0.0251	0.0032	0.0219
83	0.0242	0.0031	0.0211
84	0.0234	0.0030	0.0204
85	0.0227	0.0029	0.0198
86	0.0220	0.0028	0.0192
87	0.0214	0.0027	0.0186
88	0.0208	0.0027	0.0181
89	0.0202	0.0026	0.0176
90	0.0197	0.0025	0.0172
91	0.0193	0.0025	0.0168
92	0.0188	0.0024	0.0164
93	0.0184	0.0024	0.0160
94	0.0180	0.0023	0.0157
95	0.0176	0.0023	0.0153
96	0.0172	0.0022	0.0150

Total soil rain loss = 0.42(In)
Total effective rainfall = 4.07(In)
Peak flow rate in flood hydrograph = 0.00(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m) Volume Ac.Ft Q(CFS) 0 2.5 5.0 7.5 10.0

0+15	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+45	0.0000	0.00	Q				
6+ 0	0.0000	0.00	Q				
6+15	0.0000	0.00	Q				
6+30	0.0000	0.00	Q				
6+45	0.0000	0.00	Q				
7+ 0	0.0000	0.00	Q				
7+15	0.0000	0.00	Q				
7+30	0.0000	0.00	Q				
7+45	0.0000	0.00	Q				
8+ 0	0.0000	0.00	Q				
8+15	0.0000	0.00	Q				
8+30	0.0000	0.00	Q				
8+45	0.0000	0.00	Q				
9+ 0	0.0000	0.00	Q				
9+15	0.0000	0.00	Q				
9+30	0.0000	0.00	Q				
9+45	0.0000	0.00	Q				
10+ 0	0.0000	0.00	Q				
10+15	0.0000	0.00	Q				
10+30	0.0000	0.00	Q				
10+45	0.0000	0.00	Q				
11+ 0	0.0000	0.00	Q				
11+15	0.0000	0.00	Q				
11+30	0.0000	0.00	Q				
11+45	0.0000	0.00	Q				
12+ 0	0.0000	0.00	Q				
12+15	0.0000	0.00	Q				

12+30	0.0000	0.00	Q				
12+45	0.0000	0.00	Q				
13+ 0	0.0000	0.00	Q				
13+15	0.0000	0.00	Q				
13+30	0.0000	0.00	Q				
13+45	0.0000	0.00	Q				
14+ 0	0.0000	0.00	Q				
14+15	0.0000	0.00	Q				
14+30	0.0000	0.00	Q				
14+45	0.0000	0.00	Q				
15+ 0	0.0000	0.00	Q				
15+15	0.0000	0.00	Q				
15+30	0.0000	0.00	Q				
15+45	0.0000	0.00	Q				
16+ 0	0.0000	0.00	Q				
16+15	0.0000	0.00	Q				
16+30	0.0000	0.00	Q				
16+45	0.0000	0.00	Q				
17+ 0	0.0000	0.00	Q				
17+15	0.0000	0.00	Q				
17+30	0.0000	0.00	Q				
17+45	0.0000	0.00	Q				
18+ 0	0.0000	0.00	Q				
18+15	0.0000	0.00	Q				
18+30	0.0000	0.00	Q				
18+45	0.0000	0.00	Q				
19+ 0	0.0000	0.00	Q				
19+15	0.0000	0.00	Q				
19+30	0.0000	0.00	Q				
19+45	0.0000	0.00	Q				
20+ 0	0.0000	0.00	Q				
20+15	0.0000	0.00	Q				
20+30	0.0000	0.00	Q				
20+45	0.0000	0.00	Q				
21+ 0	0.0000	0.00	Q				
21+15	0.0000	0.00	Q				
21+30	0.0000	0.00	Q				
21+45	0.0000	0.00	Q				
22+ 0	0.0000	0.00	Q				
22+15	0.0000	0.00	Q				
22+30	0.0000	0.00	Q				
22+45	0.0000	0.00	Q				
23+ 0	0.0000	0.00	Q				
23+15	0.0000	0.00	Q				
23+30	0.0000	0.00	Q				
23+45	0.0000	0.00	Q				
24+ 0	0.0000	0.00	Q				

DMA F

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PostF.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Post 25yr Unit Hydrograph
DMA F

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	2.6	1.00	A	0.400	0.140	0.056

Area-averaged adjusted loss rate Fm (In/Hr) = 0.056

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.36	0.140	32.0	32.0	21.25	0.001
2.24	0.860	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.815
Area-averaged low loss fraction, Yb = 0.185

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User entry of time of concentration = 0.090 (hours)
Watershed area = 2.60(Ac.)
Catchment Lag time = 0.072 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 347.2222
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.056(In/Hr)
Average low loss rate fraction (Yb) = 0.185 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 2.60(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 10.48 (CFS))	
1	69.546	7.289
2	100.000	3.192

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6440	0.1039
2	0.8699	0.0661
3	1.0241	0.0474
4	1.1499	0.0396
5	1.2787	0.0413
6	1.3947	0.0374
7	1.5009	0.0345
8	1.5994	0.0321
9	1.6917	0.0301
10	1.7787	0.0285

11	1.8612	0.0271
12	1.9400	0.0258
13	2.0163	0.0251
14	2.0897	0.0241
15	2.1604	0.0233
16	2.2287	0.0225
17	2.2948	0.0218
18	2.3589	0.0212
19	2.4212	0.0206
20	2.4819	0.0200
21	2.5410	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7100	0.0182
25	2.7506	0.0134
26	2.7901	0.0131
27	2.8288	0.0128
28	2.8665	0.0125
29	2.9034	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0433	0.0112
34	3.0765	0.0110
35	3.1092	0.0108
36	3.1412	0.0106
37	3.1727	0.0104
38	3.2037	0.0103
39	3.2342	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3226	0.0096
43	3.3512	0.0095
44	3.3794	0.0093
45	3.4072	0.0092
46	3.4346	0.0091
47	3.4616	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5405	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6655	0.0081
56	3.6897	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7605	0.0078
60	3.7836	0.0077

61	3.8064	0.0076
62	3.8290	0.0075
63	3.8514	0.0074
64	3.8736	0.0074
65	3.8955	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9811	0.0070
70	4.0021	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1238	0.0066
77	4.1434	0.0065
78	4.1630	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2206	0.0063
82	4.2395	0.0063
83	4.2582	0.0062
84	4.2768	0.0062
85	4.2953	0.0061
86	4.3137	0.0061
87	4.3319	0.0061
88	4.3499	0.0060
89	4.3679	0.0060
90	4.3857	0.0059
91	4.4034	0.0059
92	4.4209	0.0058
93	4.4384	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0032	0.0139
2	0.0173	0.0032	0.0141
3	0.0175	0.0032	0.0142
4	0.0176	0.0033	0.0144
5	0.0178	0.0033	0.0145
6	0.0180	0.0033	0.0147
7	0.0182	0.0034	0.0148
8	0.0184	0.0034	0.0150
9	0.0186	0.0034	0.0152

10	0.0188	0.0035	0.0154
11	0.0191	0.0035	0.0155
12	0.0193	0.0036	0.0157
13	0.0195	0.0036	0.0159
14	0.0198	0.0037	0.0161
15	0.0200	0.0037	0.0163
16	0.0203	0.0038	0.0165
17	0.0206	0.0038	0.0168
18	0.0208	0.0039	0.0170
19	0.0211	0.0039	0.0172
20	0.0214	0.0040	0.0175
21	0.0217	0.0040	0.0177
22	0.0221	0.0041	0.0180
23	0.0224	0.0041	0.0183
24	0.0227	0.0042	0.0185
25	0.0231	0.0043	0.0188
26	0.0235	0.0043	0.0191
27	0.0239	0.0044	0.0195
28	0.0243	0.0045	0.0198
29	0.0247	0.0046	0.0202
30	0.0252	0.0047	0.0205
31	0.0257	0.0048	0.0209
32	0.0261	0.0048	0.0213
33	0.0267	0.0049	0.0217
34	0.0272	0.0050	0.0222
35	0.0278	0.0051	0.0227
36	0.0284	0.0053	0.0232
37	0.0291	0.0054	0.0237
38	0.0297	0.0055	0.0242
39	0.0305	0.0056	0.0249
40	0.0313	0.0058	0.0255
41	0.0321	0.0059	0.0262
42	0.0330	0.0061	0.0269
43	0.0340	0.0063	0.0277
44	0.0350	0.0065	0.0285
45	0.0362	0.0067	0.0295
46	0.0373	0.0069	0.0304
47	0.0387	0.0072	0.0316
48	0.0401	0.0074	0.0327
49	0.0552	0.0102	0.0450
50	0.0570	0.0106	0.0465
51	0.0593	0.0110	0.0483
52	0.0616	0.0114	0.0502
53	0.0644	0.0119	0.0524
54	0.0673	0.0125	0.0549
55	0.0710	0.0131	0.0579
56	0.0750	0.0139	0.0611
57	0.0791	0.0140	0.0651
58	0.0850	0.0140	0.0710
59	0.0929	0.0140	0.0789

60	0.1027	0.0140	0.0887
61	0.1174	0.0140	0.1034
62	0.1243	0.0140	0.1103
63	0.1647	0.0140	0.1507
64	0.3182	0.0140	0.3042
65	0.5412	0.0140	0.5272
66	0.1289	0.0140	0.1149
67	0.1014	0.0140	0.0874
68	0.0842	0.0140	0.0702
69	0.0744	0.0138	0.0606
70	0.0669	0.0124	0.0545
71	0.0612	0.0113	0.0499
72	0.0568	0.0105	0.0463
73	0.0399	0.0074	0.0325
74	0.0372	0.0069	0.0303
75	0.0348	0.0064	0.0284
76	0.0329	0.0061	0.0268
77	0.0312	0.0058	0.0254
78	0.0296	0.0055	0.0242
79	0.0283	0.0052	0.0231
80	0.0271	0.0050	0.0221
81	0.0261	0.0048	0.0212
82	0.0251	0.0046	0.0205
83	0.0242	0.0045	0.0197
84	0.0234	0.0043	0.0191
85	0.0227	0.0042	0.0185
86	0.0220	0.0041	0.0179
87	0.0214	0.0040	0.0174
88	0.0208	0.0038	0.0169
89	0.0202	0.0037	0.0165
90	0.0197	0.0037	0.0161
91	0.0193	0.0036	0.0157
92	0.0188	0.0035	0.0153
93	0.0184	0.0034	0.0150
94	0.0180	0.0033	0.0147
95	0.0176	0.0033	0.0143
96	0.0172	0.0032	0.0141

Total soil rain loss = 0.64(In)
Total effective rainfall = 3.85(In)
Peak flow rate in flood hydrograph = 4.81(CFS)

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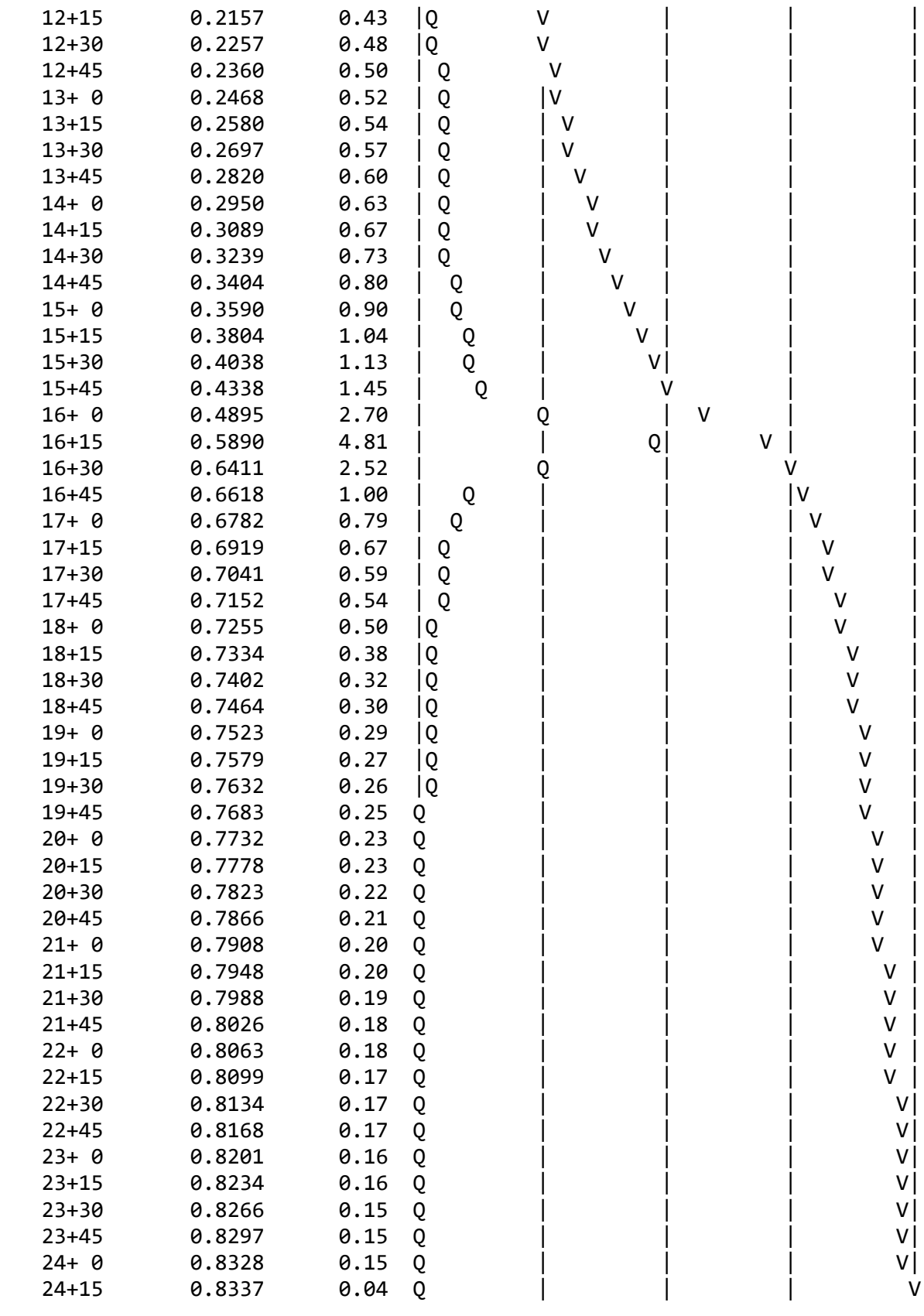
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+15	0.0021	0.10	Q				
0+30	0.0051	0.15	Q				
0+45	0.0082	0.15	Q				
1+ 0	0.0113	0.15	Q				
1+15	0.0144	0.15	Q				
1+30	0.0176	0.15	Q				
1+45	0.0208	0.16	Q				
2+ 0	0.0241	0.16	QV				
2+15	0.0273	0.16	QV				
2+30	0.0306	0.16	QV				
2+45	0.0340	0.16	QV				
3+ 0	0.0374	0.16	QV				
3+15	0.0408	0.17	QV				
3+30	0.0443	0.17	Q V				
3+45	0.0478	0.17	Q V				
4+ 0	0.0514	0.17	Q V				
4+15	0.0550	0.17	Q V				
4+30	0.0587	0.18	Q V				
4+45	0.0624	0.18	Q V				
5+ 0	0.0661	0.18	Q V				
5+15	0.0700	0.18	Q V				
5+30	0.0738	0.19	Q V				
5+45	0.0778	0.19	Q V				
6+ 0	0.0818	0.19	Q V				
6+15	0.0858	0.20	Q V				
6+30	0.0900	0.20	Q V				
6+45	0.0941	0.20	Q V				
7+ 0	0.0984	0.21	Q V				
7+15	0.1028	0.21	Q V				
7+30	0.1072	0.21	Q V				
7+45	0.1117	0.22	Q V				
8+ 0	0.1163	0.22	Q V				
8+15	0.1209	0.23	Q V				
8+30	0.1257	0.23	Q V				
8+45	0.1306	0.24	Q V				
9+ 0	0.1356	0.24	Q V				
9+15	0.1407	0.25	Q V				
9+30	0.1459	0.25	|Q V				
9+45	0.1512	0.26	|Q V				
10+ 0	0.1567	0.27	|Q V				
10+15	0.1623	0.27	|Q V				
10+30	0.1681	0.28	|Q V				
10+45	0.1740	0.29	|Q V				
11+ 0	0.1802	0.30	|Q V				
11+15	0.1865	0.31	|Q V				
11+30	0.1930	0.32	|Q V|				
11+45	0.1998	0.33	|Q V|				
12+ 0	0.2068	0.34	|Q V|				



DMA G

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PostG.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Post 25yr Unit Hydrograph
DMA G

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	3.4	1.00	A	0.400	0.240	0.096

Area-averaged adjusted loss rate Fm (In/Hr) = 0.096

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.81	0.240	32.0	32.0	21.25	0.001
2.56	0.760	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.720
Area-averaged low loss fraction, Yb = 0.280
++

User entry of time of concentration = 0.090 (hours)
Watershed area = 3.37(Ac.)
Catchment Lag time = 0.072 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 347.2222
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.096(In/Hr)
Average low loss rate fraction (Yb) = 0.280 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 3.37(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 13.59 (CFS))	
1	69.546	9.448
2	100.000	4.137

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6440	0.1038
2	0.8699	0.0661
3	1.0241	0.0474
4	1.1498	0.0396
5	1.2787	0.0413
6	1.3947	0.0374
7	1.5009	0.0345
8	1.5994	0.0321
9	1.6916	0.0301
10	1.7787	0.0285

11	1.8612	0.0271
12	1.9400	0.0258
13	2.0163	0.0251
14	2.0897	0.0241
15	2.1604	0.0233
16	2.2287	0.0225
17	2.2948	0.0218
18	2.3589	0.0212
19	2.4212	0.0206
20	2.4819	0.0200
21	2.5410	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7100	0.0182
25	2.7506	0.0134
26	2.7901	0.0131
27	2.8288	0.0128
28	2.8665	0.0125
29	2.9033	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0432	0.0112
34	3.0765	0.0110
35	3.1092	0.0108
36	3.1412	0.0106
37	3.1727	0.0104
38	3.2037	0.0103
39	3.2342	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3226	0.0096
43	3.3512	0.0095
44	3.3794	0.0093
45	3.4072	0.0092
46	3.4346	0.0091
47	3.4616	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5405	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6655	0.0081
56	3.6897	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7605	0.0078
60	3.7836	0.0077

61	3.8064	0.0076
62	3.8290	0.0075
63	3.8514	0.0074
64	3.8736	0.0074
65	3.8955	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9811	0.0070
70	4.0021	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1237	0.0066
77	4.1434	0.0065
78	4.1629	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2206	0.0063
82	4.2395	0.0063
83	4.2582	0.0062
84	4.2768	0.0062
85	4.2953	0.0061
86	4.3137	0.0061
87	4.3319	0.0061
88	4.3499	0.0060
89	4.3679	0.0060
90	4.3857	0.0059
91	4.4034	0.0059
92	4.4209	0.0058
93	4.4384	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0048	0.0123
2	0.0173	0.0048	0.0124
3	0.0175	0.0049	0.0126
4	0.0176	0.0049	0.0127
5	0.0178	0.0050	0.0128
6	0.0180	0.0050	0.0130
7	0.0182	0.0051	0.0131
8	0.0184	0.0052	0.0133
9	0.0186	0.0052	0.0134

10	0.0188	0.0053	0.0136
11	0.0191	0.0053	0.0137
12	0.0193	0.0054	0.0139
13	0.0195	0.0055	0.0141
14	0.0198	0.0055	0.0142
15	0.0200	0.0056	0.0144
16	0.0203	0.0057	0.0146
17	0.0206	0.0058	0.0148
18	0.0208	0.0058	0.0150
19	0.0211	0.0059	0.0152
20	0.0214	0.0060	0.0154
21	0.0217	0.0061	0.0157
22	0.0221	0.0062	0.0159
23	0.0224	0.0063	0.0161
24	0.0227	0.0064	0.0164
25	0.0231	0.0065	0.0166
26	0.0235	0.0066	0.0169
27	0.0239	0.0067	0.0172
28	0.0243	0.0068	0.0175
29	0.0247	0.0069	0.0178
30	0.0252	0.0070	0.0181
31	0.0257	0.0072	0.0185
32	0.0261	0.0073	0.0188
33	0.0267	0.0075	0.0192
34	0.0272	0.0076	0.0196
35	0.0278	0.0078	0.0200
36	0.0284	0.0079	0.0205
37	0.0291	0.0081	0.0209
38	0.0297	0.0083	0.0214
39	0.0305	0.0085	0.0220
40	0.0313	0.0087	0.0225
41	0.0321	0.0090	0.0231
42	0.0330	0.0092	0.0238
43	0.0340	0.0095	0.0245
44	0.0350	0.0098	0.0252
45	0.0362	0.0101	0.0260
46	0.0373	0.0104	0.0269
47	0.0387	0.0108	0.0279
48	0.0401	0.0112	0.0289
49	0.0552	0.0154	0.0398
50	0.0570	0.0160	0.0411
51	0.0593	0.0166	0.0427
52	0.0616	0.0172	0.0443
53	0.0644	0.0180	0.0463
54	0.0673	0.0188	0.0485
55	0.0710	0.0199	0.0511
56	0.0750	0.0210	0.0540
57	0.0792	0.0221	0.0570
58	0.0850	0.0238	0.0612
59	0.0929	0.0240	0.0689

60	0.1027	0.0240	0.0787
61	0.1174	0.0240	0.0934
62	0.1243	0.0240	0.1003
63	0.1647	0.0240	0.1407
64	0.3182	0.0240	0.2942
65	0.5412	0.0240	0.5172
66	0.1289	0.0240	0.1049
67	0.1014	0.0240	0.0774
68	0.0842	0.0236	0.0606
69	0.0744	0.0208	0.0536
70	0.0669	0.0187	0.0482
71	0.0612	0.0171	0.0441
72	0.0568	0.0159	0.0409
73	0.0399	0.0112	0.0288
74	0.0372	0.0104	0.0268
75	0.0348	0.0097	0.0251
76	0.0329	0.0092	0.0237
77	0.0312	0.0087	0.0224
78	0.0296	0.0083	0.0214
79	0.0283	0.0079	0.0204
80	0.0271	0.0076	0.0195
81	0.0261	0.0073	0.0188
82	0.0251	0.0070	0.0181
83	0.0242	0.0068	0.0175
84	0.0234	0.0066	0.0169
85	0.0227	0.0063	0.0163
86	0.0220	0.0062	0.0159
87	0.0214	0.0060	0.0154
88	0.0208	0.0058	0.0150
89	0.0202	0.0057	0.0146
90	0.0197	0.0055	0.0142
91	0.0193	0.0054	0.0139
92	0.0188	0.0053	0.0135
93	0.0184	0.0051	0.0132
94	0.0180	0.0050	0.0130
95	0.0176	0.0049	0.0127
96	0.0172	0.0048	0.0124

Total soil rain loss = 1.00(In)
Total effective rainfall = 3.49(In)
Peak flow rate in flood hydrograph = 6.10(CFS)

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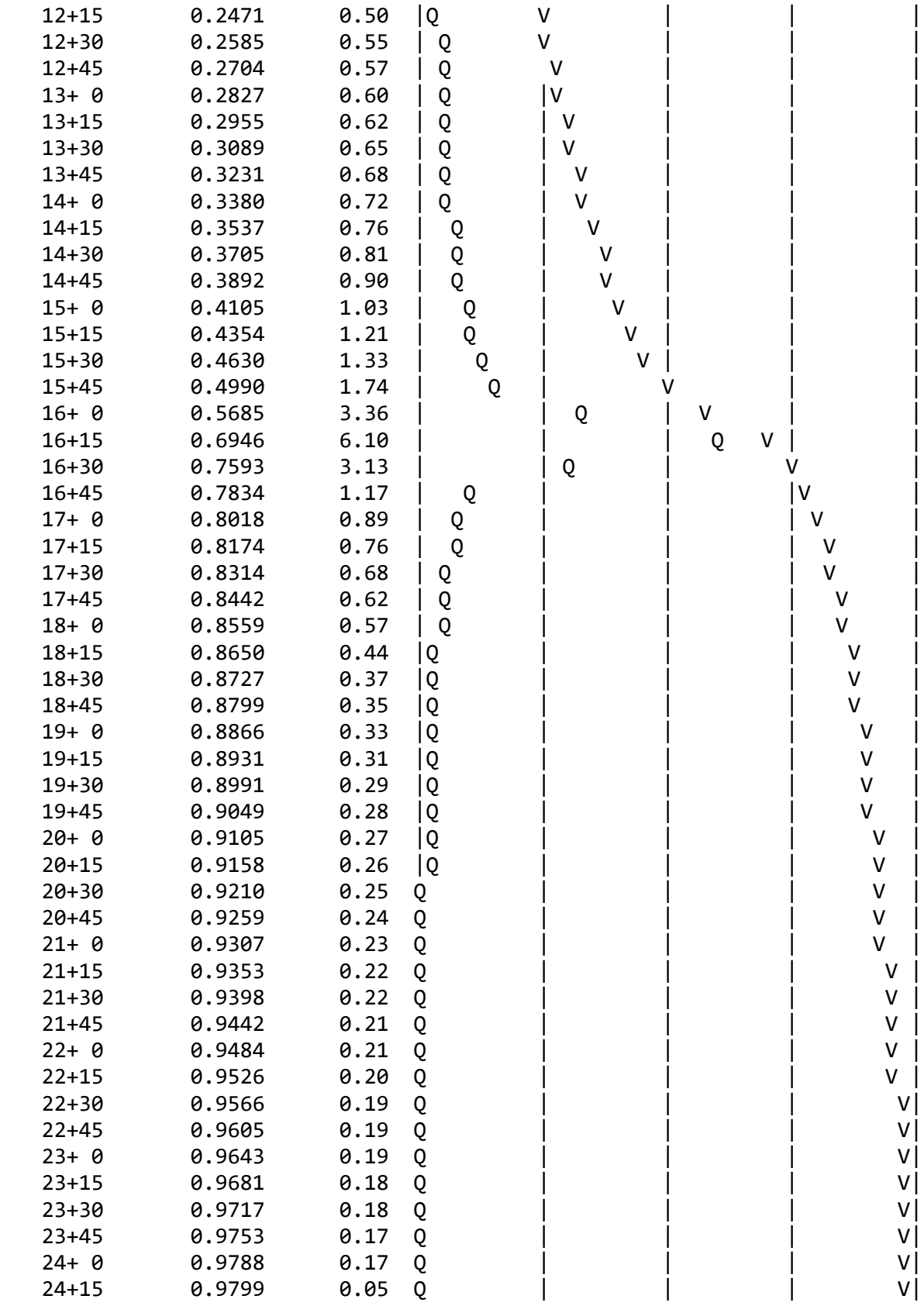
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+15	0.0024	0.12	Q				
0+30	0.0059	0.17	Q				
0+45	0.0094	0.17	Q				
1+ 0	0.0130	0.17	Q				
1+15	0.0165	0.17	Q				
1+30	0.0202	0.18	Q				
1+45	0.0238	0.18	Q				
2+ 0	0.0276	0.18	QV				
2+15	0.0313	0.18	QV				
2+30	0.0351	0.18	QV				
2+45	0.0389	0.19	QV				
3+ 0	0.0428	0.19	QV				
3+15	0.0468	0.19	QV				
3+30	0.0507	0.19	Q V				
3+45	0.0548	0.20	Q V				
4+ 0	0.0589	0.20	Q V				
4+15	0.0630	0.20	Q V				
4+30	0.0672	0.20	Q V				
4+45	0.0715	0.21	Q V				
5+ 0	0.0758	0.21	Q V				
5+15	0.0801	0.21	Q V				
5+30	0.0846	0.21	Q V				
5+45	0.0891	0.22	Q V				
6+ 0	0.0937	0.22	Q V				
6+15	0.0983	0.23	Q V				
6+30	0.1030	0.23	Q V				
6+45	0.1078	0.23	Q V				
7+ 0	0.1127	0.24	Q V				
7+15	0.1177	0.24	Q V				
7+30	0.1228	0.24	Q V				
7+45	0.1279	0.25	Q V				
8+ 0	0.1332	0.25	|Q V				
8+15	0.1385	0.26	|Q V				
8+30	0.1440	0.26	|Q V				
8+45	0.1496	0.27	|Q V				
9+ 0	0.1553	0.28	|Q V				
9+15	0.1611	0.28	|Q V				
9+30	0.1671	0.29	|Q V				
9+45	0.1732	0.30	|Q V				
10+ 0	0.1795	0.30	|Q V				
10+15	0.1860	0.31	|Q V				
10+30	0.1926	0.32	|Q V				
10+45	0.1994	0.33	|Q V				
11+ 0	0.2064	0.34	|Q V				
11+15	0.2136	0.35	|Q V				
11+30	0.2211	0.36	|Q V				
11+45	0.2289	0.37	|Q V				
12+ 0	0.2369	0.39	|Q V				



DMA H

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PostH.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Post 25yr Unit Hydrograph
DMA H

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	1.5	1.00	A	0.400	0.200	0.080

Area-averaged adjusted loss rate Fm (In/Hr) = 0.080

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.29	0.200	32.0	32.0	21.25	0.001
1.18	0.800	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.758
Area-averaged low loss fraction, Yb = 0.242
++

User entry of time of concentration = 0.100 (hours)
Watershed area = 1.47(Ac.)
Catchment Lag time = 0.080 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 312.5000
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.080(In/Hr)
Average low loss rate fraction (Yb) = 0.242 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 1.47(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 5.93 (CFS))	
1	66.192	3.922
2	100.000	2.003

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6441	0.1039
2	0.8699	0.0661
3	1.0242	0.0474
4	1.1499	0.0396
5	1.2788	0.0413
6	1.3947	0.0374
7	1.5009	0.0345
8	1.5995	0.0321
9	1.6917	0.0301
10	1.7787	0.0285

11	1.8613	0.0271
12	1.9400	0.0258
13	2.0163	0.0251
14	2.0897	0.0241
15	2.1604	0.0233
16	2.2287	0.0225
17	2.2948	0.0218
18	2.3589	0.0212
19	2.4213	0.0206
20	2.4819	0.0200
21	2.5410	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7100	0.0182
25	2.7506	0.0134
26	2.7902	0.0131
27	2.8288	0.0128
28	2.8665	0.0125
29	2.9034	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0433	0.0112
34	3.0765	0.0110
35	3.1092	0.0108
36	3.1412	0.0106
37	3.1728	0.0104
38	3.2037	0.0103
39	3.2342	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3227	0.0096
43	3.3513	0.0095
44	3.3794	0.0093
45	3.4072	0.0092
46	3.4346	0.0091
47	3.4616	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5405	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6656	0.0081
56	3.6897	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7605	0.0078
60	3.7836	0.0077

61	3.8064	0.0076
62	3.8290	0.0075
63	3.8514	0.0074
64	3.8736	0.0074
65	3.8955	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9812	0.0070
70	4.0021	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1238	0.0066
77	4.1434	0.0065
78	4.1630	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2206	0.0063
82	4.2395	0.0063
83	4.2582	0.0062
84	4.2769	0.0062
85	4.2953	0.0061
86	4.3137	0.0061
87	4.3319	0.0061
88	4.3499	0.0060
89	4.3679	0.0060
90	4.3857	0.0059
91	4.4034	0.0059
92	4.4209	0.0058
93	4.4384	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0041	0.0130
2	0.0173	0.0042	0.0131
3	0.0175	0.0042	0.0132
4	0.0176	0.0043	0.0134
5	0.0178	0.0043	0.0135
6	0.0180	0.0044	0.0137
7	0.0182	0.0044	0.0138
8	0.0184	0.0045	0.0140
9	0.0186	0.0045	0.0141

10	0.0188	0.0046	0.0143
11	0.0191	0.0046	0.0145
12	0.0193	0.0047	0.0146
13	0.0195	0.0047	0.0148
14	0.0198	0.0048	0.0150
15	0.0200	0.0048	0.0152
16	0.0203	0.0049	0.0154
17	0.0206	0.0050	0.0156
18	0.0208	0.0050	0.0158
19	0.0211	0.0051	0.0160
20	0.0214	0.0052	0.0162
21	0.0217	0.0053	0.0165
22	0.0221	0.0053	0.0167
23	0.0224	0.0054	0.0170
24	0.0227	0.0055	0.0172
25	0.0231	0.0056	0.0175
26	0.0235	0.0057	0.0178
27	0.0239	0.0058	0.0181
28	0.0243	0.0059	0.0184
29	0.0247	0.0060	0.0188
30	0.0252	0.0061	0.0191
31	0.0257	0.0062	0.0195
32	0.0261	0.0063	0.0198
33	0.0267	0.0065	0.0202
34	0.0272	0.0066	0.0206
35	0.0278	0.0067	0.0211
36	0.0284	0.0069	0.0215
37	0.0291	0.0070	0.0220
38	0.0297	0.0072	0.0226
39	0.0305	0.0074	0.0231
40	0.0313	0.0076	0.0237
41	0.0321	0.0078	0.0244
42	0.0330	0.0080	0.0250
43	0.0340	0.0082	0.0258
44	0.0350	0.0085	0.0265
45	0.0362	0.0087	0.0274
46	0.0373	0.0090	0.0283
47	0.0387	0.0094	0.0294
48	0.0401	0.0097	0.0304
49	0.0552	0.0134	0.0418
50	0.0570	0.0138	0.0432
51	0.0593	0.0143	0.0449
52	0.0616	0.0149	0.0467
53	0.0644	0.0156	0.0488
54	0.0673	0.0163	0.0510
55	0.0710	0.0172	0.0538
56	0.0750	0.0181	0.0569
57	0.0791	0.0191	0.0600
58	0.0850	0.0200	0.0650
59	0.0929	0.0200	0.0729

60	0.1027	0.0200	0.0827
61	0.1174	0.0200	0.0974
62	0.1243	0.0200	0.1043
63	0.1647	0.0200	0.1447
64	0.3183	0.0200	0.2983
65	0.5412	0.0200	0.5212
66	0.1289	0.0200	0.1089
67	0.1014	0.0200	0.0814
68	0.0842	0.0200	0.0642
69	0.0744	0.0180	0.0564
70	0.0669	0.0162	0.0507
71	0.0612	0.0148	0.0464
72	0.0568	0.0137	0.0430
73	0.0399	0.0097	0.0303
74	0.0372	0.0090	0.0282
75	0.0348	0.0084	0.0264
76	0.0329	0.0080	0.0249
77	0.0312	0.0075	0.0236
78	0.0296	0.0072	0.0225
79	0.0283	0.0069	0.0215
80	0.0271	0.0066	0.0206
81	0.0261	0.0063	0.0198
82	0.0251	0.0061	0.0190
83	0.0242	0.0059	0.0184
84	0.0234	0.0057	0.0178
85	0.0227	0.0055	0.0172
86	0.0220	0.0053	0.0167
87	0.0214	0.0052	0.0162
88	0.0208	0.0050	0.0158
89	0.0202	0.0049	0.0153
90	0.0197	0.0048	0.0150
91	0.0193	0.0047	0.0146
92	0.0188	0.0045	0.0143
93	0.0184	0.0044	0.0139
94	0.0180	0.0044	0.0136
95	0.0176	0.0043	0.0133
96	0.0172	0.0042	0.0131

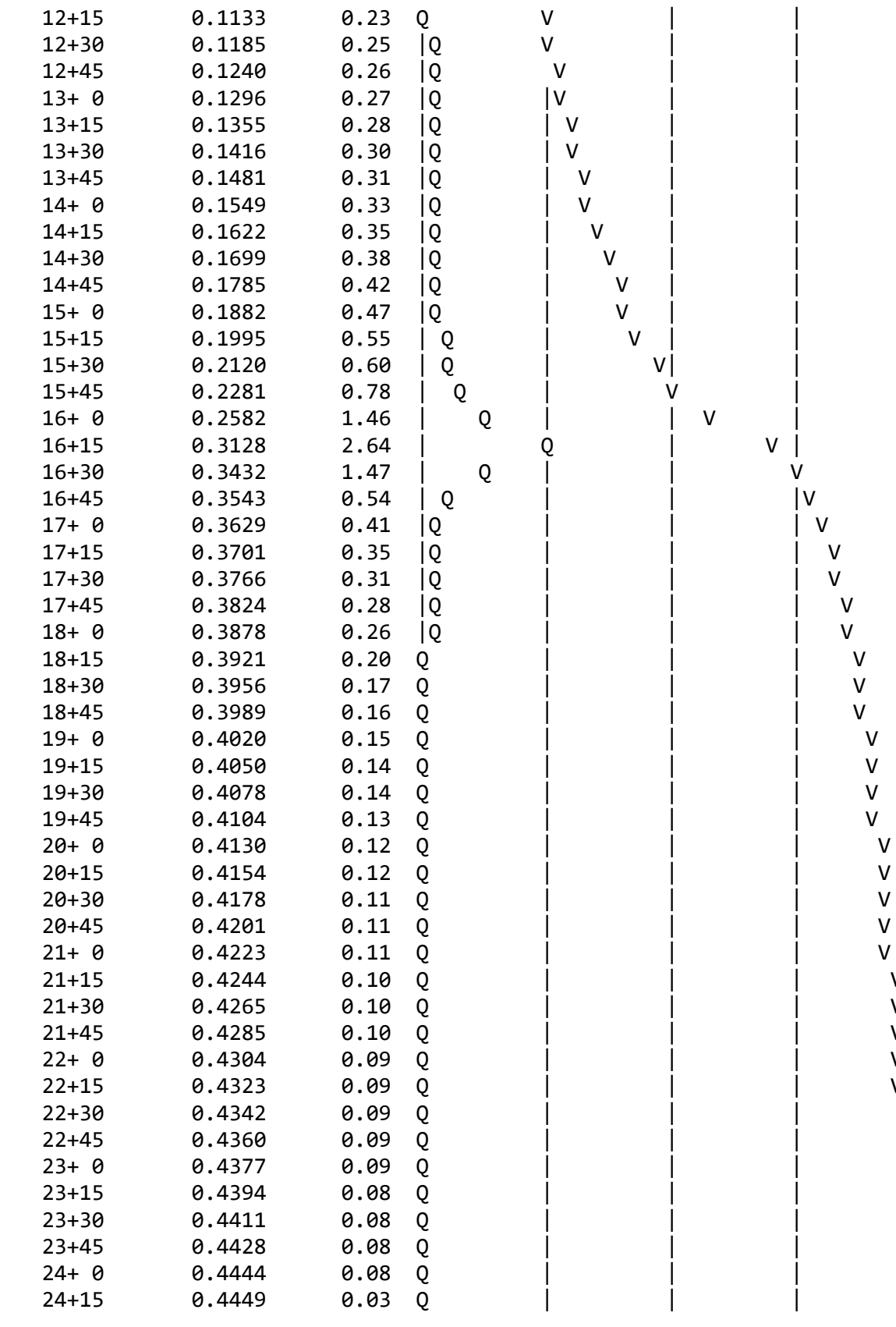
Total soil rain loss = 0.86(In)
Total effective rainfall = 3.63(In)
Peak flow rate in flood hydrograph = 2.64(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+15	0.0011	0.05	Q				
0+30	0.0026	0.08	Q				
0+45	0.0043	0.08	Q				
1+ 0	0.0059	0.08	Q				
1+15	0.0075	0.08	Q				
1+30	0.0092	0.08	Q				
1+45	0.0109	0.08	Q				
2+ 0	0.0126	0.08	QV				
2+15	0.0143	0.08	QV				
2+30	0.0161	0.08	QV				
2+45	0.0178	0.09	QV				
3+ 0	0.0196	0.09	QV				
3+15	0.0214	0.09	QV				
3+30	0.0232	0.09	Q V				
3+45	0.0251	0.09	Q V				
4+ 0	0.0270	0.09	Q V				
4+15	0.0289	0.09	Q V				
4+30	0.0308	0.09	Q V				
4+45	0.0327	0.09	Q V				
5+ 0	0.0347	0.10	Q V				
5+15	0.0367	0.10	Q V				
5+30	0.0388	0.10	Q V				
5+45	0.0408	0.10	Q V				
6+ 0	0.0429	0.10	Q V				
6+15	0.0451	0.10	Q V				
6+30	0.0472	0.10	Q V				
6+45	0.0494	0.11	Q V				
7+ 0	0.0517	0.11	Q V				
7+15	0.0540	0.11	Q V				
7+30	0.0563	0.11	Q V				
7+45	0.0587	0.11	Q V				
8+ 0	0.0611	0.12	Q V				
8+15	0.0635	0.12	Q V				
8+30	0.0660	0.12	Q V				
8+45	0.0686	0.12	Q V				
9+ 0	0.0712	0.13	Q V				
9+15	0.0739	0.13	Q V				
9+30	0.0766	0.13	Q V				
9+45	0.0794	0.14	Q V				
10+ 0	0.0823	0.14	Q V				
10+15	0.0853	0.14	Q V				
10+30	0.0883	0.15	Q V				
10+45	0.0914	0.15	Q V				
11+ 0	0.0947	0.16	Q V				
11+15	0.0980	0.16	Q V				
11+30	0.1014	0.17	Q V				
11+45	0.1050	0.17	Q V				
12+ 0	0.1086	0.18	Q V				


12+15 0.1133 0.23
12+30 0.1185 0.25
12+45 0.1240 0.26
13+ 0 0.1296 0.27
13+15 0.1355 0.28
13+30 0.1416 0.30
13+45 0.1481 0.31
14+ 0 0.1549 0.33
14+15 0.1622 0.35
14+30 0.1699 0.38
14+45 0.1785 0.42
15+ 0 0.1882 0.47
15+15 0.1995 0.55
15+30 0.2120 0.60
15+45 0.2281 0.78
16+ 0 0.2582 1.46
16+15 0.3128 2.64
16+30 0.3432 1.47
16+45 0.3543 0.54
17+ 0 0.3629 0.41
17+15 0.3701 0.35
17+30 0.3766 0.31
17+45 0.3824 0.28
18+ 0 0.3878 0.26
18+15 0.3921 0.20
18+30 0.3956 0.17
18+45 0.3989 0.16
19+ 0 0.4020 0.15
19+15 0.4050 0.14
19+30 0.4078 0.14
19+45 0.4104 0.13
20+ 0 0.4130 0.12
20+15 0.4154 0.12
20+30 0.4178 0.11
20+45 0.4201 0.11
21+ 0 0.4223 0.11
21+15 0.4244 0.10
21+30 0.4265 0.10
21+45 0.4285 0.10
22+ 0 0.4304 0.09
22+15 0.4323 0.09
22+30 0.4342 0.09
22+45 0.4360 0.09
23+ 0 0.4377 0.09
23+15 0.4394 0.08
23+30 0.4411 0.08
23+45 0.4428 0.08
24+ 0 0.4444 0.08
24+15 0.4449 0.03

PRE-DEVELOPMENT CONDITION

DA1 DMA1

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PreDA1.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Pre 25 Year Unit Hydrogrpah
DA1 DMA1

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	4.9	1.00	A	0.400	0.390	0.156

Area-averaged adjusted loss rate Fm (In/Hr) = 0.156

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
1.90	0.390	32.0	32.0	21.25	0.001
2.96	0.610	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.578
Area-averaged low loss fraction, Yb = 0.422
++

User entry of time of concentration = 0.090 (hours)
Watershed area = 4.86(Ac.)
Catchment Lag time = 0.072 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 347.2222
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.156(In/Hr)
Average low loss rate fraction (Yb) = 0.422 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 4.86(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 19.59 (CFS))	
1	69.546	13.625
2	100.000	5.967

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6440	0.1038
2	0.8698	0.0661
3	1.0240	0.0474
4	1.1497	0.0396
5	1.2786	0.0413
6	1.3946	0.0374
7	1.5008	0.0345
8	1.5993	0.0321
9	1.6916	0.0301
10	1.7786	0.0285

11	1.8612	0.0271
12	1.9399	0.0258
13	2.0163	0.0251
14	2.0897	0.0241
15	2.1604	0.0233
16	2.2286	0.0225
17	2.2948	0.0218
18	2.3589	0.0212
19	2.4212	0.0206
20	2.4819	0.0200
21	2.5409	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7100	0.0182
25	2.7506	0.0134
26	2.7901	0.0131
27	2.8287	0.0128
28	2.8665	0.0125
29	2.9033	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0432	0.0112
34	3.0765	0.0110
35	3.1092	0.0108
36	3.1412	0.0106
37	3.1727	0.0104
38	3.2037	0.0103
39	3.2341	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3226	0.0096
43	3.3512	0.0095
44	3.3794	0.0093
45	3.4072	0.0092
46	3.4346	0.0091
47	3.4616	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5405	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6655	0.0081
56	3.6897	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7605	0.0078
60	3.7836	0.0077

61	3.8064	0.0076
62	3.8290	0.0075
63	3.8514	0.0074
64	3.8735	0.0074
65	3.8955	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9811	0.0070
70	4.0021	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1237	0.0066
77	4.1434	0.0065
78	4.1629	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2206	0.0063
82	4.2395	0.0063
83	4.2582	0.0062
84	4.2768	0.0062
85	4.2953	0.0061
86	4.3136	0.0061
87	4.3318	0.0061
88	4.3499	0.0060
89	4.3679	0.0060
90	4.3857	0.0059
91	4.4033	0.0059
92	4.4209	0.0058
93	4.4384	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0072	0.0099
2	0.0173	0.0073	0.0100
3	0.0175	0.0074	0.0101
4	0.0176	0.0074	0.0102
5	0.0178	0.0075	0.0103
6	0.0180	0.0076	0.0104
7	0.0182	0.0077	0.0105
8	0.0184	0.0078	0.0106
9	0.0186	0.0079	0.0108

10	0.0188	0.0079	0.0109
11	0.0191	0.0080	0.0110
12	0.0193	0.0081	0.0112
13	0.0195	0.0082	0.0113
14	0.0198	0.0083	0.0114
15	0.0200	0.0085	0.0116
16	0.0203	0.0086	0.0117
17	0.0206	0.0087	0.0119
18	0.0208	0.0088	0.0120
19	0.0211	0.0089	0.0122
20	0.0214	0.0090	0.0124
21	0.0217	0.0092	0.0126
22	0.0221	0.0093	0.0128
23	0.0224	0.0095	0.0130
24	0.0227	0.0096	0.0131
25	0.0231	0.0098	0.0134
26	0.0235	0.0099	0.0136
27	0.0239	0.0101	0.0138
28	0.0243	0.0102	0.0140
29	0.0247	0.0104	0.0143
30	0.0252	0.0106	0.0146
31	0.0257	0.0108	0.0148
32	0.0261	0.0110	0.0151
33	0.0267	0.0113	0.0154
34	0.0272	0.0115	0.0157
35	0.0278	0.0117	0.0161
36	0.0284	0.0120	0.0164
37	0.0291	0.0123	0.0168
38	0.0297	0.0125	0.0172
39	0.0305	0.0129	0.0176
40	0.0313	0.0132	0.0181
41	0.0321	0.0136	0.0186
42	0.0330	0.0139	0.0191
43	0.0340	0.0143	0.0197
44	0.0350	0.0148	0.0202
45	0.0362	0.0153	0.0209
46	0.0373	0.0157	0.0216
47	0.0387	0.0163	0.0224
48	0.0401	0.0169	0.0232
49	0.0552	0.0233	0.0319
50	0.0570	0.0241	0.0330
51	0.0593	0.0250	0.0343
52	0.0616	0.0260	0.0356
53	0.0644	0.0271	0.0372
54	0.0673	0.0284	0.0389
55	0.0710	0.0299	0.0410
56	0.0750	0.0316	0.0434
57	0.0792	0.0334	0.0458
58	0.0850	0.0359	0.0491
59	0.0930	0.0390	0.0540

60	0.1027	0.0390	0.0637
61	0.1174	0.0390	0.0784
62	0.1243	0.0390	0.0853
63	0.1647	0.0390	0.1257
64	0.3182	0.0390	0.2792
65	0.5412	0.0390	0.5022
66	0.1289	0.0390	0.0899
67	0.1014	0.0390	0.0624
68	0.0842	0.0355	0.0487
69	0.0744	0.0314	0.0430
70	0.0669	0.0282	0.0387
71	0.0612	0.0258	0.0354
72	0.0568	0.0239	0.0328
73	0.0399	0.0168	0.0231
74	0.0372	0.0157	0.0215
75	0.0348	0.0147	0.0201
76	0.0329	0.0139	0.0190
77	0.0312	0.0131	0.0180
78	0.0296	0.0125	0.0171
79	0.0283	0.0119	0.0164
80	0.0271	0.0114	0.0157
81	0.0261	0.0110	0.0151
82	0.0251	0.0106	0.0145
83	0.0242	0.0102	0.0140
84	0.0234	0.0099	0.0135
85	0.0227	0.0096	0.0131
86	0.0220	0.0093	0.0127
87	0.0214	0.0090	0.0124
88	0.0208	0.0088	0.0120
89	0.0202	0.0085	0.0117
90	0.0197	0.0083	0.0114
91	0.0193	0.0081	0.0111
92	0.0188	0.0079	0.0109
93	0.0184	0.0078	0.0106
94	0.0180	0.0076	0.0104
95	0.0176	0.0074	0.0102
96	0.0172	0.0073	0.0100

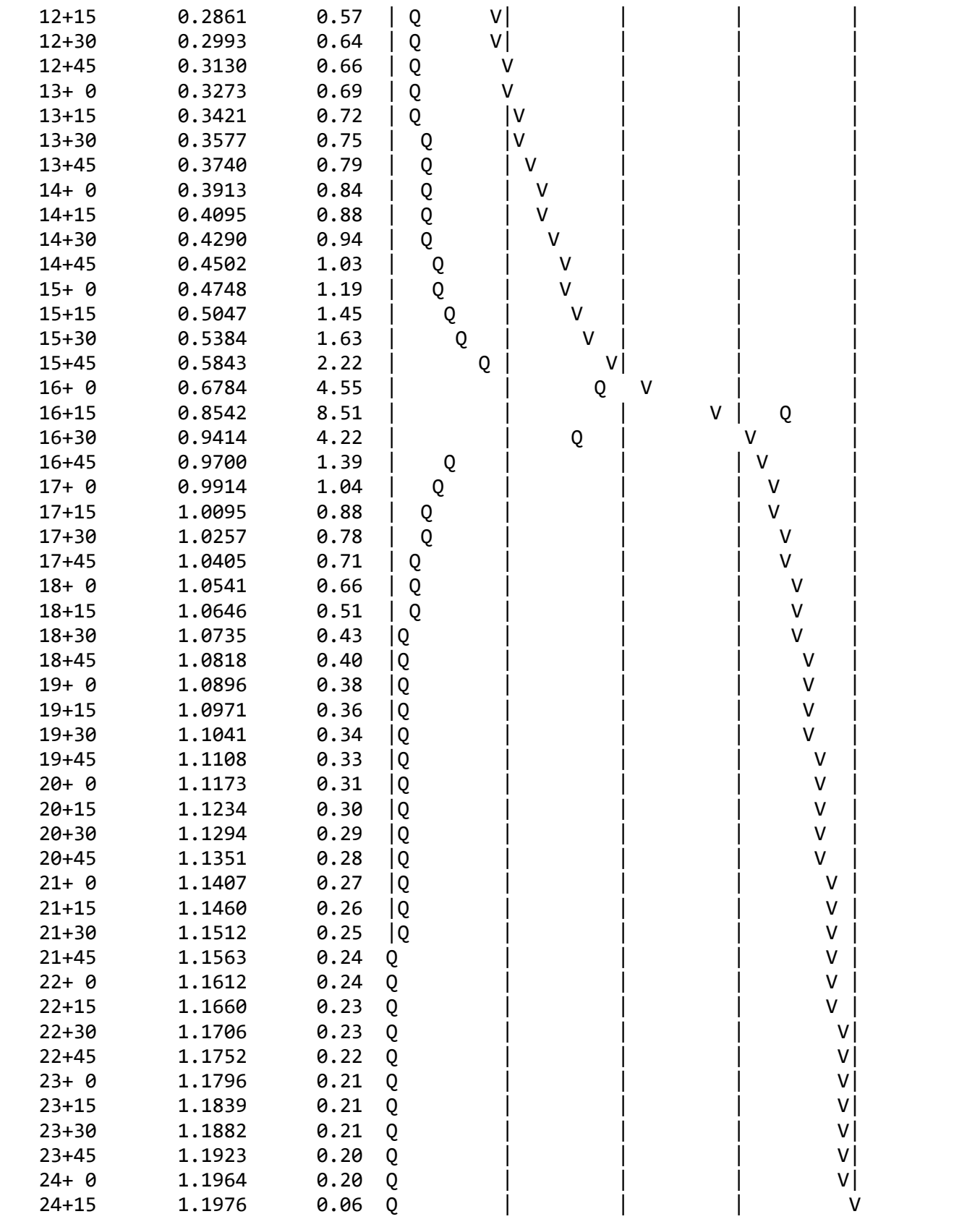
Total soil rain loss = 1.53(In)
Total effective rainfall = 2.96(In)
Peak flow rate in flood hydrograph = 8.51(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+15	0.0028	0.13	Q				
0+30	0.0068	0.20	Q				
0+45	0.0109	0.20	Q				
1+ 0	0.0150	0.20	Q				
1+15	0.0192	0.20	Q				
1+30	0.0234	0.20	Q				
1+45	0.0276	0.21	Q				
2+ 0	0.0319	0.21	QV				
2+15	0.0362	0.21	QV				
2+30	0.0406	0.21	QV				
2+45	0.0451	0.22	QV				
3+ 0	0.0496	0.22	QV				
3+15	0.0541	0.22	QV				
3+30	0.0588	0.22	QV				
3+45	0.0634	0.23	Q V				
4+ 0	0.0682	0.23	Q V				
4+15	0.0729	0.23	Q V				
4+30	0.0778	0.24	Q V				
4+45	0.0827	0.24	Q V				
5+ 0	0.0877	0.24	Q V				
5+15	0.0928	0.25	Q V				
5+30	0.0979	0.25	Q V				
5+45	0.1031	0.25	|Q V				
6+ 0	0.1084	0.26	|Q V				
6+15	0.1138	0.26	|Q V				
6+30	0.1193	0.26	|Q V				
6+45	0.1249	0.27	|Q V				
7+ 0	0.1305	0.27	|Q V				
7+15	0.1363	0.28	|Q V				
7+30	0.1421	0.28	|Q V				
7+45	0.1481	0.29	|Q V				
8+ 0	0.1542	0.29	|Q V				
8+15	0.1604	0.30	|Q V				
8+30	0.1667	0.31	|Q V				
8+45	0.1732	0.31	|Q V				
9+ 0	0.1798	0.32	|Q V				
9+15	0.1866	0.33	|Q V				
9+30	0.1935	0.33	|Q V				
9+45	0.2006	0.34	|Q V				
10+ 0	0.2078	0.35	|Q V				
10+15	0.2153	0.36	|Q V				
10+30	0.2229	0.37	|Q V				
10+45	0.2308	0.38	|Q V				
11+ 0	0.2390	0.39	|Q V				
11+15	0.2473	0.41	|Q V				
11+30	0.2560	0.42	|Q V				
11+45	0.2649	0.43	|Q V				
12+ 0	0.2742	0.45	|Q V|				


12+15 0.2861 0.57
12+30 0.2993 0.64
12+45 0.3130 0.66
13+ 0 0.3273 0.69
13+15 0.3421 0.72
13+30 0.3577 0.75
13+45 0.3740 0.79
14+ 0 0.3913 0.84
14+15 0.4095 0.88
14+30 0.4290 0.94
14+45 0.4502 1.03
15+ 0 0.4748 1.19
15+15 0.5047 1.45
15+30 0.5384 1.63
15+45 0.5843 2.22
16+ 0 0.6784 4.55
16+15 0.8542 8.51
16+30 0.9414 4.22
16+45 0.9700 1.39
17+ 0 0.9914 1.04
17+15 1.0095 0.88
17+30 1.0257 0.78
17+45 1.0405 0.71
18+ 0 1.0541 0.66
18+15 1.0646 0.51
18+30 1.0735 0.43
18+45 1.0818 0.40
19+ 0 1.0896 0.38
19+15 1.0971 0.36
19+30 1.1041 0.34
19+45 1.1108 0.33
20+ 0 1.1173 0.31
20+15 1.1234 0.30
20+30 1.1294 0.29
20+45 1.1351 0.28
21+ 0 1.1407 0.27
21+15 1.1460 0.26
21+30 1.1512 0.25
21+45 1.1563 0.24
22+ 0 1.1612 0.24
22+15 1.1660 0.23
22+30 1.1706 0.23
22+45 1.1752 0.22
23+ 0 1.1796 0.21
23+15 1.1839 0.21
23+30 1.1882 0.21
23+45 1.1923 0.20
24+ 0 1.1964 0.20
24+15 1.1976 0.06

DA2 DMA1

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PreDA21.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Pre 25 Year Unit Hydrograph
DA2 DMA 1

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	7.0	1.00	A	0.400	0.190	0.076

Area-averaged adjusted loss rate Fm (In/Hr) = 0.076

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
1.32	0.190	32.0	32.0	21.25	0.001
5.63	0.810	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.768
Area-averaged low loss fraction, Yb = 0.232
++

User entry of time of concentration = 0.200 (hours)
Watershed area = 6.95(Ac.)
Catchment Lag time = 0.160 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 156.2500
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.076(In/Hr)
Average low loss rate fraction (Yb) = 0.232 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 6.95(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 28.02 (CFS))	
1	36.372	10.191
2	96.012	16.709
3	100.000	1.117

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6439	0.1038
2	0.8697	0.0661
3	1.0239	0.0474
4	1.1496	0.0396
5	1.2785	0.0413
6	1.3945	0.0374
7	1.5007	0.0345
8	1.5993	0.0321
9	1.6915	0.0301

10	1.7786	0.0285
11	1.8612	0.0271
12	1.9399	0.0259
13	2.0163	0.0251
14	2.0896	0.0241
15	2.1603	0.0233
16	2.2286	0.0225
17	2.2947	0.0218
18	2.3589	0.0212
19	2.4212	0.0206
20	2.4818	0.0200
21	2.5409	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7099	0.0182
25	2.7505	0.0134
26	2.7901	0.0131
27	2.8287	0.0128
28	2.8664	0.0125
29	2.9033	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0432	0.0112
34	3.0765	0.0110
35	3.1091	0.0108
36	3.1412	0.0106
37	3.1727	0.0104
38	3.2037	0.0103
39	3.2341	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3226	0.0096
43	3.3512	0.0095
44	3.3794	0.0093
45	3.4072	0.0092
46	3.4345	0.0091
47	3.4616	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5404	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6655	0.0081
56	3.6896	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7604	0.0078

60	3.7835	0.0077
61	3.8064	0.0076
62	3.8290	0.0075
63	3.8514	0.0074
64	3.8735	0.0074
65	3.8955	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9811	0.0070
70	4.0020	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1237	0.0066
77	4.1434	0.0065
78	4.1629	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2205	0.0063
82	4.2394	0.0063
83	4.2582	0.0062
84	4.2768	0.0062
85	4.2953	0.0061
86	4.3136	0.0061
87	4.3318	0.0061
88	4.3499	0.0060
89	4.3678	0.0060
90	4.3856	0.0059
91	4.4033	0.0059
92	4.4209	0.0058
93	4.4383	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0040	0.0131
2	0.0173	0.0040	0.0133
3	0.0175	0.0041	0.0134
4	0.0176	0.0041	0.0135
5	0.0178	0.0041	0.0137
6	0.0180	0.0042	0.0138
7	0.0182	0.0042	0.0140
8	0.0184	0.0043	0.0141

9	0.0186	0.0043	0.0143
10	0.0188	0.0044	0.0145
11	0.0191	0.0044	0.0146
12	0.0193	0.0045	0.0148
13	0.0195	0.0045	0.0150
14	0.0198	0.0046	0.0152
15	0.0200	0.0047	0.0154
16	0.0203	0.0047	0.0156
17	0.0206	0.0048	0.0158
18	0.0208	0.0048	0.0160
19	0.0211	0.0049	0.0162
20	0.0214	0.0050	0.0164
21	0.0217	0.0051	0.0167
22	0.0221	0.0051	0.0169
23	0.0224	0.0052	0.0172
24	0.0227	0.0053	0.0175
25	0.0231	0.0054	0.0177
26	0.0235	0.0055	0.0180
27	0.0239	0.0056	0.0183
28	0.0243	0.0056	0.0186
29	0.0247	0.0058	0.0190
30	0.0252	0.0059	0.0193
31	0.0257	0.0060	0.0197
32	0.0261	0.0061	0.0201
33	0.0267	0.0062	0.0205
34	0.0272	0.0063	0.0209
35	0.0278	0.0065	0.0214
36	0.0284	0.0066	0.0218
37	0.0291	0.0068	0.0223
38	0.0297	0.0069	0.0228
39	0.0305	0.0071	0.0234
40	0.0313	0.0073	0.0240
41	0.0321	0.0075	0.0247
42	0.0330	0.0077	0.0253
43	0.0340	0.0079	0.0261
44	0.0350	0.0081	0.0269
45	0.0362	0.0084	0.0278
46	0.0373	0.0087	0.0287
47	0.0387	0.0090	0.0297
48	0.0401	0.0093	0.0308
49	0.0552	0.0128	0.0424
50	0.0570	0.0133	0.0438
51	0.0593	0.0138	0.0455
52	0.0616	0.0143	0.0473
53	0.0644	0.0150	0.0494
54	0.0673	0.0156	0.0517
55	0.0710	0.0165	0.0545
56	0.0750	0.0174	0.0576
57	0.0792	0.0184	0.0608
58	0.0850	0.0190	0.0660

59	0.0930	0.0190	0.0740
60	0.1027	0.0190	0.0837
61	0.1174	0.0190	0.0984
62	0.1243	0.0190	0.1053
63	0.1646	0.0190	0.1456
64	0.3182	0.0190	0.2992
65	0.5411	0.0190	0.5221
66	0.1289	0.0190	0.1099
67	0.1014	0.0190	0.0824
68	0.0842	0.0190	0.0652
69	0.0744	0.0173	0.0571
70	0.0669	0.0155	0.0513
71	0.0612	0.0142	0.0470
72	0.0568	0.0132	0.0436
73	0.0399	0.0093	0.0306
74	0.0372	0.0086	0.0285
75	0.0348	0.0081	0.0267
76	0.0329	0.0076	0.0252
77	0.0312	0.0072	0.0239
78	0.0296	0.0069	0.0228
79	0.0283	0.0066	0.0217
80	0.0271	0.0063	0.0208
81	0.0261	0.0061	0.0200
82	0.0251	0.0058	0.0193
83	0.0242	0.0056	0.0186
84	0.0234	0.0054	0.0180
85	0.0227	0.0053	0.0174
86	0.0220	0.0051	0.0169
87	0.0214	0.0050	0.0164
88	0.0208	0.0048	0.0160
89	0.0202	0.0047	0.0155
90	0.0197	0.0046	0.0151
91	0.0193	0.0045	0.0148
92	0.0188	0.0044	0.0144
93	0.0184	0.0043	0.0141
94	0.0180	0.0042	0.0138
95	0.0176	0.0041	0.0135
96	0.0172	0.0040	0.0132

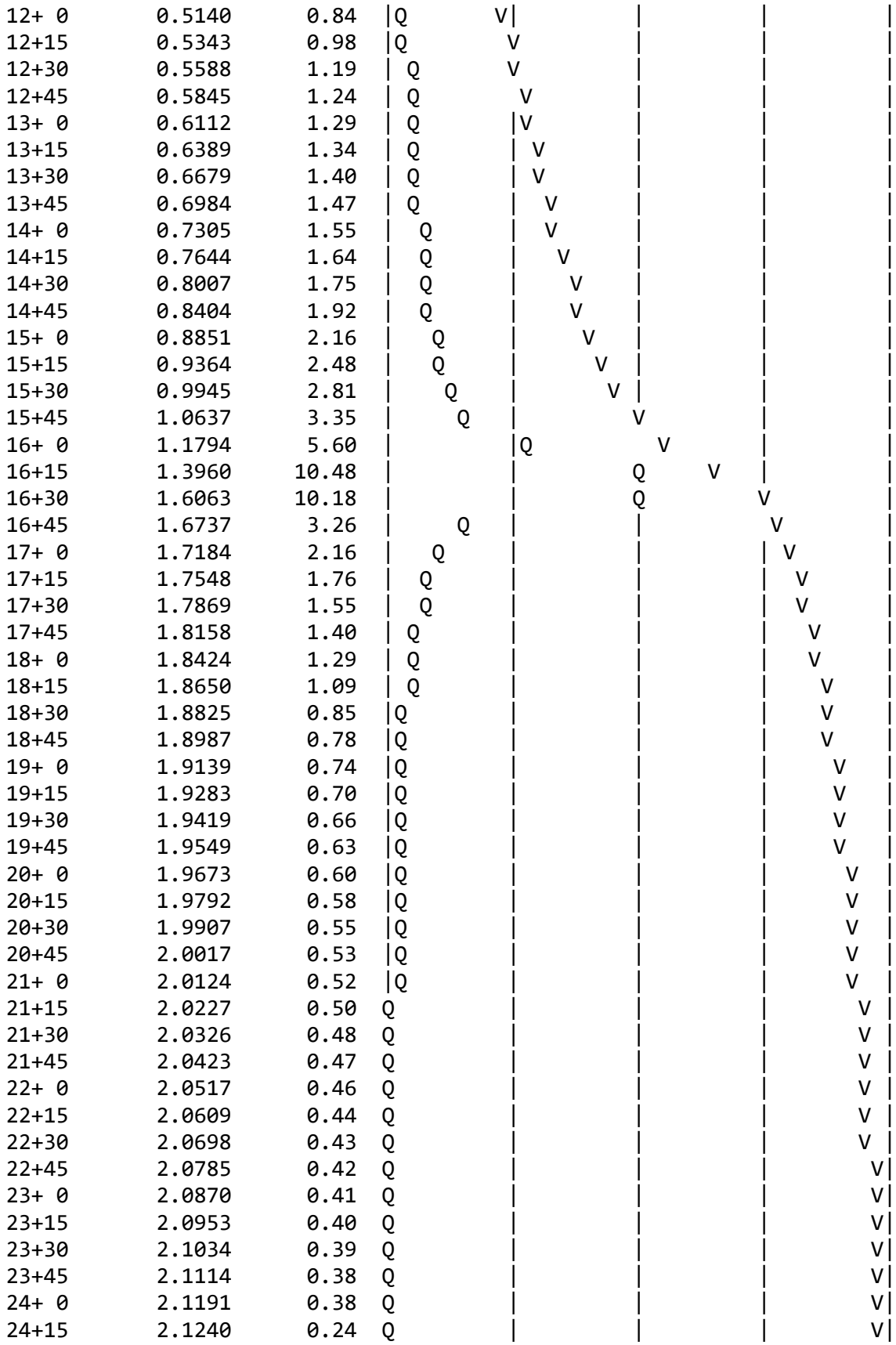
Total soil rain loss = 0.82(In)
Total effective rainfall = 3.67(In)
Peak flow rate in flood hydrograph = 10.48(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+15	0.0028	0.13	Q	|	|	|	|
0+30	0.0101	0.35	Q	|	|	|	|
0+45	0.0178	0.37	Q	|	|	|	|
1+ 0	0.0256	0.38	Q	|	|	|	|
1+15	0.0334	0.38	Q	|	|	|	|
1+30	0.0414	0.38	Q	|	|	|	|
1+45	0.0494	0.39	Q	|	|	|	|
2+ 0	0.0575	0.39	QV	|	|	|	|
2+15	0.0657	0.40	QV	|	|	|	|
2+30	0.0741	0.40	QV	|	|	|	|
2+45	0.0825	0.41	QV	|	|	|	|
3+ 0	0.0910	0.41	QV	|	|	|	|
3+15	0.0996	0.42	QV	|	|	|	|
3+30	0.1083	0.42	Q V	|	|	|	|
3+45	0.1171	0.43	Q V	|	|	|	|
4+ 0	0.1260	0.43	Q V	|	|	|	|
4+15	0.1351	0.44	Q V	|	|	|	|
4+30	0.1443	0.44	Q V	|	|	|	|
4+45	0.1536	0.45	Q V	|	|	|	|
5+ 0	0.1630	0.46	Q V	|	|	|	|
5+15	0.1726	0.46	Q V	|	|	|	|
5+30	0.1823	0.47	Q V	|	|	|	|
5+45	0.1921	0.48	Q V	|	|	|	|
6+ 0	0.2021	0.48	Q V	|	|	|	|
6+15	0.2123	0.49	Q V	|	|	|	|
6+30	0.2226	0.50	Q V	|	|	|	|
6+45	0.2331	0.51	|Q V	|	|	|	|
7+ 0	0.2438	0.52	|Q V	|	|	|	|
7+15	0.2546	0.53	|Q V	|	|	|	|
7+30	0.2657	0.53	|Q V	|	|	|	|
7+45	0.2769	0.54	|Q V	|	|	|	|
8+ 0	0.2884	0.56	|Q V	|	|	|	|
8+15	0.3001	0.57	|Q V	|	|	|	|
8+30	0.3120	0.58	|Q V	|	|	|	|
8+45	0.3242	0.59	|Q V	|	|	|	|
9+ 0	0.3367	0.60	|Q V	|	|	|	|
9+15	0.3494	0.62	|Q V	|	|	|	|
9+30	0.3624	0.63	|Q V	|	|	|	|
9+45	0.3757	0.65	|Q V	|	|	|	|
10+ 0	0.3894	0.66	|Q V	|	|	|	|
10+15	0.4034	0.68	|Q V	|	|	|	|
10+30	0.4178	0.70	|Q V	|	|	|	|
10+45	0.4326	0.72	|Q V	|	|	|	|
11+ 0	0.4479	0.74	|Q V	|	|	|	|
11+15	0.4636	0.76	|Q V	|	|	|	|
11+30	0.4798	0.79	|Q V	|	|	|	|
11+45	0.4966	0.81	|Q V	|	|	|	|


12+ 0 0.5140 0.84
12+15 0.5343 0.98
12+30 0.5588 1.19
12+45 0.5845 1.24
13+ 0 0.6112 1.29
13+15 0.6389 1.34
13+30 0.6679 1.40
13+45 0.6984 1.47
14+ 0 0.7305 1.55
14+15 0.7644 1.64
14+30 0.8007 1.75
14+45 0.8404 1.92
15+ 0 0.8851 2.16
15+15 0.9364 2.48
15+30 0.9945 2.81
15+45 1.0637 3.35
16+ 0 1.1794 5.60
16+15 1.3960 10.48
16+30 1.6063 10.18
16+45 1.6737 3.26
17+ 0 1.7184 2.16
17+15 1.7548 1.76
17+30 1.7869 1.55
17+45 1.8158 1.40
18+ 0 1.8424 1.29
18+15 1.8650 1.09
18+30 1.8825 0.85
18+45 1.8987 0.78
19+ 0 1.9139 0.74
19+15 1.9283 0.70
19+30 1.9419 0.66
19+45 1.9549 0.63
20+ 0 1.9673 0.60
20+15 1.9792 0.58
20+30 1.9907 0.55
20+45 2.0017 0.53
21+ 0 2.0124 0.52
21+15 2.0227 0.50
21+30 2.0326 0.48
21+45 2.0423 0.47
22+ 0 2.0517 0.46
22+15 2.0609 0.44
22+30 2.0698 0.43
22+45 2.0785 0.42
23+ 0 2.0870 0.41
23+15 2.0953 0.40
23+30 2.1034 0.39
23+45 2.1114 0.38
24+ 0 2.1191 0.38
24+15 2.1240 0.24

```
   24+30       2.1243      0.01  Q         |         |         |        V|
-----------------------------------------------------------------------------
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DA2 DMA2

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PreDA22.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Pre 25 Year Unit Hydrograph
DA2 DMA2

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	8.9	1.00	A	0.400	0.180	0.072

Area-averaged adjusted loss rate Fm (In/Hr) = 0.072

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
1.60	0.180	32.0	32.0	21.25	0.001
7.28	0.820	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.777
Area-averaged low loss fraction, Yb = 0.223
++

User entry of time of concentration = 0.170 (hours)
Watershed area = 8.88(Ac.)
Catchment Lag time = 0.136 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 183.8235
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.072(In/Hr)
Average low loss rate fraction (Yb) = 0.223 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 8.88(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 35.80 (CFS))	
1	44.297	15.857
2	100.000	7.929

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6439	0.1038
2	0.8696	0.0661
3	1.0238	0.0474
4	1.1495	0.0396
5	1.2784	0.0413
6	1.3944	0.0375
7	1.5007	0.0345
8	1.5992	0.0321
9	1.6915	0.0301
10	1.7785	0.0285

11	1.8611	0.0271
12	1.9399	0.0259
13	2.0162	0.0251
14	2.0896	0.0241
15	2.1603	0.0233
16	2.2286	0.0225
17	2.2947	0.0218
18	2.3589	0.0212
19	2.4212	0.0206
20	2.4818	0.0200
21	2.5409	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7099	0.0182
25	2.7505	0.0134
26	2.7901	0.0131
27	2.8287	0.0128
28	2.8664	0.0125
29	2.9033	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0432	0.0112
34	3.0765	0.0110
35	3.1091	0.0108
36	3.1412	0.0106
37	3.1727	0.0104
38	3.2037	0.0103
39	3.2341	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3226	0.0096
43	3.3512	0.0095
44	3.3794	0.0093
45	3.4071	0.0092
46	3.4345	0.0091
47	3.4615	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5404	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6655	0.0081
56	3.6896	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7604	0.0078
60	3.7835	0.0077

61	3.8064	0.0076
62	3.8290	0.0075
63	3.8514	0.0074
64	3.8735	0.0074
65	3.8954	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9811	0.0070
70	4.0020	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1237	0.0066
77	4.1434	0.0065
78	4.1629	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2205	0.0063
82	4.2394	0.0063
83	4.2582	0.0062
84	4.2768	0.0062
85	4.2953	0.0061
86	4.3136	0.0061
87	4.3318	0.0061
88	4.3499	0.0060
89	4.3678	0.0060
90	4.3856	0.0059
91	4.4033	0.0059
92	4.4209	0.0058
93	4.4383	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0038	0.0133
2	0.0173	0.0039	0.0134
3	0.0175	0.0039	0.0136
4	0.0176	0.0039	0.0137
5	0.0178	0.0040	0.0139
6	0.0180	0.0040	0.0140
7	0.0182	0.0041	0.0142
8	0.0184	0.0041	0.0143
9	0.0186	0.0042	0.0145

10	0.0188	0.0042	0.0146
11	0.0191	0.0043	0.0148
12	0.0193	0.0043	0.0150
13	0.0195	0.0044	0.0152
14	0.0198	0.0044	0.0154
15	0.0200	0.0045	0.0156
16	0.0203	0.0045	0.0158
17	0.0206	0.0046	0.0160
18	0.0208	0.0046	0.0162
19	0.0211	0.0047	0.0164
20	0.0214	0.0048	0.0166
21	0.0217	0.0048	0.0169
22	0.0221	0.0049	0.0171
23	0.0224	0.0050	0.0174
24	0.0227	0.0051	0.0177
25	0.0231	0.0052	0.0180
26	0.0235	0.0052	0.0182
27	0.0239	0.0053	0.0186
28	0.0243	0.0054	0.0189
29	0.0247	0.0055	0.0192
30	0.0252	0.0056	0.0196
31	0.0257	0.0057	0.0199
32	0.0261	0.0058	0.0203
33	0.0267	0.0060	0.0207
34	0.0272	0.0061	0.0211
35	0.0278	0.0062	0.0216
36	0.0284	0.0063	0.0221
37	0.0291	0.0065	0.0226
38	0.0297	0.0066	0.0231
39	0.0305	0.0068	0.0237
40	0.0313	0.0070	0.0243
41	0.0321	0.0072	0.0250
42	0.0330	0.0074	0.0256
43	0.0340	0.0076	0.0264
44	0.0350	0.0078	0.0272
45	0.0362	0.0081	0.0281
46	0.0373	0.0083	0.0290
47	0.0387	0.0086	0.0301
48	0.0401	0.0089	0.0312
49	0.0552	0.0123	0.0429
50	0.0570	0.0127	0.0443
51	0.0593	0.0132	0.0460
52	0.0616	0.0137	0.0478
53	0.0644	0.0144	0.0500
54	0.0673	0.0150	0.0523
55	0.0710	0.0158	0.0552
56	0.0750	0.0167	0.0583
57	0.0792	0.0177	0.0615
58	0.0850	0.0180	0.0670
59	0.0930	0.0180	0.0750

60	0.1027	0.0180	0.0847
61	0.1174	0.0180	0.0994
62	0.1243	0.0180	0.1063
63	0.1646	0.0180	0.1466
64	0.3181	0.0180	0.3001
65	0.5411	0.0180	0.5231
66	0.1289	0.0180	0.1109
67	0.1014	0.0180	0.0834
68	0.0842	0.0180	0.0662
69	0.0744	0.0166	0.0578
70	0.0669	0.0149	0.0520
71	0.0612	0.0137	0.0476
72	0.0568	0.0127	0.0441
73	0.0399	0.0089	0.0310
74	0.0372	0.0083	0.0289
75	0.0348	0.0078	0.0271
76	0.0329	0.0073	0.0255
77	0.0312	0.0069	0.0242
78	0.0296	0.0066	0.0230
79	0.0283	0.0063	0.0220
80	0.0271	0.0061	0.0211
81	0.0261	0.0058	0.0203
82	0.0251	0.0056	0.0195
83	0.0242	0.0054	0.0188
84	0.0234	0.0052	0.0182
85	0.0227	0.0051	0.0176
86	0.0220	0.0049	0.0171
87	0.0214	0.0048	0.0166
88	0.0208	0.0046	0.0162
89	0.0202	0.0045	0.0157
90	0.0197	0.0044	0.0153
91	0.0193	0.0043	0.0150
92	0.0188	0.0042	0.0146
93	0.0184	0.0041	0.0143
94	0.0180	0.0040	0.0140
95	0.0176	0.0039	0.0137
96	0.0172	0.0038	0.0134

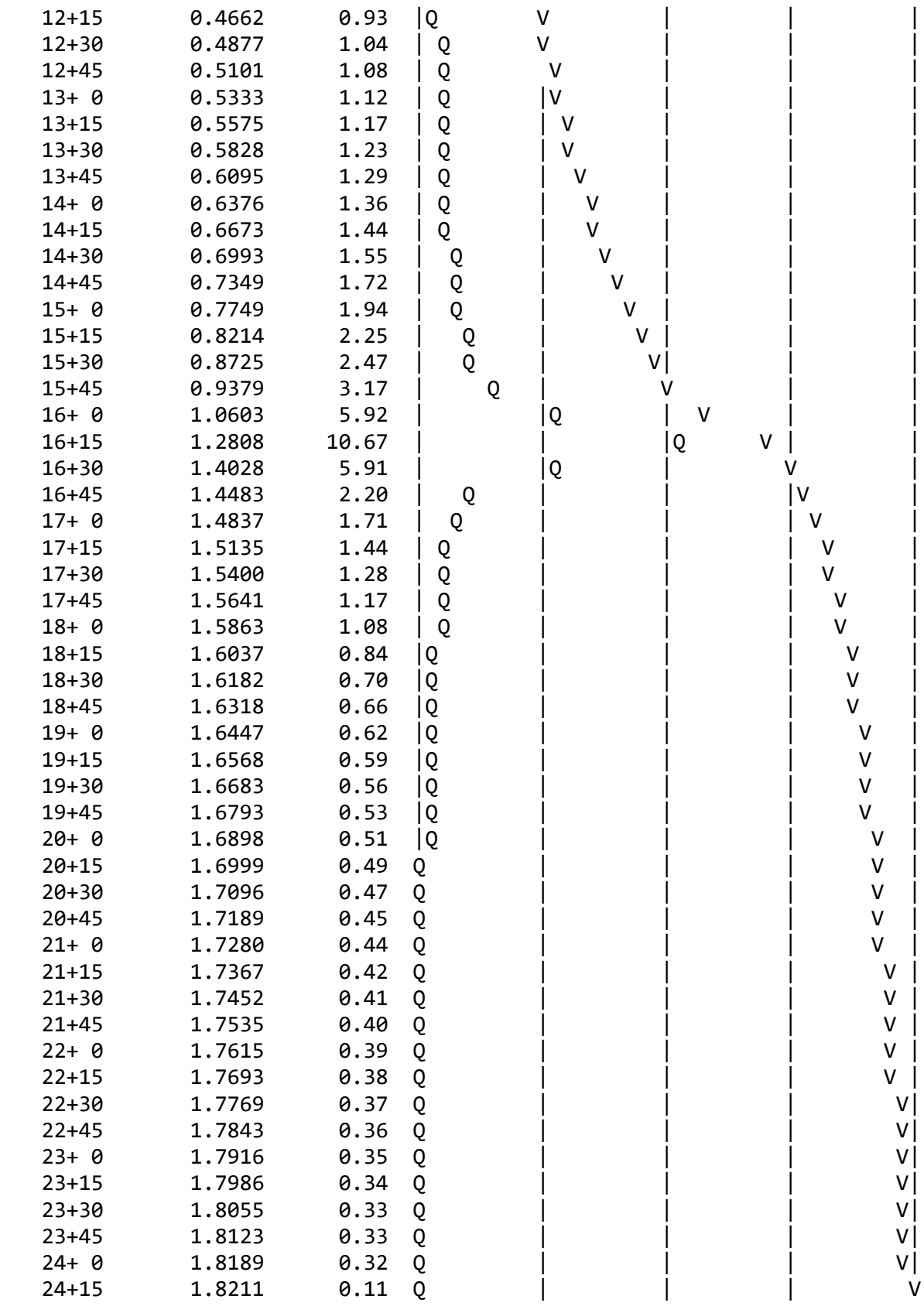
Total soil rain loss = 0.78(In)
Total effective rainfall = 3.71(In)
Peak flow rate in flood hydrograph = 10.67(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+15	0.0044	0.21	Q				
0+30	0.0109	0.32	Q				
0+45	0.0176	0.32	Q				
1+ 0	0.0243	0.32	Q				
1+15	0.0311	0.33	Q				
1+30	0.0379	0.33	Q				
1+45	0.0448	0.34	Q				
2+ 0	0.0519	0.34	QV				
2+15	0.0589	0.34	QV				
2+30	0.0661	0.35	QV				
2+45	0.0734	0.35	QV				
3+ 0	0.0807	0.36	QV				
3+15	0.0881	0.36	QV				
3+30	0.0956	0.36	Q V				
3+45	0.1033	0.37	Q V				
4+ 0	0.1110	0.37	Q V				
4+15	0.1188	0.38	Q V				
4+30	0.1267	0.38	Q V				
4+45	0.1347	0.39	Q V				
5+ 0	0.1429	0.39	Q V				
5+15	0.1512	0.40	Q V				
5+30	0.1595	0.41	Q V				
5+45	0.1681	0.41	Q V				
6+ 0	0.1767	0.42	Q V				
6+15	0.1855	0.42	Q V				
6+30	0.1944	0.43	Q V				
6+45	0.2035	0.44	Q V				
7+ 0	0.2127	0.45	Q V				
7+15	0.2221	0.45	Q V				
7+30	0.2316	0.46	Q V				
7+45	0.2414	0.47	Q V				
8+ 0	0.2513	0.48	Q V				
8+15	0.2614	0.49	Q V				
8+30	0.2717	0.50	Q V				
8+45	0.2823	0.51	|Q V				
9+ 0	0.2931	0.52	|Q V				
9+15	0.3041	0.53	|Q V				
9+30	0.3154	0.55	|Q V				
9+45	0.3269	0.56	|Q V				
10+ 0	0.3388	0.57	|Q V				
10+15	0.3509	0.59	|Q V				
10+30	0.3634	0.60	|Q V				
10+45	0.3763	0.62	|Q V				
11+ 0	0.3895	0.64	|Q V				
11+15	0.4032	0.66	|Q V				
11+30	0.4173	0.68	|Q V				
11+45	0.4319	0.71	|Q V				
12+ 0	0.4470	0.73	|Q V				



DA3 DMA1

U n i t H y d r o g r a p h A n a l y s i s

Study date 07/04/20 File Name 2019285PreDA3.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6277

2019-285 6400 Katella Avenue
Pre 25 Year Unit Hydrograph
DA3 DMA1

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
67.0	1.6	1.00	A	0.400	0.850	0.340

Area-averaged adjusted loss rate Fm (In/Hr) = 0.340

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
1.38	0.850	67.0	67.0	4.93	0.325
0.24	0.150	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.418
Area-averaged low loss fraction, Yb = 0.582
++

User entry of time of concentration = 0.240 (hours)
Watershed area = 1.62(Ac.)
Catchment Lag time = 0.192 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 130.2083
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.340(In/Hr)
Average low loss rate fraction (Yb) = 0.582 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 1.62(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.400(In)
30-minute factor = 1.000 Adjusted rainfall = 0.870(In)
1-hour factor = 1.000 Adjusted rainfall = 1.150(In)
3-hour factor = 1.000 Adjusted rainfall = 1.940(In)
6-hour factor = 1.000 Adjusted rainfall = 2.710(In)
24-hour factor = 1.000 Adjusted rainfall = 4.490(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 6.53 (CFS))	
1	27.757	1.813
2	91.522	4.164
3	100.000	0.554

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6441	0.1039
2	0.8699	0.0661
3	1.0242	0.0474
4	1.1499	0.0396
5	1.2788	0.0413
6	1.3947	0.0374
7	1.5009	0.0345
8	1.5994	0.0321
9	1.6917	0.0301

10	1.7787	0.0285
11	1.8613	0.0271
12	1.9400	0.0258
13	2.0163	0.0251
14	2.0897	0.0241
15	2.1604	0.0233
16	2.2287	0.0225
17	2.2948	0.0218
18	2.3589	0.0212
19	2.4213	0.0206
20	2.4819	0.0200
21	2.5410	0.0195
22	2.5986	0.0191
23	2.6549	0.0186
24	2.7100	0.0182
25	2.7506	0.0134
26	2.7902	0.0131
27	2.8288	0.0128
28	2.8665	0.0125
29	2.9034	0.0122
30	2.9394	0.0119
31	2.9747	0.0117
32	3.0093	0.0115
33	3.0433	0.0112
34	3.0765	0.0110
35	3.1092	0.0108
36	3.1412	0.0106
37	3.1727	0.0104
38	3.2037	0.0103
39	3.2342	0.0101
40	3.2641	0.0099
41	3.2936	0.0098
42	3.3227	0.0096
43	3.3512	0.0095
44	3.3794	0.0093
45	3.4072	0.0092
46	3.4346	0.0091
47	3.4616	0.0090
48	3.4882	0.0088
49	3.5145	0.0087
50	3.5405	0.0086
51	3.5661	0.0085
52	3.5914	0.0084
53	3.6164	0.0083
54	3.6411	0.0082
55	3.6655	0.0081
56	3.6897	0.0080
57	3.7135	0.0079
58	3.7371	0.0078
59	3.7605	0.0078

60	3.7836	0.0077
61	3.8064	0.0076
62	3.8290	0.0075
63	3.8514	0.0074
64	3.8736	0.0074
65	3.8955	0.0073
66	3.9172	0.0072
67	3.9387	0.0071
68	3.9600	0.0071
69	3.9812	0.0070
70	4.0021	0.0070
71	4.0228	0.0069
72	4.0433	0.0068
73	4.0637	0.0068
74	4.0839	0.0067
75	4.1039	0.0067
76	4.1238	0.0066
77	4.1434	0.0065
78	4.1630	0.0065
79	4.1823	0.0064
80	4.2015	0.0064
81	4.2206	0.0063
82	4.2395	0.0063
83	4.2582	0.0062
84	4.2768	0.0062
85	4.2953	0.0061
86	4.3137	0.0061
87	4.3319	0.0061
88	4.3499	0.0060
89	4.3679	0.0060
90	4.3857	0.0059
91	4.4034	0.0059
92	4.4209	0.0058
93	4.4384	0.0058
94	4.4557	0.0058
95	4.4729	0.0057
96	4.4900	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0171	0.0100	0.0071
2	0.0173	0.0101	0.0072
3	0.0175	0.0102	0.0073
4	0.0176	0.0103	0.0074
5	0.0178	0.0104	0.0075
6	0.0180	0.0105	0.0075
7	0.0182	0.0106	0.0076
8	0.0184	0.0107	0.0077

9	0.0186	0.0108	0.0078
10	0.0188	0.0110	0.0079
11	0.0191	0.0111	0.0080
12	0.0193	0.0112	0.0081
13	0.0195	0.0114	0.0082
14	0.0198	0.0115	0.0083
15	0.0200	0.0117	0.0084
16	0.0203	0.0118	0.0085
17	0.0206	0.0120	0.0086
18	0.0208	0.0121	0.0087
19	0.0211	0.0123	0.0088
20	0.0214	0.0125	0.0090
21	0.0217	0.0127	0.0091
22	0.0221	0.0128	0.0092
23	0.0224	0.0130	0.0094
24	0.0227	0.0132	0.0095
25	0.0231	0.0135	0.0097
26	0.0235	0.0137	0.0098
27	0.0239	0.0139	0.0100
28	0.0243	0.0141	0.0102
29	0.0247	0.0144	0.0103
30	0.0252	0.0147	0.0105
31	0.0257	0.0149	0.0107
32	0.0261	0.0152	0.0109
33	0.0267	0.0155	0.0112
34	0.0272	0.0158	0.0114
35	0.0278	0.0162	0.0116
36	0.0284	0.0165	0.0119
37	0.0291	0.0169	0.0122
38	0.0297	0.0173	0.0124
39	0.0305	0.0178	0.0128
40	0.0313	0.0182	0.0131
41	0.0321	0.0187	0.0134
42	0.0330	0.0192	0.0138
43	0.0340	0.0198	0.0142
44	0.0350	0.0204	0.0146
45	0.0362	0.0210	0.0151
46	0.0373	0.0217	0.0156
47	0.0387	0.0225	0.0162
48	0.0401	0.0234	0.0168
49	0.0552	0.0321	0.0231
50	0.0570	0.0332	0.0238
51	0.0593	0.0345	0.0248
52	0.0616	0.0358	0.0257
53	0.0644	0.0375	0.0269
54	0.0673	0.0392	0.0281
55	0.0710	0.0413	0.0297
56	0.0750	0.0436	0.0313
57	0.0791	0.0461	0.0331
58	0.0850	0.0495	0.0355

59	0.0929	0.0541	0.0388
60	0.1027	0.0597	0.0429
61	0.1174	0.0683	0.0491
62	0.1243	0.0723	0.0519
63	0.1647	0.0850	0.0797
64	0.3182	0.0850	0.2332
65	0.5412	0.0850	0.4562
66	0.1289	0.0750	0.0539
67	0.1014	0.0590	0.0424
68	0.0842	0.0490	0.0352
69	0.0744	0.0433	0.0311
70	0.0669	0.0389	0.0280
71	0.0612	0.0356	0.0256
72	0.0568	0.0330	0.0237
73	0.0399	0.0232	0.0167
74	0.0372	0.0216	0.0155
75	0.0348	0.0203	0.0146
76	0.0329	0.0191	0.0137
77	0.0312	0.0181	0.0130
78	0.0296	0.0173	0.0124
79	0.0283	0.0165	0.0118
80	0.0271	0.0158	0.0113
81	0.0261	0.0152	0.0109
82	0.0251	0.0146	0.0105
83	0.0242	0.0141	0.0101
84	0.0234	0.0136	0.0098
85	0.0227	0.0132	0.0095
86	0.0220	0.0128	0.0092
87	0.0214	0.0124	0.0089
88	0.0208	0.0121	0.0087
89	0.0202	0.0118	0.0085
90	0.0197	0.0115	0.0082
91	0.0193	0.0112	0.0080
92	0.0188	0.0109	0.0079
93	0.0184	0.0107	0.0077
94	0.0180	0.0105	0.0075
95	0.0176	0.0102	0.0074
96	0.0172	0.0100	0.0072

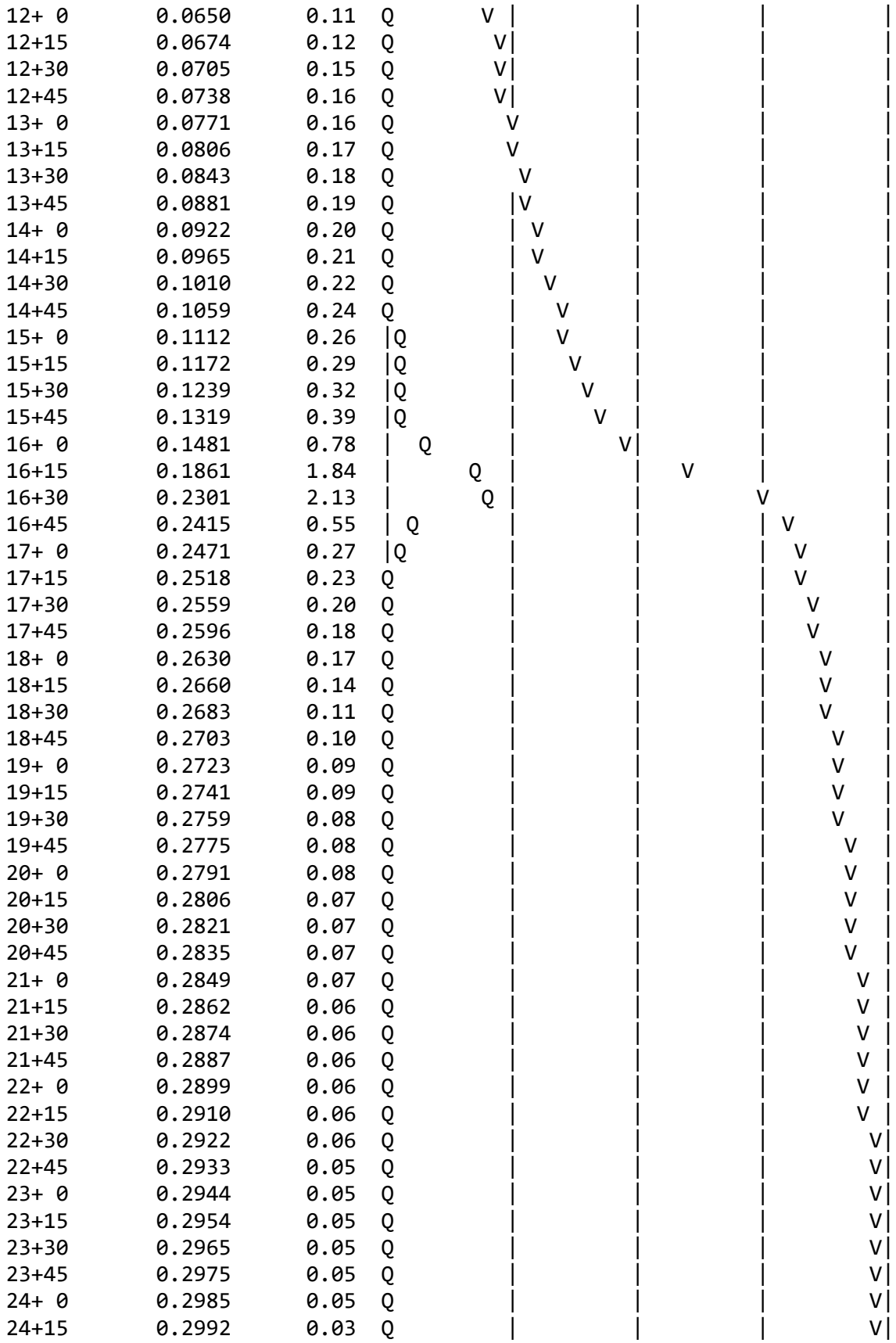
Total soil rain loss = 2.27(In)
Total effective rainfall = 2.22(In)
Peak flow rate in flood hydrograph = 2.13(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+15	0.0003	0.01	Q	|	|	|	|
0+30	0.0012	0.04	Q	|	|	|	|
0+45	0.0021	0.05	Q	|	|	|	|
1+ 0	0.0031	0.05	Q	|	|	|	|
1+15	0.0041	0.05	Q	|	|	|	|
1+30	0.0051	0.05	Q	|	|	|	|
1+45	0.0061	0.05	Q	|	|	|	|
2+ 0	0.0072	0.05	Q	|	|	|	|
2+15	0.0082	0.05	QV	|	|	|	|
2+30	0.0093	0.05	QV	|	|	|	|
2+45	0.0103	0.05	QV	|	|	|	|
3+ 0	0.0114	0.05	QV	|	|	|	|
3+15	0.0125	0.05	QV	|	|	|	|
3+30	0.0136	0.05	QV	|	|	|	|
3+45	0.0147	0.05	QV	|	|	|	|
4+ 0	0.0158	0.05	Q V	|	|	|	|
4+15	0.0170	0.06	Q V	|	|	|	|
4+30	0.0182	0.06	Q V	|	|	|	|
4+45	0.0193	0.06	Q V	|	|	|	|
5+ 0	0.0205	0.06	Q V	|	|	|	|
5+15	0.0217	0.06	Q V	|	|	|	|
5+30	0.0230	0.06	Q V	|	|	|	|
5+45	0.0242	0.06	Q V	|	|	|	|
6+ 0	0.0255	0.06	Q V	|	|	|	|
6+15	0.0268	0.06	Q V	|	|	|	|
6+30	0.0281	0.06	Q V	|	|	|	|
6+45	0.0294	0.06	Q V	|	|	|	|
7+ 0	0.0308	0.07	Q V	|	|	|	|
7+15	0.0321	0.07	Q V	|	|	|	|
7+30	0.0335	0.07	Q V	|	|	|	|
7+45	0.0350	0.07	Q V	|	|	|	|
8+ 0	0.0364	0.07	Q V	|	|	|	|
8+15	0.0379	0.07	Q V	|	|	|	|
8+30	0.0394	0.07	Q V	|	|	|	|
8+45	0.0410	0.07	Q V	|	|	|	|
9+ 0	0.0425	0.08	Q V	|	|	|	|
9+15	0.0441	0.08	Q V	|	|	|	|
9+30	0.0458	0.08	Q V	|	|	|	|
9+45	0.0475	0.08	Q V	|	|	|	|
10+ 0	0.0492	0.08	Q V	|	|	|	|
10+15	0.0510	0.09	Q V	|	|	|	|
10+30	0.0528	0.09	Q V	|	|	|	|
10+45	0.0547	0.09	Q V	|	|	|	|
11+ 0	0.0566	0.09	Q V	|	|	|	|
11+15	0.0586	0.10	Q V	|	|	|	|
11+30	0.0606	0.10	Q V	|	|	|	|
11+45	0.0628	0.10	Q V	|	|	|	|


12+ 0 0.0650 0.11
12+15 0.0674 0.12
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13+ 0 0.0771 0.16
13+15 0.0806 0.17
13+30 0.0843 0.18
13+45 0.0881 0.19
14+ 0 0.0922 0.20
14+15 0.0965 0.21
14+30 0.1010 0.22
14+45 0.1059 0.24
15+ 0 0.1112 0.26
15+15 0.1172 0.29
15+30 0.1239 0.32
15+45 0.1319 0.39
16+ 0 0.1481 0.78
16+15 0.1861 1.84
16+30 0.2301 2.13
16+45 0.2415 0.55
17+ 0 0.2471 0.27
17+15 0.2518 0.23
17+30 0.2559 0.20
17+45 0.2596 0.18
18+ 0 0.2630 0.17
18+15 0.2660 0.14
18+30 0.2683 0.11
18+45 0.2703 0.10
19+ 0 0.2723 0.09
19+15 0.2741 0.09
19+30 0.2759 0.08
19+45 0.2775 0.08
20+ 0 0.2791 0.08
20+15 0.2806 0.07
20+30 0.2821 0.07
20+45 0.2835 0.07
21+ 0 0.2849 0.07
21+15 0.2862 0.06
21+30 0.2874 0.06
21+45 0.2887 0.06
22+ 0 0.2899 0.06
22+15 0.2910 0.06
22+30 0.2922 0.06
22+45 0.2933 0.05
23+ 0 0.2944 0.05
23+15 0.2954 0.05
23+30 0.2965 0.05
23+45 0.2975 0.05
24+ 0 0.2985 0.05
24+15 0.2992 0.03

```
   24+30       0.2992      0.00  Q         |         |         |         V
-------------------------------------------------------------------------
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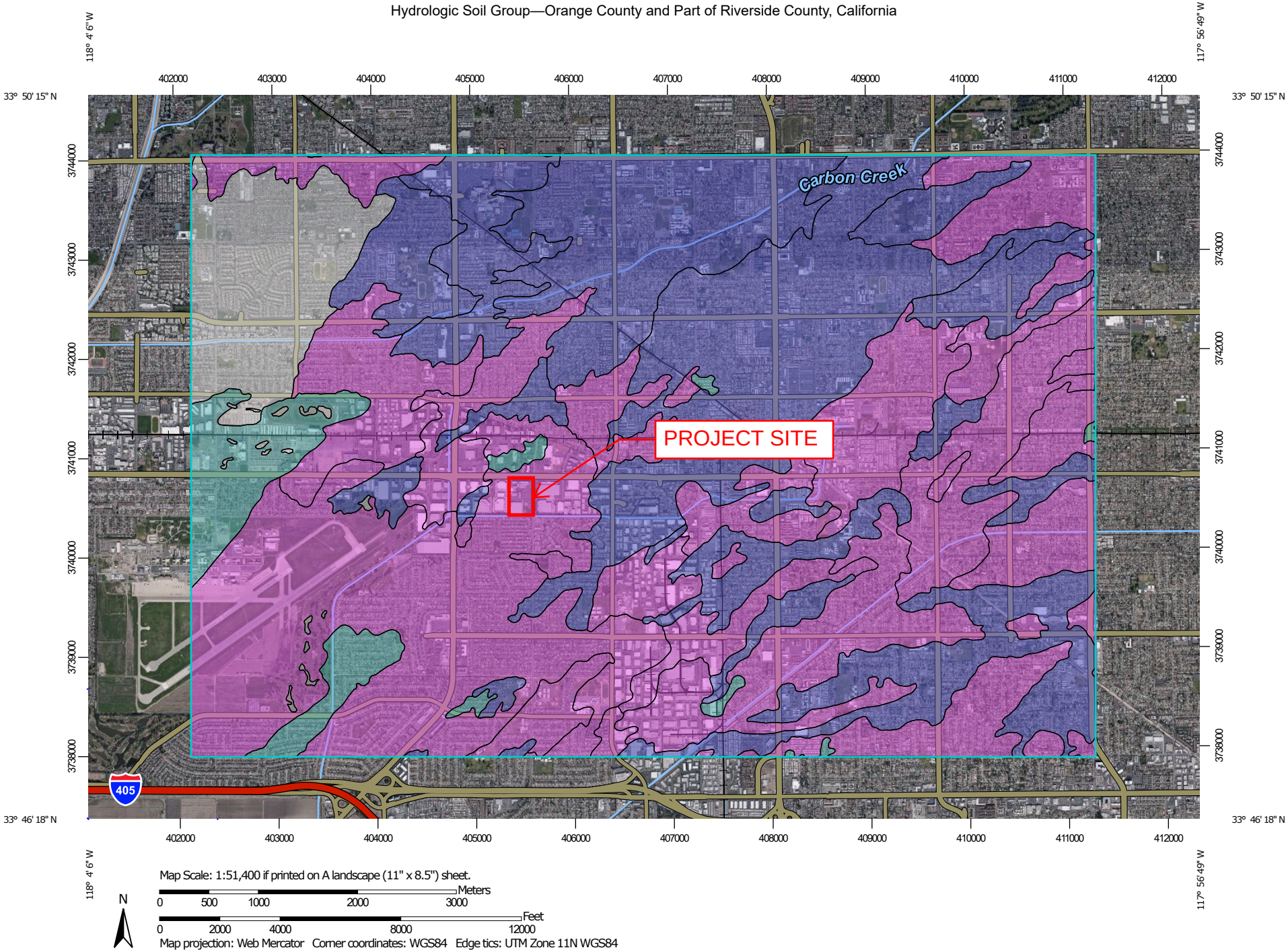
APPENDIX C

REFERENCE DOCUMENTS

SOILS MAP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Carbon Creek
PROJECT SITE
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N
Meters
0 500 1000 2000 3000
Feet
0 2000 4000 8000 12000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County and Part of Riverside County, California
Survey Area Data: Version 13, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 13, 2018—Jan 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
122	Bolsa silt loam	C	0.0	0.0%
123	Bolsa silt loam, drained	C	603.6	4.4%
158	Hueneme fine sandy loam, drained	A	4,006.7	29.1%
163	Metz loamy sand	B	3,498.9	25.4%
164	Metz loamy sand, moderately fine substratum	B	1,542.0	11.2%
166	Mocho loam, 0 to 2 percent slopes, warm MAAT, MLRA 19	B	228.6	1.7%
185	Pits		0.1	0.0%
194	San Emigdio fine sandy loam, 0 to 2 percent slopes	A	1,646.3	12.0%
196	San Emigdio fine sandy loam, moderately fine substratum, 0 to 2 percent slopes	A	1,372.3	10.0%
1000LA	Urban land-Metz-Pico complex, 0 to 2 percent slopes		839.8	6.1%
W	Water		24.8	0.2%
Totals for Area of Interest			**13,763.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

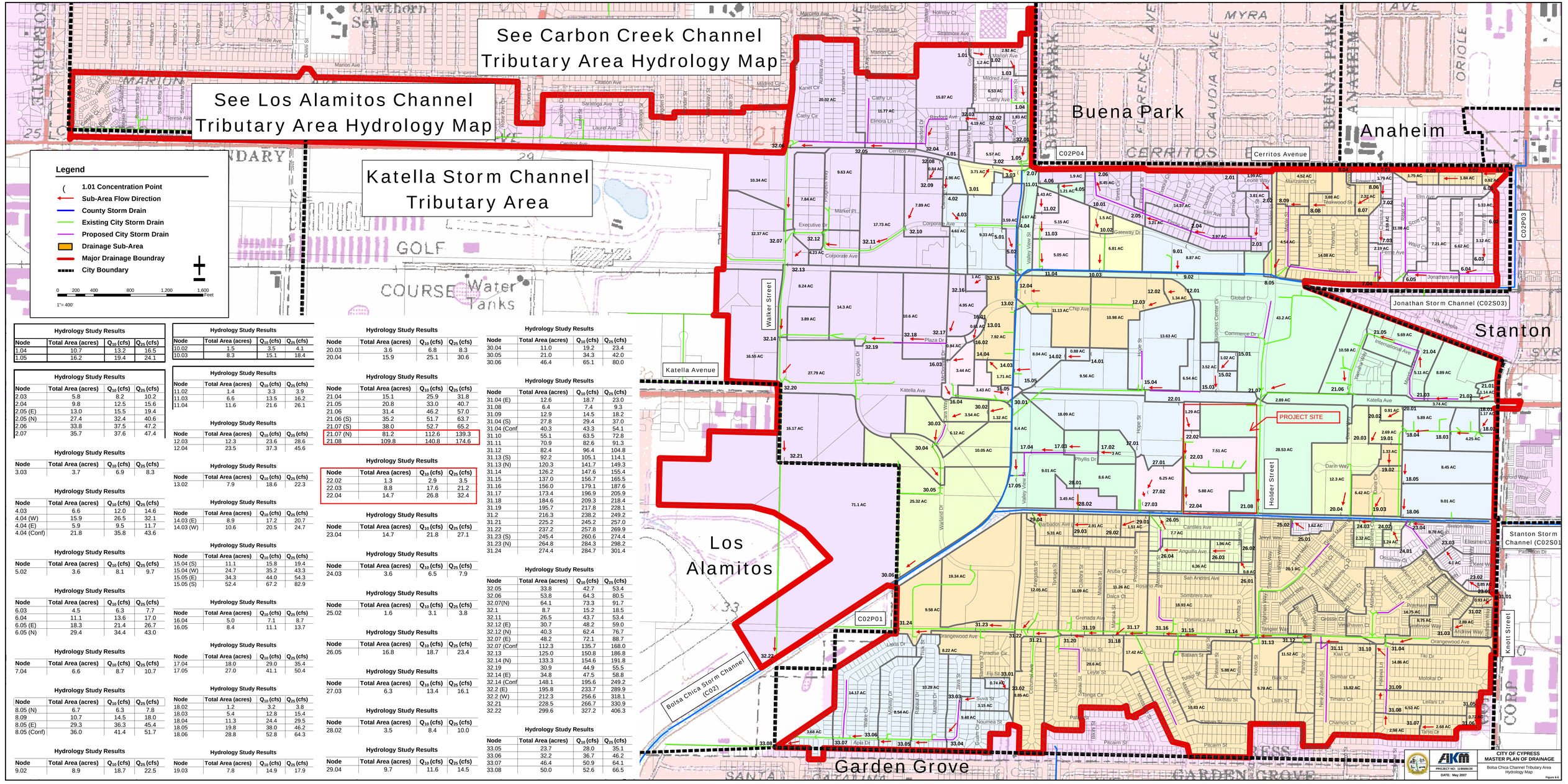
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

MASTER PLAN OF DRAINAGE



Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
1.04	10.7	13.2	16.5
1.05	16.2	19.4	24.1

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
2.03	5.8	8.2	10.2
2.04	9.8	12.5	15.6
2.05 (E)	13.0	15.5	19.4
2.05 (N)	27.4	32.4	40.6
2.06	33.8	37.5	47.2
2.07	35.7	37.6	47.4

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
3.03	3.7	6.9	8.3

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
4.03	6.6	12.0	14.6
4.04 (W)	15.9	26.5	32.1
4.04 (E)	5.9	9.5	11.7
4.04 (Conf)	21.8	35.8	43.6

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
5.02	3.6	8.1	9.7

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
6.03	4.5	6.3	7.7
6.04	11.1	13.6	17.0
6.05 (E)	18.3	21.4	26.7
6.05 (N)	29.4	34.4	43.0

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
7.04	6.6	8.7	10.7

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
8.05 (N)	6.7	6.3	7.8
8.09	10.7	14.5	18.0
8.05 (E)	29.3	36.3	45.4
8.05 (Conf)	36.0	41.4	51.7

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
9.02	8.9	18.7	22.5

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
10.02	1.5	3.5	4.1
10.03	8.3	15.1	18.4

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
11.02	1.4	3.3	3.9
11.03	6.6	13.5	16.2
11.04	11.6	21.6	26.1

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
12.03	12.3	23.6	28.6
12.04	23.5	37.3	45.6

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
13.02	7.9	18.6	22.3

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
14.03 (E)	8.9	17.2	20.7
14.03 (W)	10.6	20.5	24.7

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
15.04 (S)	11.1	15.8	19.4
15.04 (W)	24.7	35.2	43.3
15.05 (E)	34.3	44.0	54.3
15.05 (S)	52.4	67.2	82.9

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
16.04	5.0	7.1	8.7
16.05	8.4	11.1	13.7

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
17.04	18.0	29.0	35.4
17.05	27.0	41.1	50.4

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
18.02	1.2	3.2	3.8
18.03	5.4	12.8	15.4
18.04	11.3	24.4	29.5
18.05	19.8	38.0	46.2
18.06	28.8	52.8	64.3

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
19.03	7.8	14.9	17.9

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
20.03	3.6	6.8	8.3
20.04	15.9	25.1	30.6

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
21.04	15.1	25.9	31.8
21.05	20.8	33.0	40.7
21.06	31.4	46.2	57.0
21.06 (S)	35.2	51.7	63.7
21.07 (S)	38.0	52.7	65.2
21.07 (N)	81.2	112.6	139.3
21.08	109.8	140.8	174.6

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
22.02	1.3	2.9	3.5
22.03	8.8	17.6	21.2
22.04	14.7	26.8	32.4

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
23.04	14.7	21.8	27.1

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
24.03	3.6	6.5	7.9

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
25.02	1.6	3.1	3.8

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
26.05	16.8	18.7	23.4

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
27.03	6.3	13.4	16.1

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
28.02	3.5	8.4	10.0

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
29.04	9.7	11.6	14.5

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
30.04	11.0	19.2	23.4
30.05	21.0	34.3	42.0
30.06	46.4	65.1	80.0

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
31.04 (E)	12.6	18.7	23.0
31.08	6.4	7.4	9.3
31.09	12.9	14.5	18.2
31.04 (S)	27.8	29.4	37.0
31.04 (Conf	40.3	43.3	54.1
31.10	55.1	63.5	72.8
31.11	70.9	82.6	91.3
31.12	82.4	96.4	104.8
31.13 (S)	92.2	105.1	114.1
31.13 (N)	120.3	141.7	149.3
31.14	126.2	147.6	155.4
31.15	137.0	156.7	165.5
31.16	156.0	179.1	187.6
31.17	173.4	196.9	205.9
31.18	184.6	209.3	218.4
31.19	195.7	217.8	228.1
31.2	216.3	238.2	249.2
31.21	225.2	245.2	257.0
31.22	237.2	257.8	269.9
31.23 (S)	245.4	260.6	274.4
31.23 (N)	264.8	284.3	298.2
31.24	274.4	284.7	301.4

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
32.05	33.8	42.7	53.4
32.06	53.8	64.3	80.5
32.07(N)	64.1	73.3	91.7
32.1	8.7	15.2	18.5
32.11	26.5	43.7	53.4
32.12 (E)	30.7	48.2	59.0
32.12 (N)	40.3	62.4	76.7
32.07 (E)	48.2	72.1	88.7
32.07 (Conf	112.3	135.7	168.0
32.13	125.0	150.8	186.8
32.14 (N)	133.3	154.6	191.8
32.19	30.9	44.9	55.5
32.14 (E)	34.8	47.5	58.8
32.14 (Conf	148.1	195.6	249.2
32.2 (E)	195.8	233.7	289.9
32.2 (W)	212.3	256.6	318.1
32.21	228.5	266.7	330.9
32.22	299.6	327.2	406.3

Hydrology Study Results

Node	Total Area (acres)	Q_{10} (cfs)	Q_{25} (cfs)
33.05	23.7	28.0	35.1
33.06	32.2	36.7	46.2
33.07	46.4	50.9	64.1
33.08	50.0	52.6	66.5

CITY OF CYPRESS
MASTER PLAN OF DRAINAGE

Bolsa Chica Channel Tributary Area Hydrology Map

PROJECT NO: 110084.00
DATE: May 2007

Figure 6-6

FLOW CAPACITY OF 42" STORM DRAIN

Capacity of Existing 42" RCP

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Normal Depth	3.50	ft
Diameter	3.50	ft
Discharge	71.14	ft³/s

Results

Discharge	71.14	ft³/s
Normal Depth	3.50	ft
Flow Area	9.62	ft²
Wetted Perimeter	11.00	ft
Hydraulic Radius	0.88	ft
Top Width	0.00	ft
Critical Depth	2.64	ft
Percent Full	100.0	%
Critical Slope	0.00592	ft/ft
Velocity	7.39	ft/s
Velocity Head	0.85	ft
Specific Energy	4.35	ft
Froude Number	0.00	
Maximum Discharge	76.52	ft³/s
Discharge Full	71.14	ft³/s
Slope Full	0.00500	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Capacity of Existing 42" RCP

GVF Output Data

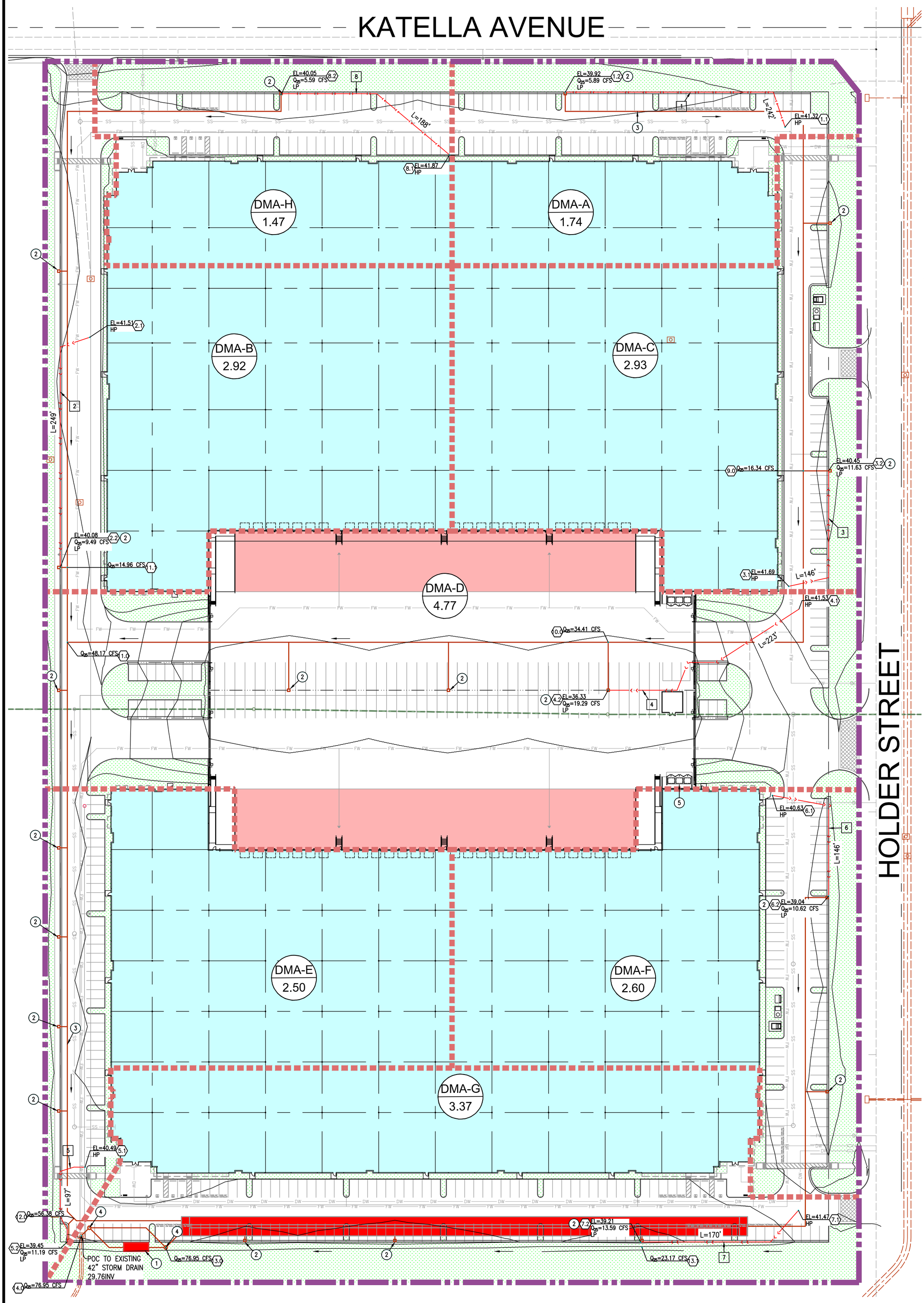
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.50	ft
Critical Depth	2.64	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00592	ft/ft

APPENDIX D

HYDROLOGY EXHIBITS

POST-DEVELOPMENT CONDITION

CITY OF CYPRESS
WQMP EXHIBIT



LEGEND:

- DRAINAGE AREA BOUNDARY
- SUB-DRAINAGE AREA BOUNDARY
- STORM DRAIN
- LONGEST FLOW PATH
- LANDSCAPE AREA
- MODULAR WETLAND SYSTEM
- A / X-XX — DRAINAGE SUB AREA DESIGNATION / AREA (AC)
- 3.10 — NODE (US/DS)
- 3 — STREAM #
- HP, LP — HIGH POINT, LOW POINT
- STORM DRAIN FLOW DIRECTION

HYDROLOGY INFORMATION

SITE AREA:	22.3 ACRE
SOIL TYPE:	B
IMPERVIOUS:	86% (PER CALCULATIONS)
ISOHYETALS	0.85" (85TH PERCENTILE)
	2.05" (2 YEAR)
FREQUENCY:	25 YEAR
METHOD:	ORANGE COUNTY HYDROLOGY MANUAL

50 0 50 100
scale 1"= 50' feet

HYDROLOGY SUMMARY (25-YEAR)

DRAINAGE AREA No.	DRAINAGE SUB-AREA	BMP TYPE	TRIBUTARY AREA (SF)	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	VOLUME (CF)
DA1	DMA-A	MODULAR WETLAND SYSTEM UNDERGROUND DETENTION SYSTEM CATCH BASIN FILTER INSERTS	75,805	1.74	0.79	274,959
	DMA-B		127,357	2.92	0.94	
	DMA-C		127,691	2.93	0.88	
	DMA-D		207,784	4.77	0.89	
	DMA-E		108,881	2.50	0.92	
	DMA-F		113,140	2.60	0.86	
	DMA-G		146,939	3.37	0.76	
	DMA-H		64,033	1.47	0.80	

DRAINAGE NOTES:

1. PROP. LID DEVICE– MODULAR WETLAND SYSTEM
2. PROPOSED CATCH BASIN WITH FILTER INSERT
3. PROPOSED STORM DRAIN PIPE PRIVATE MAINTAINED
4. PROPOSED LIFT/PUMP STATION

NOTE:
1. ALL ON–SITE STORM DRAINS ARE PRIVATE STORM DRAIN SYSTEMS, NOT TO BE MAINTAINED BY THE CITY OF CYPRESS.
2. ALL ON–SITE BMP'S & UNDERGROUND DETENTION SYSTEM TO BE MAINTAINED BY OWNER

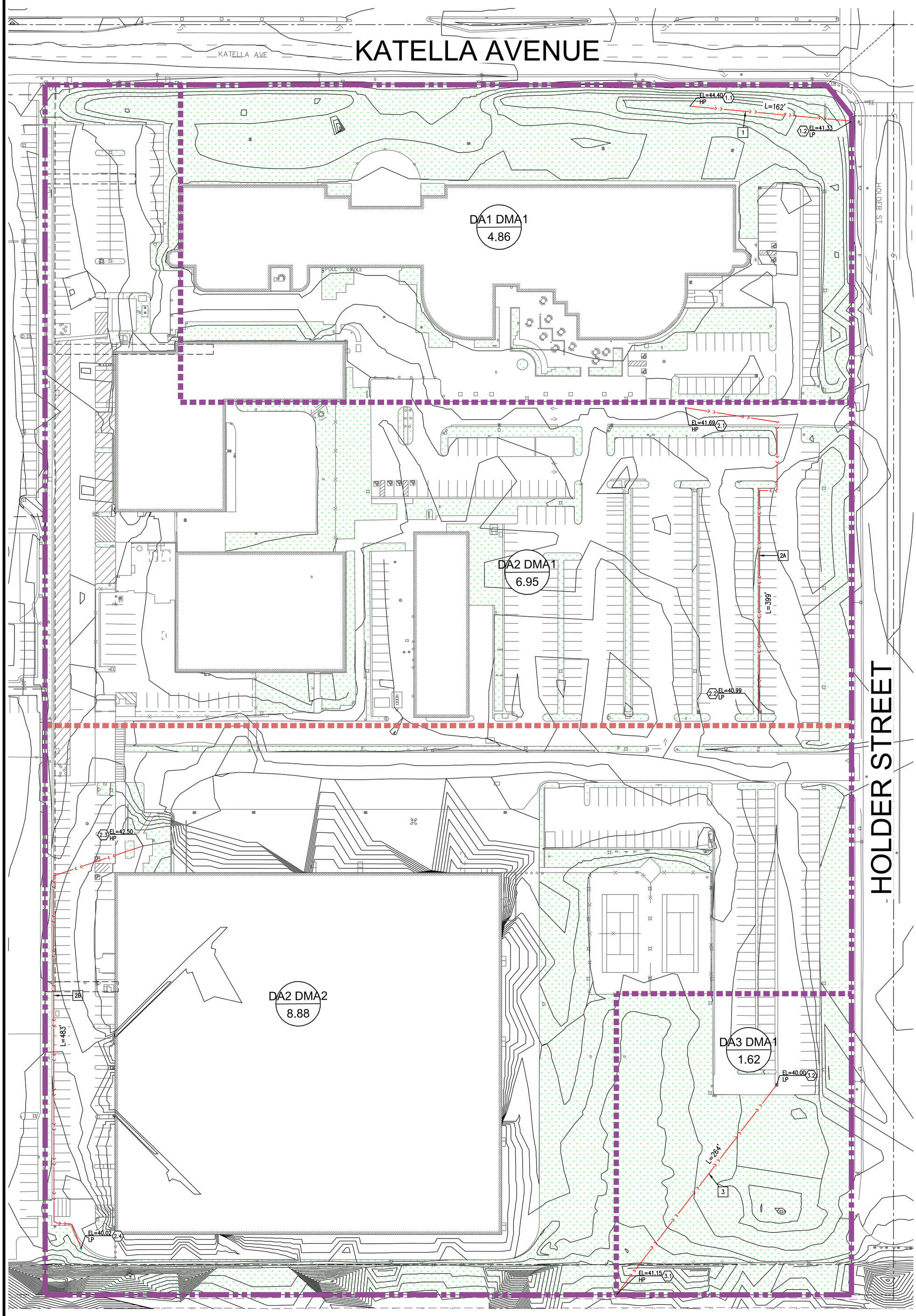
PREPARED BY:
WestLAND Group, Inc. Land Surveyors • Civil Engineers • GIS
4150 CONCOURS, ONTARIO, CA 91764
PHONE: (909) 989–9789 FAX: (909) 989–9660
JOB NO: 2018–131

KATELLA AVE INDUSTRIAL PROPOSED HYDROLOGY EXHIBIT

CITY OF CYPRESS

DATE: JUNE 2020
SHEET 1 OF 1

PRE-DEVELOPMENT CONDITION



LEGEND:

- DRAINAGE AREA BOUNDARY
- SUB-DRAINAGE AREA BOUNDARY
- LONGEST FLOW PATH
- LANDSCAPE AREA
- A / X-XX — DRAINAGE SUB AREA DESIGNATION / AREA (AC)
- 3.10 — NODE (US/DS)
- 3 — STREAM #
- HP, LP — HIGH POINT, LOW POINT

HYDROLOGY INFORMATION

SITE AREA:	23.3 ACRE	
SOIL TYPE:	B	
IMPERVIOUS:	72% (PER CALCULATIONS)	
ISOHYETALS	0.85"	(85TH PERCENTILE)
	2.05"	(2 YEAR)
FREQUENCY:	25 YEAR	
METHOD:	ORANGE COUNTY HYDROLOGY MANUAL	

HYDROLOGY SUMMARY

DRAINAGE AREA NO.	DRAINAGE SUB-AREA	TRIBUTARY AREA (SF)	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	VOLUME (CF)
DA1	DA1 DMA1	211,826	4.86	0.61	236,709
DA2	DA2 DMA1	302,640	6.95	0.81	
	DA2 DMA2	386,644	8.88	0.82	
DA3	DA3 DMA1	70,521	1.62	0.15	

N

50 0 50 100
scale 1"= 50' feet

PREPARED BY:
WestLAND Group, Inc. Land Surveyors • Civil Engineers • GIS
4150 CONCOURS, ONTARIO, CA 91764
PHONE: (909) 989-9789 FAX: (909) 989-9660
JOB NO: 2018-131

KATELLA AVE INDUSTRIAL EXISTING HYDROLOGY EXHIBIT

CITY OF CYPRESS

DATE: JUNE 2020
SHEET 1 OF 1