Snipes-Dye associates

HYDROLOGY REPORT

For

BRADLEY APARTMENT COMPLEX

1065 East Bradley Ave., El Cajon CA, 92021

County of San Diego

PDS2019-LDGRMJ-30236 / PDS2019-LDPIIP-60071

Applicant/Developer:
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EC5021

Dated: July 21, 2020

Revised: November 14, 2023

DECLARATION OF RESPONSIBLE CHARGE

I, HEREBY DECLARE THAT I AM THE CIVIL ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE COUNTY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITY FOR PROJECT DESIGN.

November 14, 2023

WILLIAM A. SNIPES
R.C.E. 50477
EXP. 06-30-25

Date

REGISTERED PROFESSIONAL ENGINEER
WILLIAM A. SNIPES
No. 50477
Exp. 06-30-25
CIVIL
STATE OF CALIFORNIA

HYDROLOGY REPORT
FOR
BRADLEY APARTMENT COMPLEX

The following hydrology and hydraulic calculations are prepared for the development of a 60-unit apartment complex project located on 1065-1069 East Bradley Avenue between N. 1st Street and N. Mollison Avenue in El Cajon, California. The subject site is known as Assessor's Parcel Numbers 388-331-04, 05 & 06, consisting of roughly 2.87 acres gross. The scope of work consists of the construction of the apartment complex, and the associated street improvements within the public right-of-way. The area of analysis for the drainage study is approximately 4.89 acres including the street improvements area and offsite surrounding areas upstream of the site.

PRE-DEVELOPMENT CONDITION: The existing site topography consists of a relatively flat to gently sloping site which houses a few commercial office buildings, an auto body shop garage and yard, sheds, and trailers surrounded predominantly by pervious dirt areas. The drainage analysis consists of two main drainage basins A and B. Drainage Basin A consists mainly of surface flows from the residential properties east of the subject site and the southerly three-quarters of the site travelling in a general southwest direction and discharging near the southwest corner of the site where the flow eventually makes its way onto the existing curb and gutter system on East Bradley Avenue. The 100-year peak discharge for Basin A is approximately 8.63 cfs. Drainage Basin B consists of surface flows from the residential properties east of the subject site and the northerly portion of the site travelling in a general west direction mainly along East Bradley Avenue. The 100-year peak discharge rate for Basin B is about 4.08 cfs. The total pre-development 100-year peak flow for the area of drainage analysis is 12.71 cfs.

The following table is a summary of the 100-year peak discharges for the pre-development condition:

		PRE-DEVELOPMENT 100-YR., 6-HR. STORM EVENT SUMMARY					
DRAINAGE BASIN		TIME OF CONCENTRATION "Tc" (MINUTES)	INTENSITY I (INCES/HR.)	NRCS HYDROLOGIC SOIL TYPE	RUNOFF FACTOR "C" (DECIMAL)	AREA A (ACRES)	DISCHARGE Q100 (CFS)
MAJOR	SUB-AREA						
A	A1	2.35	6.85	A	0.90	0.02	0.12
	A2	3.24	6.85	A	0.90	0.06	0.37
	A3	4.93	6.85	A	0.54	1.36	5.03
	A4	8.12	5.01	A & C	0.39	2.35	4.59
BASIN A SUMMARY		8.12	5.01	--	0.45	3.79	8.63
B	B1	1.85	6.85	A	0.90	0.02	0.12
	B2	2.77	6.85	A	0.67	0.37	1.70
	B3	4.06	6.85	A & C	0.47	0.70	2.25
BASIN B SUMMARY		4.06	6.85	--	0.55	1.09	4.08

POST-DEVELOPMENT CONDITION: The proposed development of the site will include the construction of a 60-unit apartment complex with a landscape common area, parking stalls, and a concrete paved driveway. The drainage patterns due to the development of the site will be similar to those in the current condition with the two major drainage basins A and B, being divided into sub-areas A1-A13 and B1-B7, respectively (as shown in attached Post-Development Drainage Map). Sub-areas A1 through A3 consist of runoff from the easterly neighboring properties and portions of North 1st Street that will flow into a new private standard type F catch basin just within the eastern edge of the site, where runoff will be directed into a proposed private 12" PVC storm drain system on the project site, bypassing the site and discharging at the southwest corner of the site onto a proposed rock rip-rap energy dissipator. The 100-year peak discharge for these sub-areas were calculated to be 5.61 cfs. Sub-area A4 consists of a proposed landscaped slope that runs parallel to the westerly property boundary, where runoff will enter the bypass system via a series of 6" atrium grates. The 100-year peak discharge for sub-area A4 was determined to be 0.14 cfs. Sub-areas A5 and A6 consist of surface flows from the majority of site (the central half of the site) that will be directed towards to a curb inlet type proprietary biofiltration system (Modular Wetlands System) for storm water quality treatment and then routed into an underground storage system (StormTank Modular System) for detention of the 100-year peak flows. The 100-yr. peak discharge draining into the curb inlet system is approximately of 7.31 cfs. The Modular Wetland System will gravity flow into a standard clean out with two outlets. One outlet will gravity flow into underground detention tank (Tank #1) for the 85th percentile storm events. The second outlet is gravity flow through a standpipe within the clean out which will divert all the Q100 flows to the second underground detention tank (Tank #2). Tank #2 will provide some detention, therefore reducing the discharge to 4.25 cfs. Sub-areas A7 through A12 comprised of the areas mainly along the east, south, and west of the site (approximately one-third of the project site) consist of surface flows that are directed into a proposed biofiltration basin located near the southwest corner of the site via concrete ditches. The 100-year peak discharge for these sub-areas was calculated to be approximately 2.61 cfs. The proposed biofiltration basin aside from providing storm water quality treatment, will also provide detention of the 100-year peak discharge. The peak discharge after mitigation will be 0.69 cfs and it will discharge onto the proposed rock rip-rap energy dissipator, confluencing with the discharges from sub-areas A1 through A6, and A13. Therefore, the total peak 100-year discharge for drainage basin A will be 7.13 cfs, which represents a 1.50 cfs reduction from the pre-developed condition. The runoff from drainage basin A will eventually be directed onto East Bradley Avenue approximately 100 feet west of the site through an existing pump system located on the neighboring mini-storage facility property as shown on County of San Diego drawing L0783 (a copy of the as-built drawing has been enclosed in the Drainage Maps section of this report).

Drainage Basin B consists of surface flows from the residential properties east of the subject site (sub-areas B1 through B3) travelling in a general west direction mainly along East Bradley Avenue and the northerly portion of the site (sub-areas B4 through B7) that eventually discharges onto East Bradley Avenue. The 100-year peak discharge from sub-areas B1 through B3 is approximately 3.58 cfs near the northwest corner of the site along East Bradley Avenue. Runoff from sub-areas B4 through B7 will surface flow in a general westerly direction into a proposed biofiltration basin located on the northwest corner of the site. The 100-year peak discharge tributary to the proposed biofiltration basin was determined to be 1.78 cfs. The proposed biofiltration basin was designed to provide storm water treatment as well as detention of the peak 100-year flow. The total mitigated 100-yr. peak discharge for sub-areas B4 through B7 after detention was determined to be 0.61 cfs. The mitigated runoff will outlet through a proposed curb outlet and confluence with the runoff from sub-areas B1 through B3 on East Bradley Avenue for a total 100-year peak discharge for drainage basin B of 3.79 cfs, which represents a decrease of 0.29 cfs from the current condition.

The following tables are the complete breakdown and summary of the 100-year peak discharges for the post-development condition:

		POST-DEVELOPMENT 100-YR., 6-HR. STORM EVENT SUMMARY						
DRAINAGE BASIN		TIME OF CONCENTRATION "Tc" (MINUTES)	INTENSITY "I" (INCES/HR.)	NRCS HYDROLOGIC SOIL TYPE	RUNOFF FACTOR "C" (DECIMAL)	AREA "A" (ACRES)	DISCHARGE Q100 (CFS)	MITIGATED DISCHARGE Q100 (CFS)
MAJOR	SUB-AREA							
A	A1	2.35	6.85	A	0.90	0.02	0.12	0.12
	A2	3.24	6.85	A	0.90	0.06	0.37	0.37
	A3	4.94	6.85	A	0.53	1.41	5.61	5.61
	A4	5.12	6.74	C	0.30	0.07	0.14	0.14
	A5	2.95	6.85	A	0.87	0.11	0.66	0.66
	A6	5.00	6.85	A & C	0.86	1.13	7.31	0.16
	A7	6.49	5.79	A	0.59	0.03	0.10	0.10
	A8	9.23	4.61	A	0.59	0.04	0.11	0.11
	A9	12.61	3.77	A	0.90	0.03	0.26	0.26
	A10	13.58	3.60	A	0.77	0.17	0.47	0.47
	A11	16.24	3.21	A & C	0.90	0.03	0.72	0.72
	A12	17.19	3.09	A & C	0.68	0.64	2.04	1.79
	A13	9.22	4.62	A & C	0.50	0.03	0.08	0.08
BASIN A SUMMARY		5.27	3.09	--	0.70	3.76	13.66	7.13
B	B1	1.85	6.85	A	0.90	0.02	0.12	0.12
	B2	2.77	6.85	A	0.67	0.37	1.70	1.70
	B3	3.78	6.85	A & C	0.83	0.31	1.76	1.76
	B4	3.72	6.85	A	0.72	0.05	0.25	0.25
	B5	5.12	6.74	A & C	0.74	0.14	0.70	0.70
	B6	5.17	6.70	C	0.87	0.12	0.70	0.70
	B7	6.55	5.76	C	0.55	0.12	0.38	0.38
BASIN B SUMMARY		3.78	5.74	--	0.74	1.13	4.79	3.79

	100-YEAR, 6-HOUR STORM EVENT SUMMARY												
	PRE-DEVELOPMENT						POST-DEVELOPMENT						
	TIME OF CONC. "Tc" (MINUTES)	INTENSITY I (INCHES/HR)	NRCS HYDROLOGIC SOIL TYPE	RUNOFF FACTOR "C" (DECIMAL)	AREA A (ACRES)	DISCHARGE Q100 (CFS)	TIME OF CONC. "Tc" (MINUTES)	INTENSITY I (INCHES/HR)	NRCS HYDROLOGIC SOIL TYPE	RUNOFF FACTOR "C" (DECIMAL)	AREA A (ACRES)	DISCHARGE Q100 (CFS)	MITIGATED DISCHARGE QMIT (CFS)
BASIN A	8.12	5.01	A & C	0.45	3.79	8.63	5.27	3.09	A & C	0.70	3.76	13.7	7.13
BASIN B	4.06	6.85	A & C	0.55	1.09	4.08	3.78	5.74	A & C	0.74	1.13	4.79	3.79

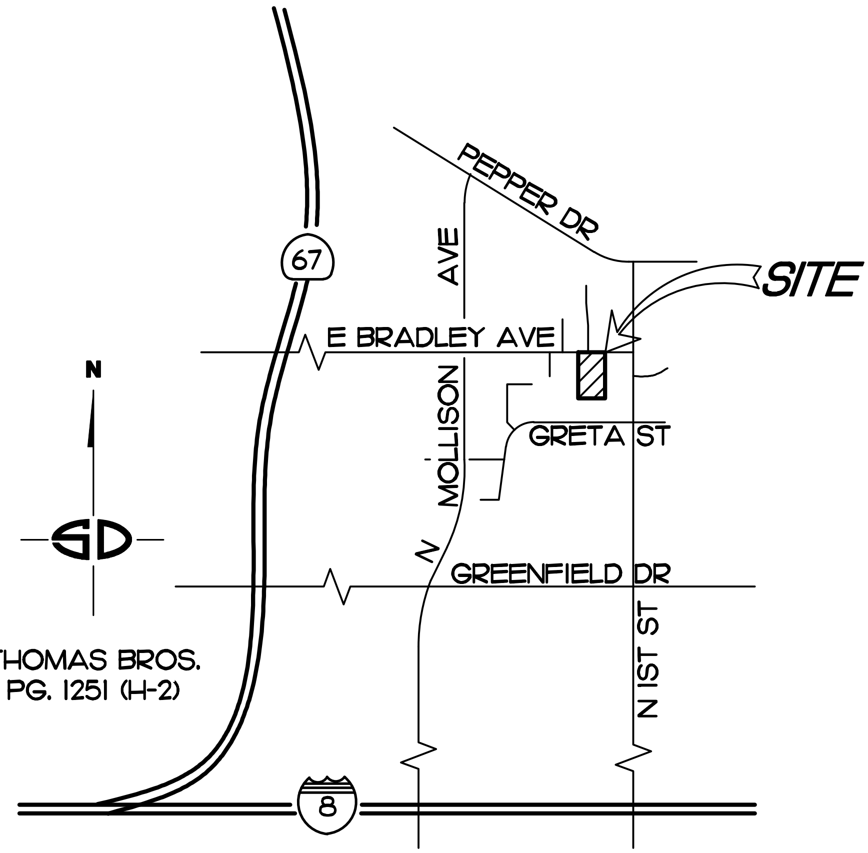
CONCLUSION:

1. The proposed discharge of surface drainage is generally consistent with the existing drainage patterns of the site. Site drainage is directed and discharged in an appropriate manner downstream of the site.

2. The proposed development of this project will not have a significant impact to the downstream drainage facilities and/or any downstream streams or rivers in a manner which would result in substantial erosion or siltation, since there will be a reduction in the post-development runoff from each basin in the current condition.

3. The site is not located within a 100-year flood hazard area or within the influence of flooding as a result of the failure of a levee or dam, therefore the proposed development will not expose people or structures to a significant risk of loss, injury or death.

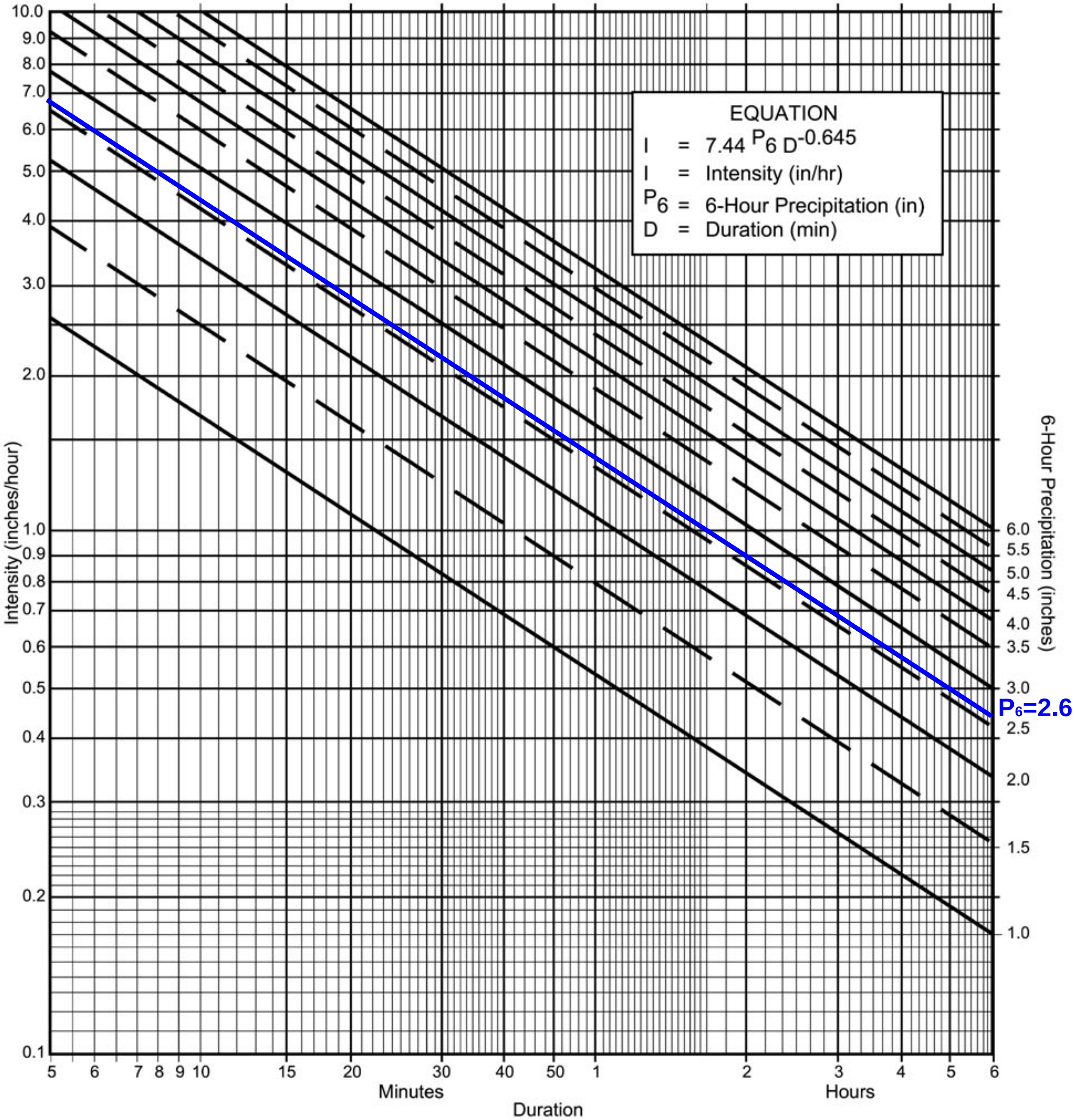
4. The proposed development will not increase the volume or velocity of surface flows to the detriment of downstream landowners and facilities.



VICINITY MAP

NO SCALE

BRADLEY APT. COMPLEX, EL CAJON, CA



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicable to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 2.6 in., P_{24} = 5.5, $\frac{P_6}{P_{24}}$ = 47 %(2)

(c) Adjusted $P_6^{(2)}$ = 2.6 in.

(d) t_x = 5.0 min.

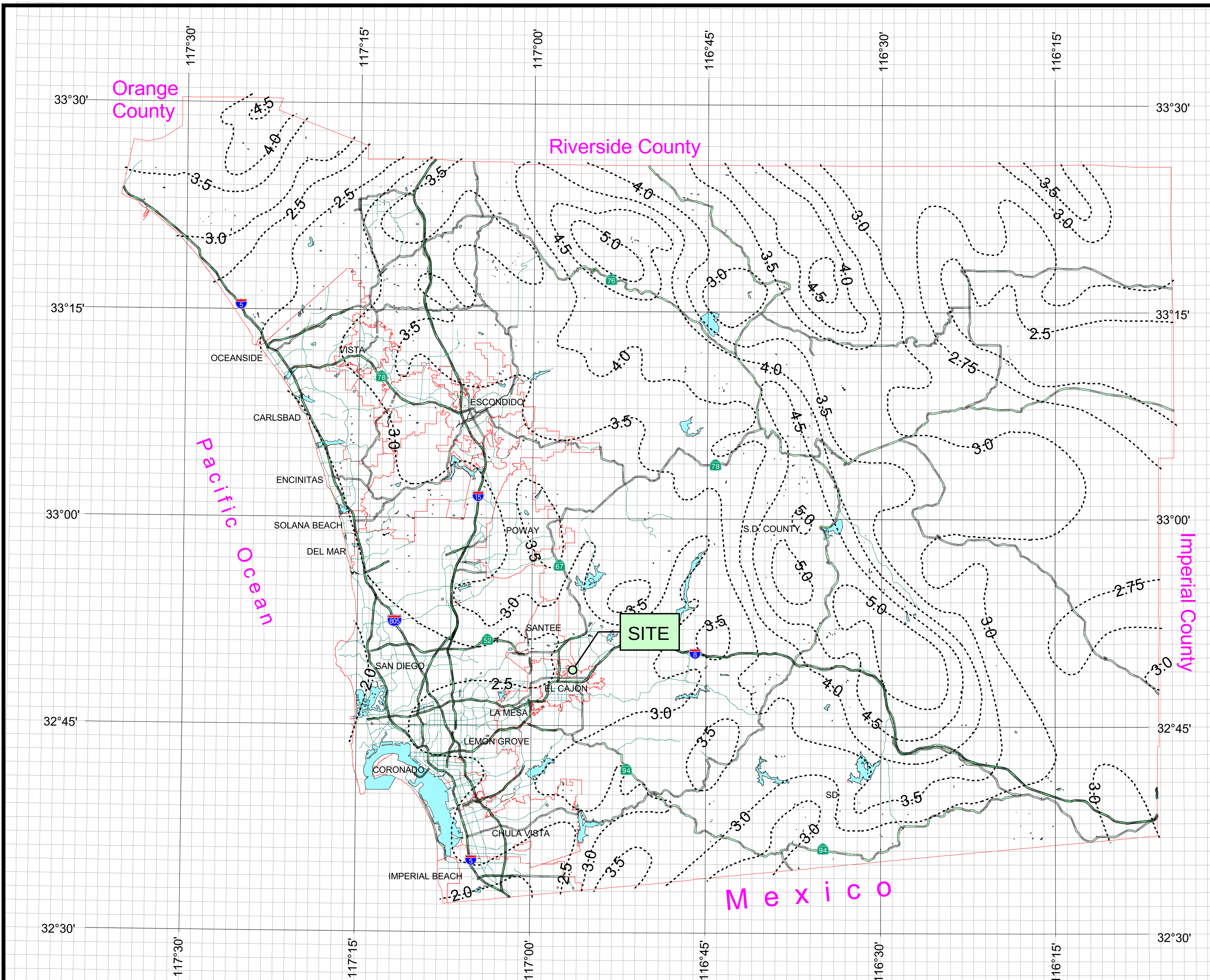
(e) I = 6.850 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6 / Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE **3-1**



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

2.6 Isopluvial (inches)

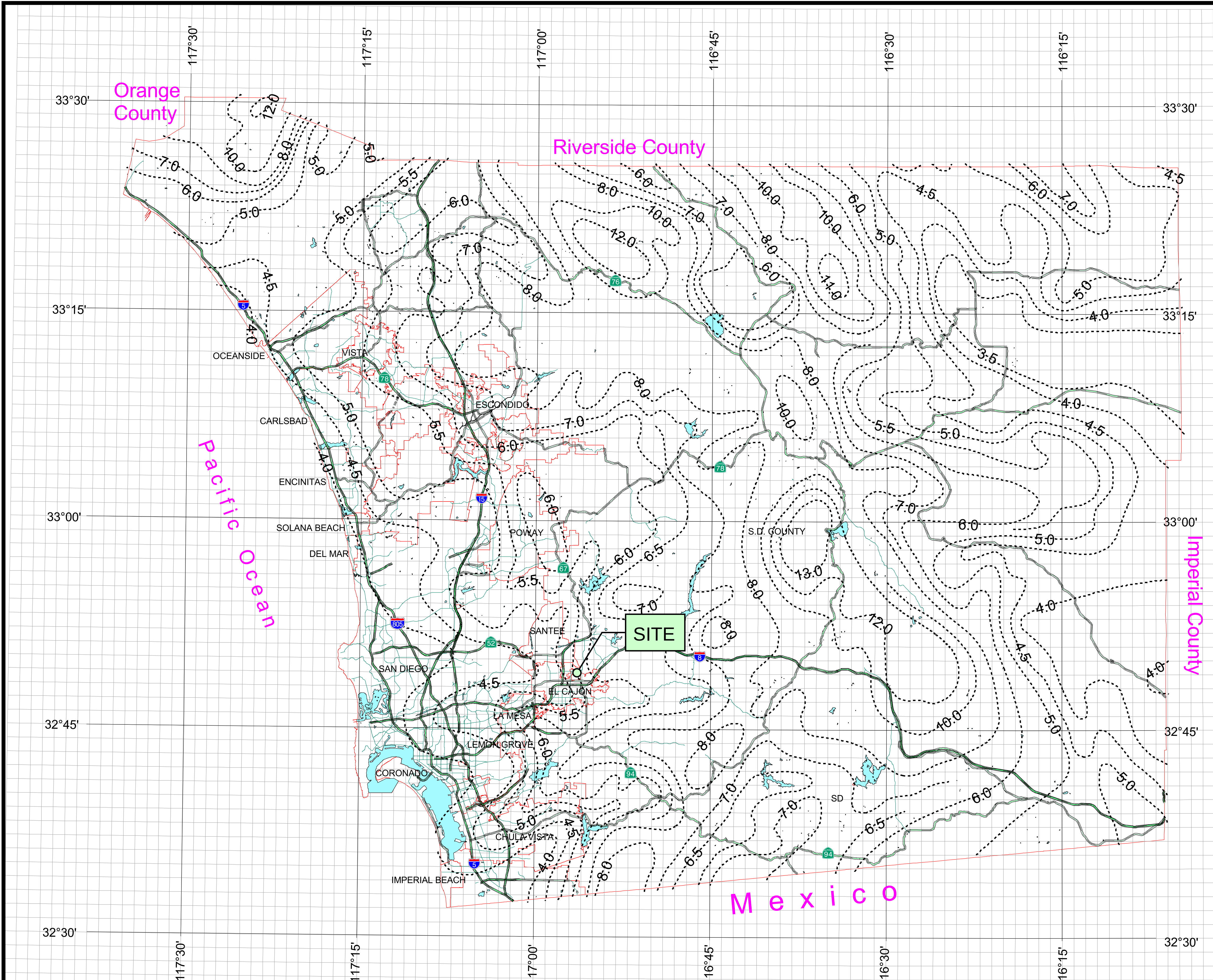
Bradley Apt. Complex

DPW GIS Department of Public Works Geographic Information Services

SanGIS We Have San Diego Covered!

N W E S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

5.5 Isopluvial (inches)

Bradley Apt. Complex

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

3 0 3 Miles

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

San Diego County Area, California

1065 E. Bradley Ave., El Cajon

November 7, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

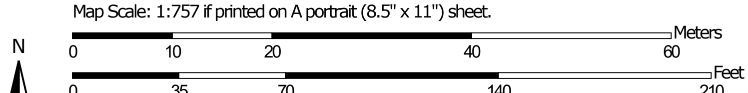
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:757 if printed on A portrait (8.5" x 11") sheet.



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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: San Diego County Area, California
Survey Area Data: Version 14, 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: Dec 7, 2014—Jan 4, 2015

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GrD	Greenfield sandy loam, 9 to 15 percent slopes	2.3	77.5%
WmB	Wyman loam, 2 to 5 percent slopes	0.7	22.5%
Totals for Area of Interest		**3.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Diego County Area, California

GrD—Greenfield sandy loam, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: hbcd
Elevation: 100 to 1,500 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Greenfield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Greenfield

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 6 inches: sandy loam
H2 - 6 to 34 inches: sandy loam, loam
H2 - 6 to 34 inches: stratified loamy coarse sand to sandy loam
H3 - 34 to 66 inches:

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: LOAMY (1975) (R019XD029CA)
Hydric soil rating: No

Minor Components

Visalia

Percent of map unit: 10 percent

Hydric soil rating: No

Ramona

Percent of map unit: 5 percent
Hydric soil rating: No

WmB—Wyman loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: hbhk
Elevation: 300 to 2,500 feet
Mean annual precipitation: 9 to 25 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Wyman and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wyman

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from basic granite

Typical profile

H1 - 0 to 13 inches: loam
H2 - 13 to 40 inches: clay loam, loam
H2 - 13 to 40 inches: loam
H3 - 40 to 67 inches: fine sandy loam
H4 - 67 to 72 inches:

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 14.7 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: LOAMY (1975) (R019XD029CA)
Hydric soil rating: No

Minor Components

Placentia

Percent of map unit: 5 percent
Hydric soil rating: No

Ramona

Percent of map unit: 5 percent
Hydric soil rating: No

Visalia

Percent of map unit: 3 percent
Hydric soil rating: No

Las posas

Percent of map unit: 2 percent
Hydric soil rating: No

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Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).

DU/A = dwelling units per acre

NRCS = National Resources Conservation Service

SNIPES - DYE associates
8348 CENTER DR., SUITE G
LA MESA, CA 91942
(619) 697-9234 FAX (619) 460-2033

JOB NO.	**Bradley Apartment Complex**		
SHEET NO.	1	OF	2
CALCULATED BY	RE	DATE	7/1/20
CHECKED BY	RE	DATE	10/26/21
DESCRIPTION	Pre-Development		
SDA PROJECT NO.	EC5021		

DETERMINE WEIGHTED RUNOFF COEFFICIENT "C"

% IMP = Percent of Impervious Surfaces

C_p = (Soil $_1$ *(Area $_1$/Area $_p$)) + (Soil $_2$ *(Area $_2$/Area $_p$)

C_p = Composite Pervious Runoff Coefficient

Soil $_1$ = Soil Group A Runoff Coefficient for Undisturbed Natural Terrain in Table 3-1

Area $_1$ = Area of Soil Group A

Soil $_2$ = Soil Group C Runoff Coefficient for Undisturbed Natural Terrain in Table 3-1

Area $_2$ = Area of Soil Group C

Area $_p$ = Total Pervious Area

C =0.90(% IMP) + Cp(1 - % IMP)

San Diego County Hydrology Manual (June 2003)

C = Runoff Coefficient

BASIN	Study Node		Imp. Area (Ac.)	Per. Area Soil 1 (Ac.)	Soil Type 1	Per. Area Soil 2 (Ac.)	Soil Type 2	Total Area (Ac.)	% IMP (Fraction)	Composite Cp	C
	FROM	TO									
A1	**1.00**	**1.01**	0.02	0.00	A	0.00	C	0.02	1.00	0.20	0.90
A2	**1.01**	**1.02**	0.06	0.00	A	0.00	C	0.06	1.00	0.20	0.90
A3	**1.02**	**1.03**	0.66	0.70	A	0.00	C	1.36	0.48	0.20	0.54
A4	**1.03**	**1.40**	0.58	1.39	A	0.38	C	2.35	0.25	0.22	0.39
B1	**2.00**	**2.01**	0.02	0.00	A	0.00	C	0.02	1.00	0.30	0.90
B2	**2.01**	**2.02**	0.25	0.12	A	0.00	C	0.37	0.68	0.20	0.67
B3	**2.02**	**2.30**	0.23	0.21	A	0.26	C	0.70	0.33	0.26	0.47

EXAMPLE: FROM NODE 1.03 TO 1.40

Cp = [0.20 X (1.39 AC / (1.39 AC + 0.38 AC))] + [0.3 X (0.38 AC / (1.39 AC + 0.38 AC))] = **0.22**

C = 0.90(0.25) + 0.22(1.00-0.25) = **0.39**

SNIPES - DYE associates
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LA MESA, CA 91942
(619) 697-9234 FAX (619) 460-2033

JOB NO.	Bradley Apartment Complex		
SHEET NO.	2	OF	2
CALCULATED BY	ND	DATE	7/13/23
CHECKED BY		DATE	
DESCRIPTION	Post-Development		
SDA PROJECT NO.	EC5021		

DETERMINE WEIGHTED RUNOFF COEFFICIENT "C"

% IMP = Percent of Impervious Surfaces

C_p = (Soil $_1$ *(Area $_1$/Area $_p$)) + (Soil $_2$ *(Area $_2$/Area $_p$)

C_p = Composite Pervious Runoff Coefficient

Soil $_1$ = Soil Group A Runoff Coefficient for Undisturbed Natural Terrain in Table 3-1

Area $_1$ = Area of Soil Group A

Soil $_2$ = Soil Group C Runoff Coefficient for Undisturbed Natural Terrain in Table 3-1

Area $_2$ = Area of Soil Group C

Area $_p$ = Total Pervious Area

C =0.90(% IMP) + Cp(1 - % IMP)

San Diego County Hydrology Manual (June 2003)

C = Runoff Coefficient

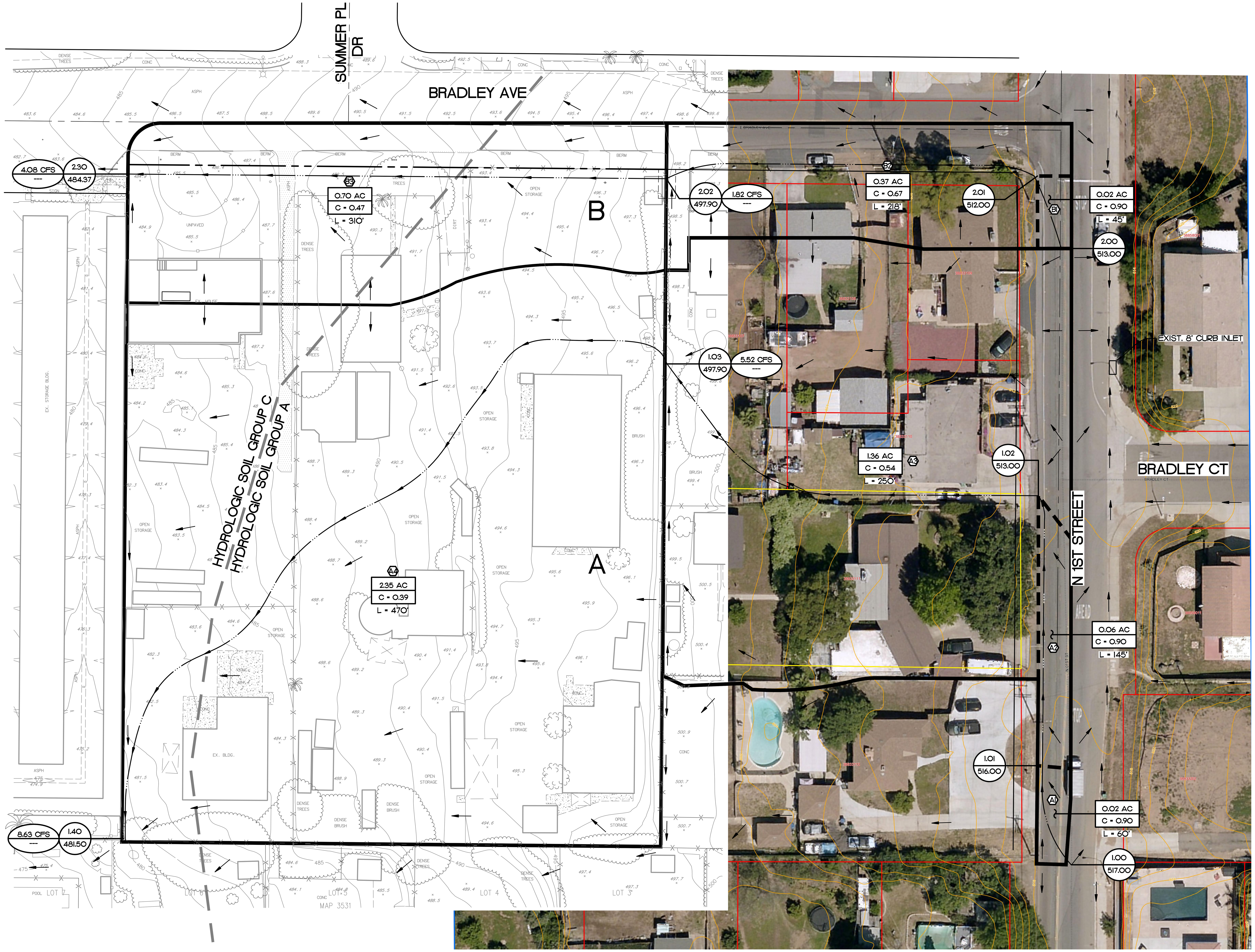
BASIN	Study Node		Imp. Area (Ac.)	Per. Area Soil 1 (Ac.)	Soil Type 1	Per. Area Soil 2 (Ac.)	Soil Type 2	Total Area (Ac.)	% IMP (Fraction)	Composite Cp	C
	FROM	TO									
A1	**1.00**	**1.01**	0.02	0.00	A	0.00	C	0.02	1.00	0.20	0.90
A2	**1.01**	**1.02**	0.06	0.00	A	0.00	C	0.06	1.00	0.20	0.90
A3	**1.02**	**1.03**	0.66	0.75	A	0.00	C	1.41	0.47	0.20	0.53
A4	**1.03**	**1.40**	0.00	0.00	A	0.07	C	0.07	0.00	0.30	0.30
A5	**1.10**	**1.11**	0.11	0.01	A	0.00	C	0.11	0.95	0.20	0.87
A6	**1.11**	**1.12**	1.06	0.06	A	0.01	C	1.13	0.94	0.21	0.86
A7	**2.10**	**1.20**	0.01	0.01	A	0.00	C	0.03	0.55	0.20	0.59
A8	**1.20**	**1.21**	0.02	0.02	A	0.00	C	0.04	0.56	0.20	0.59
A9	**1.21**	**1.22**	0.03	0.00	A	0.00	C	0.03	1.00	0.20	0.90
A10	**1.22**	**1.25**	0.14	0.03	A	0.00	C	0.17	0.82	0.20	0.77
A10B	**1.24**	**1.25**	0.03	0.00	A	0.00	C	0.03	1.00	0.20	0.90
A11	**1.25**	**1.26**	0.43	0.11	A	0.10	C	0.64	0.67	0.25	0.68
B1	**2.00**	**2.01**	0.02	0.00	A	0.00	C	0.02	1.00	0.30	0.90
B2	**2.01**	**2.02**	0.25	0.12	A	0.00	C	0.37	0.68	0.20	0.67
B3	**2.02**	**2.30**	0.27	0.01	A	0.02	C	0.31	0.90	0.26	0.83
B4	**2.10**	**2.11**	0.04	0.01	A	0.00	C	0.05	0.75	0.20	0.72
B5	**2.11**	**2.12**	0.11	0.02	A	0.02	C	0.14	0.76	0.25	0.74
B6	**2.12**	**2.13**	0.11	0.00	A	0.01	C	0.12	0.95	0.30	0.87
B7	**2.13**	**2.20**	0.05	0.00	A	0.07	C	0.12	0.42	0.30	0.55

EXAMPLE: FROM NODE 1.11 TO 1.12

Cp = [0.20 X (0.06 AC / (0.06 AC + 0.01 AC))] + [0.3 X (0.01 AC / (0.06 AC + 0.01 AC))] = **0.21**

C = 0.90(0.94) + 0.21(1.00-0.94) = **0.86**

DRAINAGE MAPS



PRE-DEVELOPMENT 100-YR., 6-HR. STORM EVENT SUMMARY

DRAINAGE BASIN MAJOR	SUB-AREA	TIME OF CONCENTRATION "Tc" (MINUTES)	INTENSITY I (INCES/HR.)	NRCS HYDROLOGIC SOIL TYPE	RUNOFF FACTOR "C" (DECIMAL)	AREA A (ACRES)	DISCHARGE Q100 (CFS)
A	A1	2.35	6.85	A	0.90	0.02	0.12
	A2	3.24	6.85	A	0.90	0.06	0.37
	A3	4.93	6.85	A	0.54	1.36	5.03
	A4	8.12	5.01	A & C	0.39	2.35	4.59
BASIN A SUMMARY		8.12	5.01	--	0.45	3.79	8.63
B	B1	1.85	6.85	A	0.90	0.02	0.12
	B2	2.77	6.85	A	0.67	0.37	1.70
	B3	4.06	6.85	A & C	0.47	0.70	2.25
BASIN B SUMMARY		4.06	6.85	--	0.55	1.09	4.08

LEGEND

MAJOR DRAINAGE BASIN ID .... A
SUB-AREA ID NO. A1
DRAINAGE BASIN BOUNDARY
DRAINAGE SUB-BASIN BOUNDARY
DIRECTION OF FLOW
STUDY NODE W/ ELEVATION .... 1.00 / 517.00
BASIN AREA W/ RUNOFF COEFFICIENT .... 2.35 AC / C = 0.39
FLOW LENGTH .... 470'
100-YR PEAK DISCHARGE .... 8.63 CFS
FLOW PATH

NOTES

1. DRAINAGE ANALYSIS AREA IS UNDERLAIN BY HYDROLOGIC SOIL GROUPS (HSG) "A" & "C".
2. COUNTY OF SAN DIEGO GIS MAP BASED ON 2018 TOPOGRAPHIC SURVEY WAS UTILIZED FOR OFFSITE DRAINAGE AREA EAST OF SITE.

N

SCALE: 1"=30'

30 15 0 30 60 90

PRE-DEVELOPMENT
DRAINAGE EXHIBIT
BRADLEY APARTMENT COMPLEX

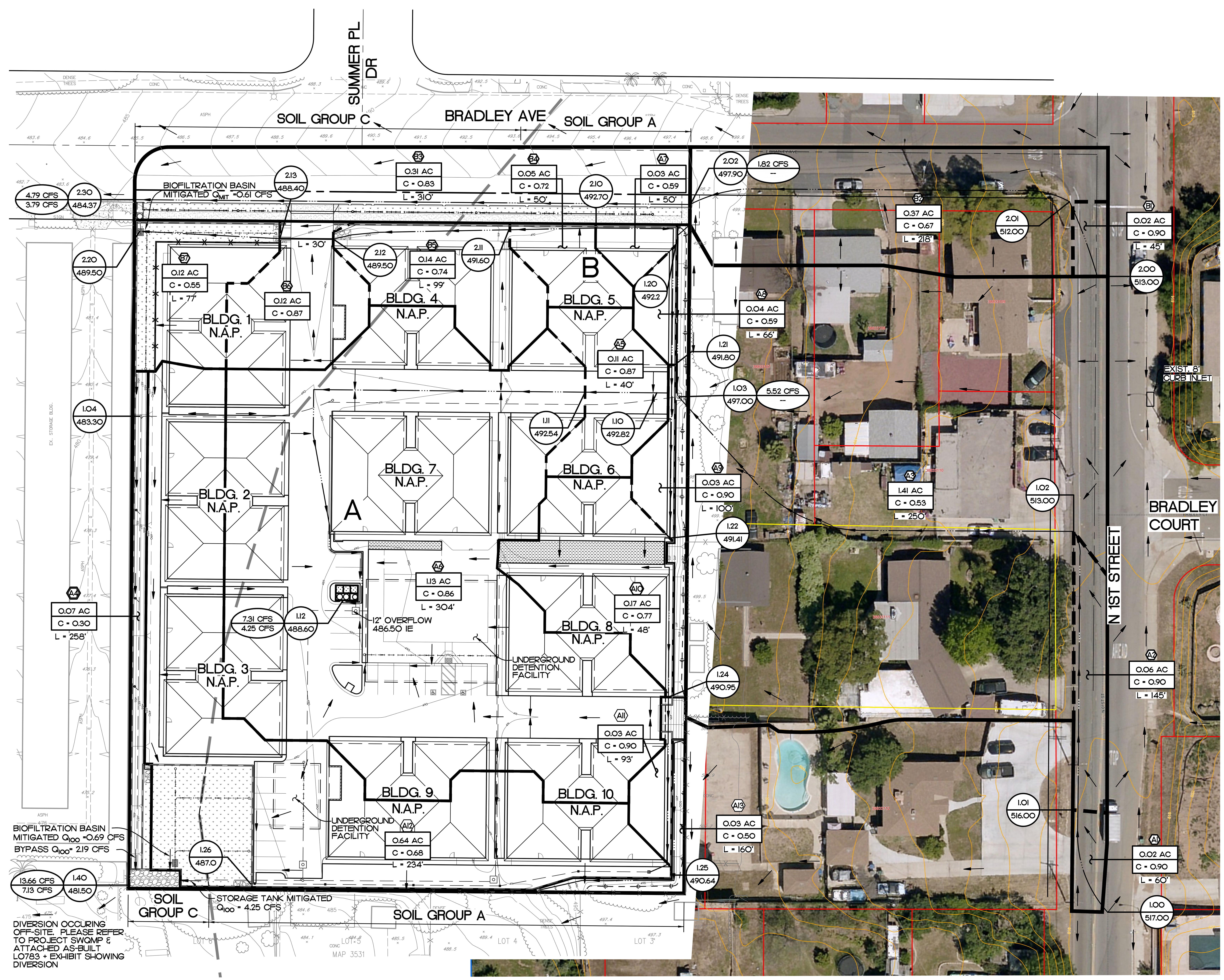
NO	DATE	REVISION DESCRIPTION	BY	NO	DATE	REVISION DESCRIPTION	BY

DESIGNER NED
DRAWN NED
CHECKED WAS
DATE 07-17-2023

SHEET TITLE PRE-DEVELOPMENT DRAINAGE EXHIBIT
JOB NAME BRADLEY APARTMENT COMPLEX
1065 - 1069 EAST BRADLEY AVE.
EL CAJON, CA 92021

SHEET 1 OF 1 SHEETS
JOB NO. EC5021

SNIPES-DYE ASSOCIATES 8348 CENTER DRIVE, SUITE G, LA MESA, CA 91942-2910 (619) 697-9234, FAX (619) 460-2033



LEGEND

- MAJOR DRAINAGE BASIN ID — A
- SUB-AREA ID NO. — A1
- DRAINAGE BASIN BOUNDARY
- DRAINAGE SUB-BASIN BOUNDARY
- DIRECTION OF FLOW
- STUDY NODE W/ ELEVATION — 1.00 / 517.00
- BASIN AREA W/ RUNOFF COEFFICIENT — 1.15 AC / C = 0.86
- FLOW LENGTH — 304'
- 100-YR PEAK DISCHARGE / 100-YR PK. DISCH. (MITIGATED) — 7.37 CFS / 0.50 CFS
- FLOW PATH

NOTES

1. DRAINAGE ANALYSIS AREA IS UNDERLAIN BY HYDROLOGIC SOIL GROUPS (HSG) "A" & "C".
2. COUNTY OF SAN DIEGO GIS MAP BASED ON 2018 TOPOGRAPHIC SURVEY WAS UTILIZED FOR OFFSITE DRAINAGE AREA EAST OF SITE.

POST-DEVELOPMENT 100-YR., 6-HR. STORM EVENT SUMMARY

DRAINAGE BASIN MAJOR	SUB-AREA	TIME OF CONCENTRATION "Tc" (MINUTES)	INTENSITY "I" (INCES/HR.)	NRCS HYDROLOGIC SOIL TYPE	RUNOFF FACTOR "C" (DECIMAL)	AREA "A" (ACRES)	DISCHARGE Q_{100} (CFS)	MITIGATED DISCHARGE Q_{100} (CFS)
A	A1	2.35	6.85	A	0.90	0.02	0.12	0.12
	A2	3.24	6.85	A	0.90	0.06	0.37	0.37
	A3	4.94	6.85	A	0.53	1.41	5.61	5.61
	A4	5.12	6.74	C	0.30	0.07	0.14	0.14
	A5	2.95	6.85	A	0.87	0.11	0.66	0.66
	A6	5.00	6.85	A & C	0.86	1.13	7.31	0.16
	A7	6.49	5.79	A	0.59	0.03	0.10	0.10
	A8	9.23	4.61	A	0.59	0.04	0.11	0.11
	A9	12.61	3.77	A	0.90	0.03	0.26	0.26
	A10	13.58	3.60	A	0.77	0.17	0.47	0.47
	A11	16.24	3.21	A & C	0.90	0.03	0.72	0.72
	A12	17.19	3.09	A & C	0.68	0.64	2.04	1.79
	A13	9.22	4.62	A & C	0.50	0.03	0.08	0.08
BASIN A SUMMARY		5.27	3.09	--	0.70	3.76	13.66	7.13
B	B1	1.85	6.85	A	0.90	0.02	0.12	0.12
	B2	2.77	6.85	A	0.67	0.37	1.70	1.70
	B3	3.78	6.85	A & C	0.83	0.31	1.76	1.76
	B4	3.72	6.85	A	0.72	0.05	0.25	0.25
	B5	5.12	6.74	A & C	0.74	0.14	0.70	0.70
	B6	5.17	6.70	C	0.87	0.12	0.70	0.70
	B7	6.55	5.76	C	0.55	0.12	0.38	0.38
BASIN B SUMMARY		3.78	5.74	--	0.74	1.13	4.79	3.79

N

30 15 0 30 60 90

SCALE: 1"=30'

POST-DEVELOPMENT DRAINAGE EXHIBIT
BRADLEY APARTMENT COMPLEX

NO	DATE	REVISION DESCRIPTION	BY	NO	DATE	REVISION DESCRIPTION	BY

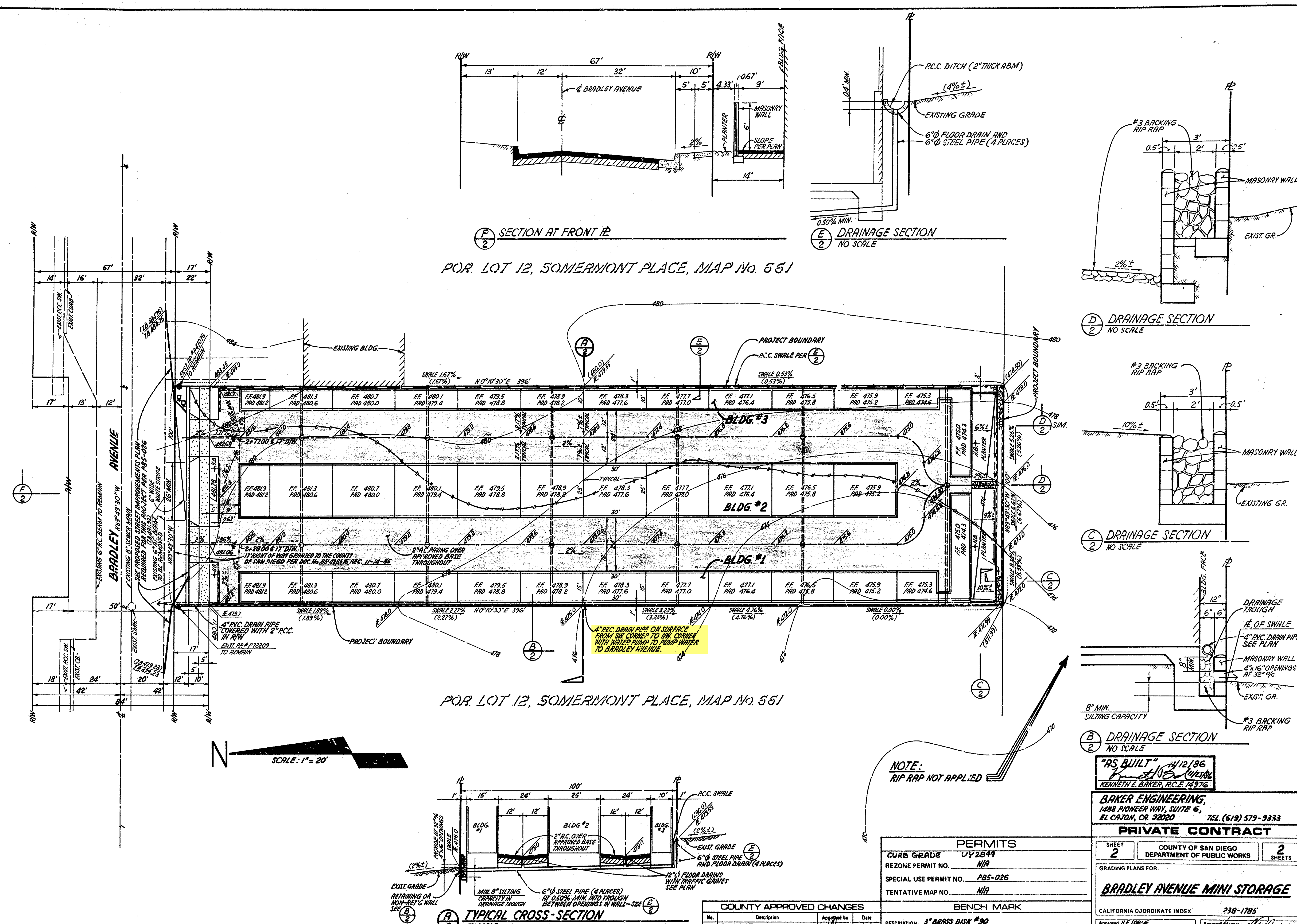
DESIGNER NED
DRAWN NED/DB
CHECKED WAS
DATE 11-10-2023

SHEET TITLE POST-DEVELOPMENT DRAINAGE EXHIBIT

JOB NAME BRADLEY APARTMENT COMPLEX
1065 - 1069 EAST BRADLEY AVE.
EL CAJON, CA 92021

SHEET 1 OF 1 SHEETS
JOB NO. EC5021

SNIPES-DYE ASSOCIATES 8348 CENTER DRIVE, SUITE G, LA MESA, CA 91942-2910 (619) 697-9234, FAX (619) 460-2033



"AS BUILT" 11/12/86
KENNETH E. BAKER, R.C.E. 14976

BAKER ENGINEERING,
1488 PIONEER WAY, SUITE 6,
EL CAJON, CA. 92020 TEL. (619) 579-9333

PRIVATE CONTRACT

SHEET	COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS	SHEETS
2		2

GRADING PLANS FOR:

BRADLEY AVENUE MINI STORAGE

CALIFORNIA COORDINATE INDEX 238-1785

Approved: H.E. SORTAE, ACTING DIRECTOR OF PUBLIC WORKS 8/14/85
By C. R. Jenings 11/26/85
Engineer of work: KENNETH E. BAKER R.C.E. 14976

Grading Permit No. L0783

FILE NO.

PERMITS	
CURB GRADE	UY2849
REZONE PERMIT NO.	N/A
SPECIAL USE PERMIT NO.	P85-026
TENTATIVE MAP NO.	N/A

BENCH MARK

DESCRIPTION: 3" BRASS DISK #90
LOCATION: TOP OF CURB IN FRONT OF 1013 BRADLEY AVENUE 5.50' WEST OF PP #JP 278451
RECORD FROM: CITY OF EL CAJON ENGINEERING DEPT.
ELEVATION: 471.367 DATUM: U.S.C.&G.S. + 0.04

COUNTY APPROVED CHANGES

No.	Description	Approved by	Date
	AS BUILT		12/3/86

PRECISION
DEC 15 1986
MICROFILMED

ENGINEER'S NAME: KENNETH E. BAKER
PHONE NO. 579-9333
1063 BRADLEY AVENUE

FOR REFERENCE

Hydromodification Management Exhibit
1065 E. Bradley Ave., El Cajon, CA
Legend
DIRECTION OF FLOW
PROJECT SITE
1065 E Bradley
U-Haul Neighborhood Dealer
Staxup Storage - El Cajon
Literacy First Charter School Junior Academy
E Bradley Ave
Kyle Pl
Buckeye Dr
N 1st St
Greta St
EXIST. 4" PVC DRAINAGE PIPE ON SURFACE WITH PUMP DISCHARGING FLOW FROM SW CORNER TO NW CORNER OF MINI STORAGE SITE ONTO BRADLEY AVENUE. REFER TO COUNTY OF SAN DIEGO GRADING PLAN L0783
Google Earth
200 ft
N

PRE-DEVELOPMENT
DRAINAGE CALCULATIONS

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

             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1305

                            Analysis prepared by:
```


Snipes-Dye associates

civil engineers & land surveyors

8348 Center Drive, Suite G, La Mesa, CA 91942

(619) 697-9234 (619) 460-2033 fax

www.snipesdye.com


```
 ************************* DESCRIPTION OF STUDY *************************
* BRADLEY APARTMENT COMPLEX                                                 *
* PRE-DEVELOPMENT CONDITIONS DRAINAGE ANALYSIS                              *
* PDS2019-LDGRMJ-30236 / PDS2019-LDPIIP-60071                               *
 **************************************************************************

  FILE NAME: EC5021PR.DAT
  TIME/DATE OF STUDY: 13:58 11/16/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
```

BASIN A

SUB-AREA A1

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      1.01 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    517.00
  DOWNSTREAM ELEVATION(FEET) =    516.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.352
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.12
```

SUB-AREA A2

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.01 TO NODE      1.02 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  516.00  DOWNSTREAM ELEVATION(FEET) =  513.00
  STREET LENGTH(FEET) =   145.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.42
  STREET FLOW TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =    3.24
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.900
  SUBAREA AREA(ACRES) =    0.06      SUBAREA RUNOFF(CFS) =    0.37
  TOTAL AREA(ACRES) =        0.1        PEAK FLOW RATE(CFS) =       0.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.19   HALFSTREET FLOOD WIDTH(FEET) =   3.41
  FLOW VELOCITY(FEET/SEC.) =  2.20   DEPTH*VELOCITY(FT*FT/SEC.) =   0.42
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.02 =     205.00 FEET.
```

SUB-AREA A3

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.02 TO NODE      1.03 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    513.00
  DOWNSTREAM NODE ELEVATION(FEET) =    497.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.48
  AVERAGE FLOW DEPTH(FEET) =   0.16   FLOOD WIDTH(FEET) =   16.42
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.68   Tc(MIN.) =    4.93
  SUBAREA AREA(ACRES) =    1.36       SUBAREA RUNOFF(CFS) =    5.03
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.560
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       5.52

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOOD WIDTH(FEET) =   21.28
  FLOW VELOCITY(FEET/SEC.) =   2.77   DEPTH*VELOCITY(FT*FT/SEC) =   0.55
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.03 =     455.00 FEET.
```

SUB-AREA A4

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.03 TO NODE      1.40 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    497.90
  DOWNSTREAM NODE ELEVATION(FEET) =    481.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   470.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.011
```

```
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .3900
S.C.S. CURVE NUMBER (AMC II) =   0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.85
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.45
AVERAGE FLOW DEPTH(FEET) =   0.25   FLOOD WIDTH(FEET) =   27.14
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.19   Tc(MIN.) =    8.12
SUBAREA AREA(ACRES) =    2.35       SUBAREA RUNOFF(CFS) =    4.59
AREA-AVERAGE RUNOFF COEFFICIENT =  0.455
TOTAL AREA(ACRES) =        3.8          PEAK FLOW RATE(CFS) =       8.63

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  0.26   FLOOD WIDTH(FEET) =   28.35
FLOW VELOCITY(FEET/SEC.) =   2.48   DEPTH*VELOCITY(FT*FT/SEC) =   0.64
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.40 =     925.00 FEET.
```

BASIN B

SUB-AREA B1

```
****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.01 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
  UPSTREAM ELEVATION(FEET) =    513.00
  DOWNSTREAM ELEVATION(FEET) =    512.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.851
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.12
```

SUB-AREA B2

```
****************************************************************************
  FLOW PROCESS FROM NODE      2.01 TO NODE      2.02 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  512.00  DOWNSTREAM ELEVATION(FEET) =  497.90
  STREET LENGTH(FEET) =   218.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
```

```
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.97
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    3.74
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.78
  STREET FLOW TRAVEL TIME(MIN.) =   0.92   Tc(MIN.) =    2.77
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.682
  SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    1.70
  TOTAL AREA(ACRES) =        0.4        PEAK FLOW RATE(CFS) =       1.82

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.85
  FLOW VELOCITY(FEET/SEC.) =  4.27   DEPTH*VELOCITY(FT*FT/SEC.) =   1.00
  LONGEST FLOWPATH FROM NODE      2.00 TO NODE      2.02 =    263.00 FEET.
```

SUB-AREA B3

```
****************************************************************************
  FLOW PROCESS FROM NODE      2.02 TO NODE      2.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  497.90  DOWNSTREAM ELEVATION(FEET) =  484.37
  STREET LENGTH(FEET) =   310.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.95
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.31
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.00
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   1.29   Tc(MIN.) =    4.06
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
```

```
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.546
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    2.25
  TOTAL AREA(ACRES) =        1.1        PEAK FLOW RATE(CFS) =       4.08

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   9.60
  FLOW VELOCITY(FEET/SEC.) =  4.32   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE      2.00 TO NODE      2.30 =     573.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =      4.06
  PEAK FLOW RATE(CFS)   =       4.08
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

POST-DEVELOPMENT DRAINAGE CALCULATIONS

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1305

                           Analysis prepared by:

 ************************** DESCRIPTION OF STUDY **************************
* BRADLEY APARTMENT COMPLEX                                                 *
* POST-DEVELOPMENT CONDITIONS DRAINAGE ANALYSIS                             *
* PDS2019-LDGRMJ-30236 / PDS2019-LDPIIP-60071                               *
 **************************************************************************

  FILE NAME: ECATES.DAT
  TIME/DATE OF STUDY: 15:06 11/07/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      1.01 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    517.00
```

```
  DOWNSTREAM ELEVATION(FEET) =    516.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.352
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE      1.01 TO NODE      1.02 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  516.00  DOWNSTREAM ELEVATION(FEET) =  513.00
  STREET LENGTH(FEET) =   145.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.42
  STREET FLOW TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =    3.24
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.900
  SUBAREA AREA(ACRES) =    0.06      SUBAREA RUNOFF(CFS) =    0.37
  TOTAL AREA(ACRES) =        0.1        PEAK FLOW RATE(CFS) =       0.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.19   HALFSTREET FLOOD WIDTH(FEET) =   3.30
  FLOW VELOCITY(FEET/SEC.) =  2.26   DEPTH*VELOCITY(FT*FT/SEC.) =   0.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.02 =     205.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.02 TO NODE      1.03 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    513.00
```

```
  DOWNSTREAM NODE ELEVATION(FEET) =    497.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.51
  AVERAGE FLOW DEPTH(FEET) =   0.16   FLOOD WIDTH(FEET) =   16.42
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.66   Tc(MIN.) =    4.90
  SUBAREA AREA(ACRES) =    1.41       SUBAREA RUNOFF(CFS) =    5.12
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.550
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       5.61

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOOD WIDTH(FEET) =   21.08
  FLOW VELOCITY(FEET/SEC.) =   2.87   DEPTH*VELOCITY(FT*FT/SEC) =   0.56
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.03 =     455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.03 TO NODE      1.04 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   491.00  DOWNSTREAM(FEET) =   483.30
  FLOW LENGTH(FEET) =   197.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.75
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        5.61
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    5.24
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.04 =     652.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.05 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   483.30  DOWNSTREAM(FEET) =   481.50
  FLOW LENGTH(FEET) =   131.30   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.15
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        5.61
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    5.54
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.05 =     783.30 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.05 TO NODE      1.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.409
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5387
  SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.13
  TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       5.61
  TC(MIN.) =    5.54
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      1.40 TO NODE      1.40 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.54
  RAINFALL INTENSITY(INCH/HR) =   6.41
  TOTAL STREAM AREA(ACRES) =     1.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.61

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    40.00
  UPSTREAM ELEVATION(FEET) =    492.82
  DOWNSTREAM ELEVATION(FEET) =    492.54
  ELEVATION DIFFERENCE(FEET) =      0.28
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.949
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.60
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.60

****************************************************************************
  FLOW PROCESS FROM NODE      1.11 TO NODE      1.12 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    492.54
  DOWNSTREAM NODE ELEVATION(FEET) =    488.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   304.00
```

```
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.823
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.43
  AVERAGE FLOW DEPTH(FEET) =   0.18   FLOOD WIDTH(FEET) =   19.05
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.08   Tc(MIN.) =    5.03
  SUBAREA AREA(ACRES) =    1.13       SUBAREA RUNOFF(CFS) =    6.63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.861
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       7.22

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.22   FLOOD WIDTH(FEET) =   24.31
  FLOW VELOCITY(FEET/SEC.) =   2.80   DEPTH*VELOCITY(FT*FT/SEC) =   0.63
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.12 =     344.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.12 TO NODE      1.40 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.70  DOWNSTREAM(FEET) =   481.50
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.20
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.22
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    5.48
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.40 =     594.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.40 TO NODE      1.40 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.48
  RAINFALL INTENSITY(INCH/HR) =   6.45
  TOTAL STREAM AREA(ACRES) =     1.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.22

****************************************************************************
  FLOW PROCESS FROM NODE      2.10 TO NODE      1.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .5900
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    492.70
 DOWNSTREAM ELEVATION(FEET) =    492.20
 ELEVATION DIFFERENCE(FEET) =      0.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.491
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.789
 SUBAREA RUNOFF(CFS) =      0.10
 TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
 FLOW PROCESS FROM NODE      1.20 TO NODE      1.21 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    492.20
 DOWNSTREAM NODE ELEVATION(FEET) =    491.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =    80.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
 MAXIMUM DEPTH(FEET) =   0.50
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.614
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .5900
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.16
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.49
 AVERAGE FLOW DEPTH(FEET) =   0.08   FLOOD WIDTH(FEET) =    7.73
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.73   Tc(MIN.) =    9.23
 SUBAREA AREA(ACRES) =    0.04       SUBAREA RUNOFF(CFS) =    0.11
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.590
 TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.19

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.09   FLOOD WIDTH(FEET) =    8.54
 FLOW VELOCITY(FEET/SEC.) =   0.50   DEPTH*VELOCITY(FT*FT/SEC) =   0.05
 LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.21 =     130.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      1.21 TO NODE      1.22 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    491.80
 DOWNSTREAM NODE ELEVATION(FEET) =    491.41
 CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
 MAXIMUM DEPTH(FEET) =   0.50
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.773
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.49
  AVERAGE FLOW DEPTH(FEET) =   0.10   FLOOD WIDTH(FEET) =    9.95
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.38   Tc(MIN.) =   12.61
  SUBAREA AREA(ACRES) =    0.03       SUBAREA RUNOFF(CFS) =    0.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.683
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.26

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOOD WIDTH(FEET) =   10.36
  FLOW VELOCITY(FEET/SEC.) =   0.49   DEPTH*VELOCITY(FT*FT/SEC) =   0.05
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.22 =     230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.22 TO NODE      1.24 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    491.41
  DOWNSTREAM NODE ELEVATION(FEET) =    490.95
  CHANNEL LENGTH THRU SUBAREA(FEET) =    48.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.596
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.82
  AVERAGE FLOW DEPTH(FEET) =   0.11   FLOOD WIDTH(FEET) =   11.17
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   13.58
  SUBAREA AREA(ACRES) =    0.17       SUBAREA RUNOFF(CFS) =    0.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.738
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       0.72

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOOD WIDTH(FEET) =   13.19
  FLOW VELOCITY(FEET/SEC.) =   0.89   DEPTH*VELOCITY(FT*FT/SEC) =   0.11
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.24 =     278.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.24 TO NODE      1.25 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    490.95
  DOWNSTREAM NODE ELEVATION(FEET) =    490.64
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
```

```
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.259
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.70
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.69
  AVERAGE FLOW DEPTH(FEET) =   0.22   FLOOD WIDTH(FEET) =   23.70
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.24   Tc(MIN.) =   15.82
  SUBAREA AREA(ACRES) =    0.67       SUBAREA RUNOFF(CFS) =    1.96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.853
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       2.61

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOOD WIDTH(FEET) =   28.15
  FLOW VELOCITY(FEET/SEC.) =   0.76   DEPTH*VELOCITY(FT*FT/SEC) =   0.20
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.25 =     371.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.25 TO NODE      1.26 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.64  DOWNSTREAM(FEET) =   487.00
  FLOW LENGTH(FEET) =   234.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.77
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =         2.61
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   16.50
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.26 =     605.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.26 TO NODE      1.40 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.50
  RAINFALL INTENSITY(INCH/HR) =   3.17
  TOTAL STREAM AREA(ACRES) =     0.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.61

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.61     5.54        6.409          1.56
      2        7.22     5.48        6.453          1.23
      3        2.61    16.50        3.172          0.94
```

```
RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  3 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       13.64     5.48       6.453
    2       13.66     5.54       6.409
    3        8.94    16.50       3.172

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      13.66   Tc(MIN.) =    5.54
TOTAL AREA(ACRES) =        3.7
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.40 =     783.30 FEET.
==============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =        3.7  TC(MIN.) =      5.54
PEAK FLOW RATE(CFS)   =      13.66
==============================================================================
==============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1305

                           Analysis prepared by:
 ************************** DESCRIPTION OF STUDY **************************
* BRADLEY APARTMENT COMPLEX                                                *
* POST-DEVELOPMENT CONDITIONS DRAINAGE ANALYSIS                            *
* PDS2019-LDGRMJ-30236 / PDS2019-LDPIIP-60071                              *
 **************************************************************************

  FILE NAME: EC5021M.DAT
  TIME/DATE OF STUDY: 15:22 11/07/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.01 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
  UPSTREAM ELEVATION(FEET) =    513.00
  DOWNSTREAM ELEVATION(FEET) =    512.00
```

```
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.851
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE      2.01 TO NODE      2.02 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  512.00  DOWNSTREAM ELEVATION(FEET) =  497.70
  STREET LENGTH(FEET) =   218.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.97
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
  STREET FLOW TRAVEL TIME(MIN.) =   0.65   Tc(MIN.) =    2.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.682
  SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    1.70
  TOTAL AREA(ACRES) =        0.4        PEAK FLOW RATE(CFS) =       1.82

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   4.72
  FLOW VELOCITY(FEET/SEC.) =  4.64   DEPTH*VELOCITY(FT*FT/SEC.) =   1.15
  LONGEST FLOWPATH FROM NODE      2.00 TO NODE      2.02 =     263.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.02 TO NODE      2.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  497.70  DOWNSTREAM ELEVATION(FEET) =  484.37
```

```
  STREET LENGTH(FEET) =   310.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.70
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.28
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.19
  STREET FLOW TRAVEL TIME(MIN.) =   1.28   Tc(MIN.) =    3.78
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.747
  SUBAREA AREA(ACRES) =    0.31      SUBAREA RUNOFF(CFS) =    1.76
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       3.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.53
  FLOW VELOCITY(FEET/SEC.) =  4.25   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
  LONGEST FLOWPATH FROM NODE      2.00 TO NODE      2.30 =     573.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.30 TO NODE      2.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    3.78
  RAINFALL INTENSITY(INCH/HR) =   6.85
  TOTAL STREAM AREA(ACRES) =     0.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.58

****************************************************************************
  FLOW PROCESS FROM NODE      2.10 TO NODE      2.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
```

```
  UPSTREAM ELEVATION(FEET) =    492.70
  DOWNSTREAM ELEVATION(FEET) =    491.60
  ELEVATION DIFFERENCE(FEET) =      1.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.719
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE      2.11 TO NODE      2.12 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    491.60
  DOWNSTREAM NODE ELEVATION(FEET) =    489.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    99.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.743
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.17
  AVERAGE FLOW DEPTH(FEET) =   0.10   FLOOD WIDTH(FEET) =   10.16
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.41   Tc(MIN.) =    5.12
  SUBAREA AREA(ACRES) =    0.14       SUBAREA RUNOFF(CFS) =    0.70
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.735
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.94

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOOD WIDTH(FEET) =   12.58
  FLOW VELOCITY(FEET/SEC.) =   1.27   DEPTH*VELOCITY(FT*FT/SEC) =   0.16
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.12 =     149.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.12 TO NODE      2.13 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   489.50  DOWNSTREAM(FEET) =   488.40
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.79
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   4.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.94
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.17
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.13 =     179.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      2.13 TO NODE      2.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.704
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7871
  SUBAREA AREA(ACRES) =    0.12   SUBAREA RUNOFF(CFS) =    0.70
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       1.64
  TC(MIN.) =    5.17

****************************************************************************
  FLOW PROCESS FROM NODE      2.13 TO NODE      2.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    487.50  DOWNSTREAM(FEET) =    487.12
  CHANNEL LENGTH THRU SUBAREA(FEET) =    77.00   CHANNEL SLOPE =  0.0049
  CHANNEL BASE(FEET) =   11.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.756
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.93
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   1.38
  Tc(MIN.) =    6.55
  SUBAREA AREA(ACRES) =     0.12       SUBAREA RUNOFF(CFS) =    0.38
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.721
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.20 =     256.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.20 TO NODE      2.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.57  DOWNSTREAM(FEET) =   484.52
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.09
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.78
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    6.56
```

```
 LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.30 =     261.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      2.30 TO NODE      2.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.56
 RAINFALL INTENSITY(INCH/HR) =   5.75
 TOTAL STREAM AREA(ACRES) =     0.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.78

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        3.58     3.78        6.850         0.70
     2        1.78     6.56        5.751         0.43

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        4.61     3.78       6.850
     2        4.79     6.56       5.751

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.79   Tc(MIN.) =    6.56
 TOTAL AREA(ACRES) =        1.1
 LONGEST FLOWPATH FROM NODE      2.00 TO NODE      2.30 =     573.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =      6.56
 PEAK FLOW RATE(CFS)   =       4.79
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

POST-DEVELOPMENT (MITIGATED) DRAINAGE CALCULATIONS

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1305

                           Analysis prepared by:
 ************************** DESCRIPTION OF STUDY **************************
* BRADLEY APARTMENT COMPLEX                                                *
* POST-DEVELOPMENT CONDITIONS DRAINAGE ANALYSIS (MITIGATED)                 *
* PDS2019-LDGRMJ-30236 / PDS2019-LDPIIP-60071                              *
 **************************************************************************

  FILE NAME: ECATES.DAT
  TIME/DATE OF STUDY: 15:27 11/09/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      1.01 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    517.00
  DOWNSTREAM ELEVATION(FEET) =    516.00
```

```
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.352
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE      1.01 TO NODE      1.02 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  516.00  DOWNSTREAM ELEVATION(FEET) =  513.00
  STREET LENGTH(FEET) =   145.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.42
  STREET FLOW TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =    3.24
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.900
  SUBAREA AREA(ACRES) =    0.06      SUBAREA RUNOFF(CFS) =    0.37
  TOTAL AREA(ACRES) =       0.1        PEAK FLOW RATE(CFS) =       0.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.19   HALFSTREET FLOOD WIDTH(FEET) =   3.30
  FLOW VELOCITY(FEET/SEC.) =  2.26   DEPTH*VELOCITY(FT*FT/SEC.) =   0.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.02 =     205.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.02 TO NODE      1.03 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    513.00
  DOWNSTREAM NODE ELEVATION(FEET) =    497.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.51
  AVERAGE FLOW DEPTH(FEET) =   0.16   FLOOD WIDTH(FEET) =   16.42
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.66   Tc(MIN.) =    4.90
  SUBAREA AREA(ACRES) =    1.41       SUBAREA RUNOFF(CFS) =    5.12
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.550
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       5.61

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOOD WIDTH(FEET) =   21.08
  FLOW VELOCITY(FEET/SEC.) =   2.87   DEPTH*VELOCITY(FT*FT/SEC) =   0.56
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.03 =     455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.03 TO NODE      1.04 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   491.00  DOWNSTREAM(FEET) =   483.30
  FLOW LENGTH(FEET) =   197.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.75
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        5.61
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    5.24
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.04 =     652.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.05 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   483.30  DOWNSTREAM(FEET) =   481.50
  FLOW LENGTH(FEET) =   131.30   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.15
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        5.61
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    5.54
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.05 =     783.30 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.05 TO NODE      1.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.409
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5387
  SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.13
  TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       5.61
  TC(MIN.) =    5.54
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      1.40 TO NODE      1.40 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.54
  RAINFALL INTENSITY(INCH/HR) =   6.41
  TOTAL STREAM AREA(ACRES) =     1.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.61

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    40.00
  UPSTREAM ELEVATION(FEET) =    492.82
  DOWNSTREAM ELEVATION(FEET) =    492.54
  ELEVATION DIFFERENCE(FEET) =      0.28
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.949
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.60
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.60

****************************************************************************
  FLOW PROCESS FROM NODE      1.11 TO NODE      1.12 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    492.54
  DOWNSTREAM NODE ELEVATION(FEET) =    488.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   304.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
```

```
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.823
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.43
  AVERAGE FLOW DEPTH(FEET) =   0.18   FLOOD WIDTH(FEET) =   19.05
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.08   Tc(MIN.) =    5.03
  SUBAREA AREA(ACRES) =    1.13       SUBAREA RUNOFF(CFS) =    6.63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.861
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       7.22

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.22   FLOOD WIDTH(FEET) =   24.31
  FLOW VELOCITY(FEET/SEC.) =   2.80   DEPTH*VELOCITY(FT*FT/SEC) =   0.63
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.12 =     344.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.12 TO NODE      1.12 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  21.00   RAIN INTENSITY(INCH/HOUR) =  2.71
  TOTAL AREA(ACRES) =     1.25   TOTAL RUNOFF(CFS) =      4.25

****************************************************************************
  FLOW PROCESS FROM NODE      1.12 TO NODE      1.40 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.70  DOWNSTREAM(FEET) =   481.50
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.41
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.25
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   21.77
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.40 =     594.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.40 TO NODE      1.40 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.77
  RAINFALL INTENSITY(INCH/HR) =   2.65
```

```
  TOTAL STREAM AREA(ACRES) =     1.25
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.25

****************************************************************************
  FLOW PROCESS FROM NODE      2.10 TO NODE      1.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    492.70
  DOWNSTREAM ELEVATION(FEET) =    492.20
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.491
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.789
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE      1.20 TO NODE      1.21 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    492.20
  DOWNSTREAM NODE ELEVATION(FEET) =    491.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =    80.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.614
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5900
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.49
  AVERAGE FLOW DEPTH(FEET) =   0.08   FLOOD WIDTH(FEET) =    7.73
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.73   Tc(MIN.) =    9.23
  SUBAREA AREA(ACRES) =    0.04       SUBAREA RUNOFF(CFS) =    0.11
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.590
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.19

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOOD WIDTH(FEET) =    8.54
  FLOW VELOCITY(FEET/SEC.) =   0.50   DEPTH*VELOCITY(FT*FT/SEC) =   0.05
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.21 =     130.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.21 TO NODE      1.22 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
```

```
  UPSTREAM NODE ELEVATION(FEET) =    491.80
  DOWNSTREAM NODE ELEVATION(FEET) =    491.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.773
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.49
  AVERAGE FLOW DEPTH(FEET) =   0.10   FLOOD WIDTH(FEET) =    9.95
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.38   Tc(MIN.) =   12.61
  SUBAREA AREA(ACRES) =    0.03       SUBAREA RUNOFF(CFS) =    0.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.683
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.26

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOOD WIDTH(FEET) =   10.36
  FLOW VELOCITY(FEET/SEC.) =   0.49   DEPTH*VELOCITY(FT*FT/SEC) =   0.05
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.22 =     230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.22 TO NODE      1.24 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    491.41
  DOWNSTREAM NODE ELEVATION(FEET) =    490.95
  CHANNEL LENGTH THRU SUBAREA(FEET) =    48.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.596
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.82
  AVERAGE FLOW DEPTH(FEET) =   0.11   FLOOD WIDTH(FEET) =   11.17
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   13.58
  SUBAREA AREA(ACRES) =    0.17       SUBAREA RUNOFF(CFS) =    0.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.738
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       0.72

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOOD WIDTH(FEET) =   13.19
  FLOW VELOCITY(FEET/SEC.) =   0.89   DEPTH*VELOCITY(FT*FT/SEC) =   0.11
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.24 =     278.00 FEET.

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

```
  FLOW PROCESS FROM NODE      1.24 TO NODE      1.25 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    490.95
  DOWNSTREAM NODE ELEVATION(FEET) =    490.64
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.259
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.70
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.69
  AVERAGE FLOW DEPTH(FEET) =   0.22   FLOOD WIDTH(FEET) =   23.70
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.24   Tc(MIN.) =   15.82
  SUBAREA AREA(ACRES) =    0.67       SUBAREA RUNOFF(CFS) =    1.96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.853
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       2.61

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOOD WIDTH(FEET) =   28.15
  FLOW VELOCITY(FEET/SEC.) =   0.76   DEPTH*VELOCITY(FT*FT/SEC) =   0.20
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.25 =     371.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.25 TO NODE      1.26 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.64  DOWNSTREAM(FEET) =   487.00
  FLOW LENGTH(FEET) =   234.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.77
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.61
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   16.50
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.26 =     605.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.26 TO NODE      1.26 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  15.82   RAIN INTENSITY(INCH/HOUR) =  3.26
  TOTAL AREA(ACRES) =     0.94   TOTAL RUNOFF(CFS) =      0.69

****************************************************************************
  FLOW PROCESS FROM NODE      1.26 TO NODE      1.40 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.82
  RAINFALL INTENSITY(INCH/HR) =   3.26
  TOTAL STREAM AREA(ACRES) =     0.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.69

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.61     5.54        6.409         1.56
      2        4.25    21.77        2.652         1.25
      3        0.69    15.82        3.259         0.94

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        6.94     5.54       6.409
      2        6.63    15.82       3.259
      3        7.13    21.77       2.652

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.13   Tc(MIN.) =   21.77
  TOTAL AREA(ACRES) =        3.8
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      1.40 =     783.30 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.8  TC(MIN.) =     21.77
  PEAK FLOW RATE(CFS)   =       7.13
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1305

                           Analysis prepared by:
 ************************** DESCRIPTION OF STUDY **************************
* BRADLEY APARTMENT COMPLEX                                                *
* POST-DEVELOPMENT CONDITIONS DRAINAGE ANALYSIS (MITIGATED)                *
* PDS2019-LDGRMJ-30236 / PDS2019-LDPIIP-60071                              *
 **************************************************************************

  FILE NAME: EC5021M.DAT
  TIME/DATE OF STUDY: 15:19 11/09/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.01 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
  UPSTREAM ELEVATION(FEET) =    513.00
  DOWNSTREAM ELEVATION(FEET) =    512.00
```

```
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.851
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE      2.01 TO NODE      2.02 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  512.00  DOWNSTREAM ELEVATION(FEET) =  497.70
  STREET LENGTH(FEET) =   218.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.97
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
  STREET FLOW TRAVEL TIME(MIN.) =   0.65   Tc(MIN.) =    2.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.682
  SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    1.70
  TOTAL AREA(ACRES) =        0.4        PEAK FLOW RATE(CFS) =       1.82

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   4.72
  FLOW VELOCITY(FEET/SEC.) =  4.64   DEPTH*VELOCITY(FT*FT/SEC.) =   1.15
  LONGEST FLOWPATH FROM NODE      2.00 TO NODE      2.02 =     263.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.02 TO NODE      2.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  497.70  DOWNSTREAM ELEVATION(FEET) =  484.37
```

```
  STREET LENGTH(FEET) =   310.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.70
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.28
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.19
  STREET FLOW TRAVEL TIME(MIN.) =   1.28   Tc(MIN.) =    3.78
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.747
  SUBAREA AREA(ACRES) =    0.31      SUBAREA RUNOFF(CFS) =    1.76
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       3.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.53
  FLOW VELOCITY(FEET/SEC.) =  4.25   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
  LONGEST FLOWPATH FROM NODE      2.00 TO NODE      2.30 =     573.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.30 TO NODE      2.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    3.78
  RAINFALL INTENSITY(INCH/HR) =   6.85
  TOTAL STREAM AREA(ACRES) =     0.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.58

****************************************************************************
  FLOW PROCESS FROM NODE      2.10 TO NODE      2.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
```

```
  UPSTREAM ELEVATION(FEET) =    492.70
  DOWNSTREAM ELEVATION(FEET) =    491.60
  ELEVATION DIFFERENCE(FEET) =      1.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.719
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE      2.11 TO NODE      2.12 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    491.60
  DOWNSTREAM NODE ELEVATION(FEET) =    489.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    99.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01700
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.743
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.17
  AVERAGE FLOW DEPTH(FEET) =   0.10   FLOOD WIDTH(FEET) =   10.16
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.41   Tc(MIN.) =    5.12
  SUBAREA AREA(ACRES) =    0.14       SUBAREA RUNOFF(CFS) =    0.70
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.735
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.94

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOOD WIDTH(FEET) =   12.58
  FLOW VELOCITY(FEET/SEC.) =   1.27   DEPTH*VELOCITY(FT*FT/SEC) =   0.16
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.12 =     149.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.12 TO NODE      2.13 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   489.50  DOWNSTREAM(FEET) =   488.40
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.79
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   4.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.94
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.17
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.13 =     179.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      2.13 TO NODE      2.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.704
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7871
  SUBAREA AREA(ACRES) =    0.12   SUBAREA RUNOFF(CFS) =    0.70
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       1.64
  TC(MIN.) =    5.17

****************************************************************************
  FLOW PROCESS FROM NODE      2.13 TO NODE      2.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    487.50  DOWNSTREAM(FEET) =    487.12
  CHANNEL LENGTH THRU SUBAREA(FEET) =    77.00   CHANNEL SLOPE =  0.0049
  CHANNEL BASE(FEET) =   11.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.756
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.93
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   1.38
  Tc(MIN.) =    6.55
  SUBAREA AREA(ACRES) =     0.12       SUBAREA RUNOFF(CFS) =    0.38
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.721
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.20 =     256.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.20 TO NODE      2.20 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.00   RAIN INTENSITY(INCH/HOUR) =  4.12
  TOTAL AREA(ACRES) =     0.43   TOTAL RUNOFF(CFS) =      0.61

****************************************************************************
  FLOW PROCESS FROM NODE      2.20 TO NODE      2.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.57  DOWNSTREAM(FEET) =   484.52
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   4.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.40
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.61
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   11.02
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.30 =     261.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.30 TO NODE      2.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.02
  RAINFALL INTENSITY(INCH/HR) =   4.11
  TOTAL STREAM AREA(ACRES) =     0.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.61

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.58     3.78        6.850          0.70
      2        0.61    11.02        4.114          0.43

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        3.79     3.78       6.850
      2        2.76    11.02       4.114

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.79   Tc(MIN.) =    3.78
  TOTAL AREA(ACRES) =        1.1
  LONGEST FLOWPATH FROM NODE      2.00 TO NODE      2.30 =     573.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =      3.78
  PEAK FLOW RATE(CFS)   =       3.79
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

BIOFILTRATION BASIN 1 OUTFLOW - 8 " PVC

****
**

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 0.670

PIPE SLOPE(FEET/FEET) = 0.3000

PIPEFLOW(CFS) = 0.69

MANNINGS FRICTION FACTOR = 0.013000

===
==

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.39

CRITICAL FLOW AREA(SQUARE FEET) = 0.214

CRITICAL FLOW TOP-WIDTH(FEET) = 0.661

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 6.56

CRITICAL FLOW VELOCITY(FEET/SEC.) = 3.228

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.16

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.32

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.55

===
==

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.15

FLOW AREA(SQUARE FEET) = 0.06

FLOW TOP-WIDTH(FEET) = 0.552

FLOW PRESSURE + MOMENTUM(POUNDS) = 16.61

FLOW VELOCITY(FEET/SEC.) = 12.266

FLOW VELOCITY HEAD(FEET) = 2.336

HYDRAULIC DEPTH(FEET) = 0.10

FROUDE NUMBER = 6.772

SPECIFIC ENERGY(FEET) = 2.48

===
==

MODULAR WETLAND SYSTEM 3'Wx0.5'H CURB INLET

****

>>>>CHANNEL INPUT INFORMATION<<<<

CHANNEL Z1(HORIZONTAL/VERTICAL) = 0.00

Z2(HORIZONTAL/VERTICAL) = 0.00

BASEWIDTH(FEET) = 3.00

CONSTANT CHANNEL SLOPE(FEET/FEET) = 0.100000

UNIFORM FLOW(CFS) = 7.31

MANNINGS FRICTION FACTOR = 0.0150

==

NORMAL-DEPTH FLOW INFORMATION:

>>>>> NORMAL DEPTH(FEET) = 0.23

FLOW TOP-WIDTH(FEET) = 3.00

FLOW AREA(SQUARE FEET) = 0.68

HYDRAULIC DEPTH(FEET) = 0.23

FLOW AVERAGE VELOCITY(FEET/SEC.) = 10.74

UNIFORM FROUDE NUMBER = 3.971

PRESSURE + MOMENTUM(POUNDS) = 156.90

AVERAGED VELOCITY HEAD(FEET) = 1.790

SPECIFIC ENERGY(FEET) = 2.017

==

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL FLOW TOP-WIDTH(FEET) = 3.00

CRITICAL FLOW AREA(SQUARE FEET) = 1.71

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.57

CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) = 4.29

CRITICAL DEPTH(FEET) = 0.57

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 90.97

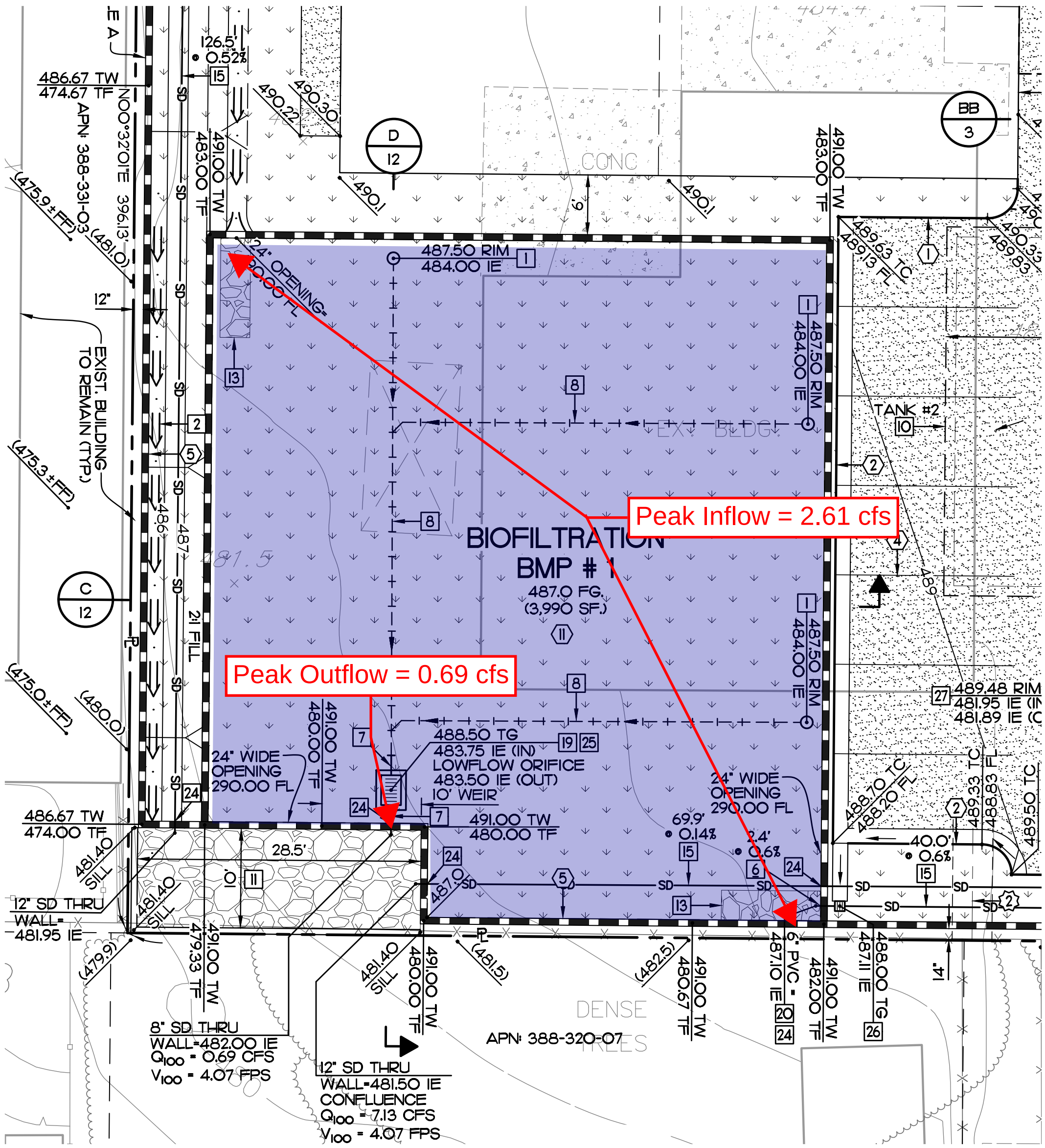
AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) = 0.285

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.854

==

DETENTION CALCULATIONS

BIOFILTRATION BASIN
BMP #1



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KEY NOTES

PVT. IMPROVEMENTS

⟨1⟩ PVT. 6" CURB PER SDRSD G-1 (TYP.).

⟨2⟩ PVT. 6" CURB/GUTTER TYPE G PER SDRSD G-2 (TYP.).

⟨4⟩ STRIPING PER BUILDING PLANS.

⟨5⟩ RETAINING WALL PLAN/PROFILE PER SHT'S 24-27.

⟨11⟩ ALL PROPOSED VEGETATION TO BE CONSTRUCTED/INSTALLED WITHIN BIOFILTRATION BASIN AND TREE WELLS SHALL BE CONFORMANCE WITH APPROVED LANDSCAPE AND IRRIGATION PLAN NO. PDS2020-LP-20-088, AND SHALL BE INCLUDED IN PROJECT SWQMP.

PVT. STORM DRAIN

[1] PVT. STORM DRAIN CLEANOUT PER DETAIL 1 ON SHT. 2.

[2] PVT. DRAINAGE DITCH TYPE D PER SDRSD D-75 (TYP.).

[6] PVT. 6" PVC SDR-35 PER SDRSD D-60.

[7] PVT. 8" PVC SDR-35 PER SDRSD D-60.

[8] PVT. 8" PVC SDR-35 PERFORATED PIPE.

[10] PVT. BRENTWOOD STORMTANK #2 SYSTEM (LAYFIELD) PER DETAILS ON SHT'S 15-23.

[11] PVT. NO. 2 BACKING (10'X28.5'X1.1' THICK) ROCK RIP-RAP PER SDRSD D-40, TYPE 2.

[13] PVT. 3"-6" ROCKS (3'X10'X0.7' THICK).

[15] PVT. 12" PVC SDR-35 PER SDRSD D-60.

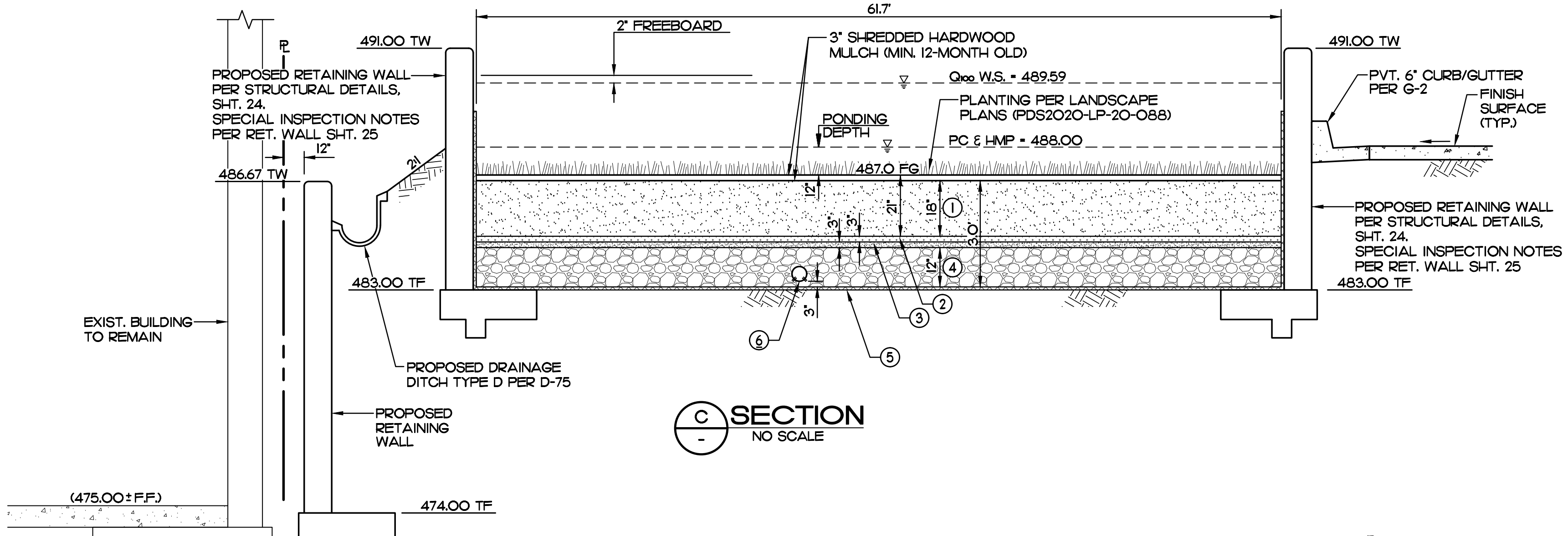
[19] MARK ALL INLETS WITH THE WORDS "NO DUMPING-DRAINS TO WATERWAYS" OR SIMILAR. SEE STENCIL TEMPLATE ON SHT. 10.

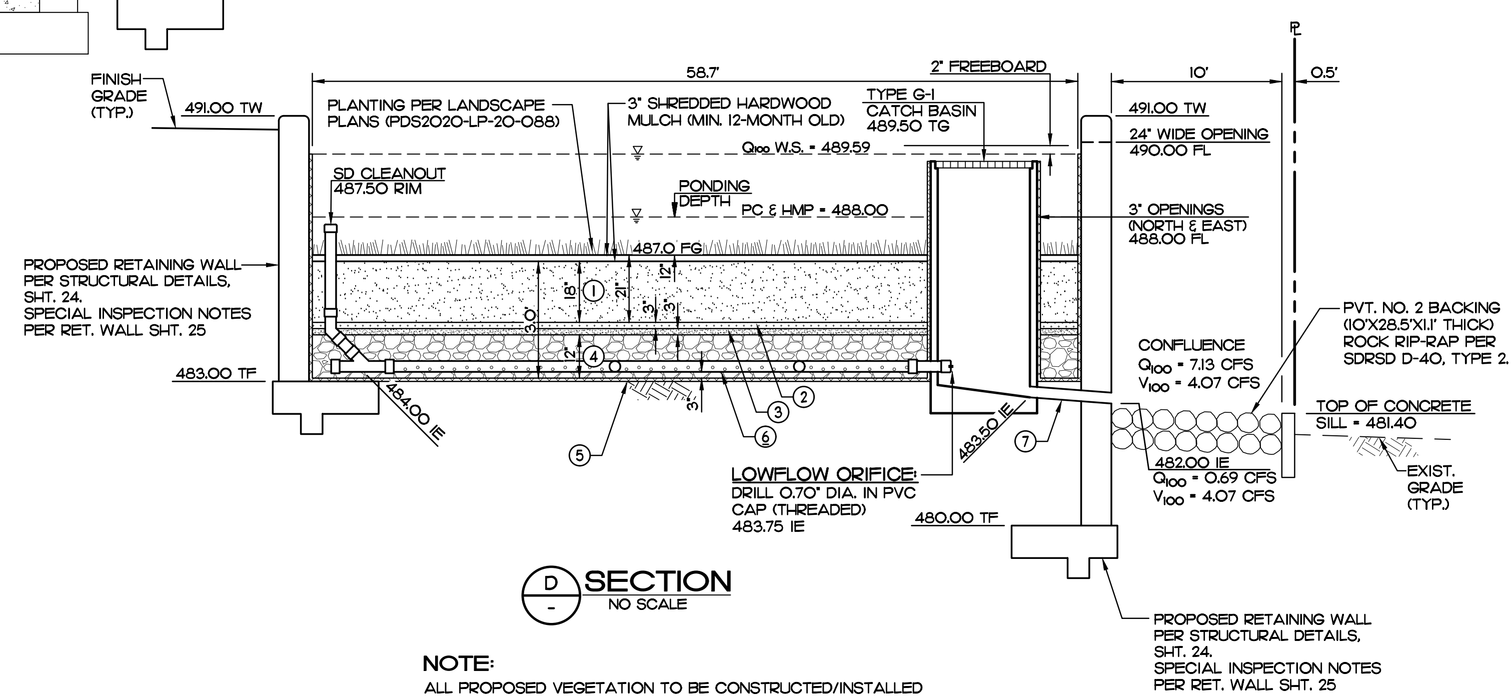
[24] STORM DRAIN PIPE THRU STEM/ FOOTING PER DETAIL 3, SHT. 14.

[25] PVT. CATCH BASIN TYPE G-1 PER SDRSD D-08.

[27] STORM DRAIN CLEANOUT TYPE A PER SDRSD D-09 W/ WEIR & 1" LOWFLOW ORIFICE. SEE DETAIL 5, SHT. 14.

BMP #1- BIOFILTRATION BASIN





NOTE:

ALL PROPOSED VEGETATION TO BE CONSTRUCTED/INSTALLED WITHIN BIOFILTRATION BASIN AND TREE WELLS SHALL BE CONFORMANCE WITH APPROVED LANDSCAPE AND IRRIGATION PLAN NO. PDS2020-LP-20-088, AND SHALL BE INCLUDED IN PROJECT SWQMP.

KEY NOTES

1. BIORETENTION SOIL MEDIA (BSM) (5INCH/HR MIN. PERCOLATION RATE) PER BSM MIXTURE RIGHT.
2. 3" CLEAN & WASHED ASTMC 33 FINE AGGREGATE SAND.
3. 3" LAYER WASHED ASTM 8 STONE.
4. CLASS 2 PERMEABLE MATERIAL PER CALTRANS 68-2.02F(3).
5. IMPERMEABLE LINER (30 MIL PVC GEOMEMBRANE BY EPI OR APPROVED EQUAL) PER MANUFACTURER'S SPECIFICATIONS.
6. 8" PVC PERFORATED PIPE @ 0.5% SLOPE.
7. 8" PVC SDR-35 @ 0.5% SLOPE.

BSM MIXTURE[2,3]

BMP COMPOSITION	SAND	SANDY LOAM			COMPOST
		SAND	SILT	CLAY	
VOLUME	65%	20%			15%
WEIGHT	85% - 90%		10% MAX.	5% MAX.	9% MAX.[1]

1. [1]9% COMPOST BY WEIGHT SHOULD PRIMARILY FALL INTO SAND COMPONENT (SEE COMPOST GRADATION LIMITS RIGHT (ASTM D422 OR APPROVED EQUAL) AND SHOULD RESULT IN APPROXIMATELY 2%-5% ORGANIC MATTER BY WEIGHT.
2. EXTRACTABLE NUTRIENT: PHOSPHORUS SHOULD BE 15% MAX. MG/KG DRY WEIGHT.
3. FOR BSM SPECIFICATIONS, SEE APPENDIX G IN COUNTY OF SAN DIEGO LID MANUAL (JULY, 2014) AND APPENDIX F.2 OF THE COUNTY OF SAN DIEGO 2020 BMP DESIGN MANUAL.

COMPOST GRADATION

SIEVE SIZE	PERCENT PASSING (BY WEIGHT)	
	MIN.	MAX.
1/2 INCH.	97	100
NO. 200	0	5

SECTIONS - BIOFILTRATION #1

KEY NOTES

1. BIORETENTION SOIL MEDIA (BSM) (5INCH/HR MIN. PERCOLATION RATE) PER BSM MIXTURE RIGHT.
2. 3" CLEAN & WASHED ASTMC 33 FINE AGGREGATE SAND.
3. 3" LAYER WASHED ASTM 8 STONE.
4. CLASS 2 PERMEABLE MATERIAL PER CALTRANS 68-2.02F(3).
5. IMPERMEABLE LINER (30 MIL PVC GEOMEMBRANE BY EPI OR APPROVED EQUAL) PER MANUFACTURER'S SPECIFICATIONS.
6. 8" PVC PERFORATED PIPE @ 0.5% SLOPE.
7. 8" PVC SDR-35 @ 0.5% SLOPE.

BSM MIXTURE[2,3]

BMP COMPOSITION	SAND	SANDY LOAM			COMPOST
		SAND	SILT	CLAY	
VOLUME	65%	20%			15%
WEIGHT	85% - 90%		10% MAX.	5% MAX.	9% MAX.[1]

1. [1]9% COMPOST BY WEIGHT SHOULD PRIMARILY FALL INTO SAND COMPONENT (SEE COMPOST GRADATION LIMITS RIGHT (ASTM D422 OR APPROVED EQUAL) AND SHOULD RESULT IN APPROXIMATELY 2%-5% ORGANIC MATTER BY WEIGHT.
2. EXTRACTABLE NUTRIENT: PHOSPHORUS SHOULD BE 15% MAX. MG/KG DRY WEIGHT.
3. FOR BSM SPECIFICATIONS, SEE APPENDIX G IN COUNTY OF SAN DIEGO LID MANUAL (JULY, 2014) AND APPENDIX F.2 OF THE COUNTY OF SAN DIEGO 2020 BMP DESIGN MANUAL.

COMPOST GRADATION

SIEVE SIZE	PERCENT PASSING (BY WEIGHT)	
	MIN.	MAX.
1/2 INCH.	97	100
NO. 200	0	5

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 2 - BMP #1

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	488.00	3,990	0	0
0.50	488.50	3,990	1,995	1,995
1.50	489.50	3,990	3,990	5,985
2.00	490.00	3,990	1,995	7,980

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.3	0.0	0.0
Span in	= 0.0	0.3	0.0	0.0
No. Barrels	= 0	1	0	0
Invert El. ft	= 0.00	488.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.013
Orif. Coeff.	= 0.60	0.60	0.00	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 489.50	0.00	0.00	0.00
Weir Coeff.	= 2.50	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	488.00	---	0.00	---	---	0.00	---	---	---	---	0.00
0.05	200	488.05	---	0.00	---	---	0.00	---	---	---	---	0.00
0.10	399	488.10	---	0.00	---	---	0.00	---	---	---	---	0.00
0.15	599	488.15	---	0.00	---	---	0.00	---	---	---	---	0.00
0.20	798	488.20	---	0.00	---	---	0.00	---	---	---	---	0.00
0.25	998	488.25	---	0.00	---	---	0.00	---	---	---	---	0.00
0.30	1,197	488.30	---	0.00	---	---	0.00	---	---	---	---	0.00
0.35	1,397	488.35	---	0.00	---	---	0.00	---	---	---	---	0.00
0.40	1,596	488.40	---	0.00	---	---	0.00	---	---	---	---	0.00
0.45	1,796	488.45	---	0.00	---	---	0.00	---	---	---	---	0.00
0.50	1,995	488.50	---	0.00	---	---	0.00	---	---	---	---	0.00
0.60	2,394	488.60	---	0.00	---	---	0.00	---	---	---	---	0.00
0.70	2,793	488.70	---	0.00	---	---	0.00	---	---	---	---	0.00
0.80	3,192	488.80	---	0.00	---	---	0.00	---	---	---	---	0.00
0.90	3,591	488.90	---	0.00	---	---	0.00	---	---	---	---	0.00
1.00	3,990	489.00	---	0.00	---	---	0.00	---	---	---	---	0.00
1.10	4,389	489.10	---	0.00	---	---	0.00	---	---	---	---	0.00
1.20	4,788	489.20	---	0.00	---	---	0.00	---	---	---	---	0.00
1.30	5,187	489.30	---	0.00	---	---	0.00	---	---	---	---	0.00
1.40	5,586	489.40	---	0.00	---	---	0.00	---	---	---	---	0.00
1.50	5,985	489.50	---	0.00	---	---	0.00	---	---	---	---	0.00
1.55	6,185	489.55	---	0.00	---	---	0.28	---	---	---	---	0.28
1.60	6,384	489.60	---	0.00	---	---	0.79	---	---	---	---	0.79
1.65	6,584	489.65	---	0.00	---	---	1.45	---	---	---	---	1.45
1.70	6,783	489.70	---	0.00	---	---	2.24	---	---	---	---	2.24
1.75	6,983	489.75	---	0.00	---	---	3.12	---	---	---	---	3.13
1.80	7,182	489.80	---	0.00	---	---	4.11	---	---	---	---	4.11
1.85	7,382	489.85	---	0.00	---	---	5.17	---	---	---	---	5.18
1.90	7,581	489.90	---	0.00	---	---	6.32	---	---	---	---	6.32
1.95	7,781	489.95	---	0.00	---	---	7.54	---	---	---	---	7.55
2.00	7,980	490.00	---	0.00	---	---	8.84	---	---	---	---	8.84

Hydrograph Plot

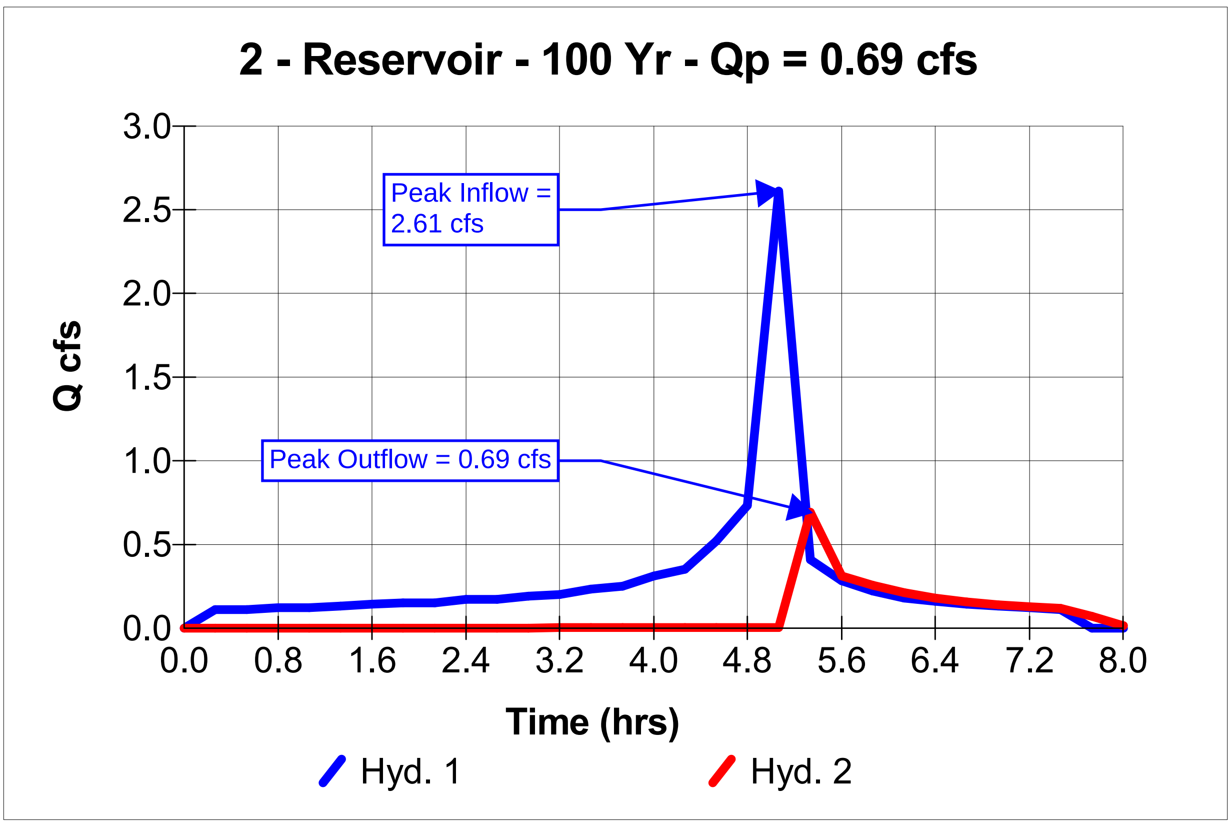
Hyd. No. 2

BMP #1

Hydrograph type	= Reservoir	Peak discharge	= 0.69 cfs
Storm frequency	= 100 yrs	Time interval	= 16 min
Inflow hyd. No.	= 1	Reservoir name	= BMP #1
Max. Elevation	= 489.59 ft	Max. Storage	= 6,344 cuft

Storage Indication method used.

Hydrograph Volume = 4,586 cuft



Hydrograph Report

Hyd. No. 2

BMP #1

Hydrograph type	= Reservoir	Peak discharge	= 0.69 cfs
Storm frequency	= 100 yrs	Time interval	= 16 min
Inflow hyd. No.	= 1	Reservoir name	= BMP #1
Max. Elevation	= 489.59 ft	Max. Storage	= 6,344 cuft

Storage Indication method used.

Outflow hydrograph volume = 4,586 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
5.33	0.41	489.59 <<	-----	0.00	-----	-----	0.69	-----	-----	-----	-----	0.69 <<
5.60	0.28	489.55	-----	0.00	-----	-----	0.31	-----	-----	-----	-----	0.31
5.87	0.22	489.55	-----	0.00	-----	-----	0.25	-----	-----	-----	-----	0.25
6.13	0.18	489.54	-----	0.00	-----	-----	0.21	-----	-----	-----	-----	0.21
6.40	0.16	489.53	-----	0.00	-----	-----	0.18	-----	-----	-----	-----	0.18
6.67	0.14	489.53	-----	0.00	-----	-----	0.15	-----	-----	-----	-----	0.16
6.93	0.13	489.52	-----	0.00	-----	-----	0.14	-----	-----	-----	-----	0.14
7.20	0.12	489.52	-----	0.00	-----	-----	0.13	-----	-----	-----	-----	0.13
7.47	0.11	489.52	-----	0.00	-----	-----	0.12	-----	-----	-----	-----	0.12
7.73	0.00	489.51	-----	0.00	-----	-----	0.07	-----	-----	-----	-----	0.07
8.00	0.00	489.50	-----	0.00	-----	-----	0.01	-----	-----	-----	-----	0.01

...End

Hydrograph Plot

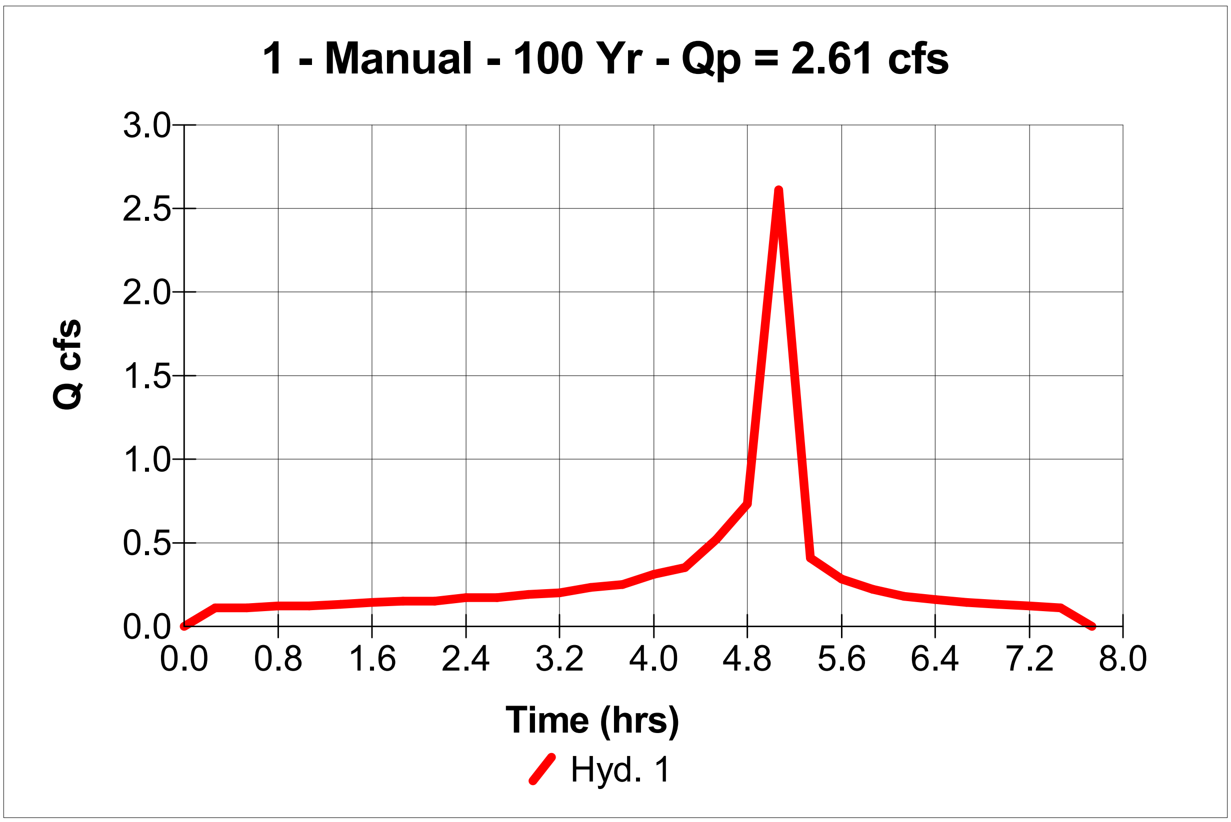
Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

DMA #1

Hydrograph type	= Manual	Peak discharge	= 2.61 cfs
Storm frequency	= 100 yrs	Time interval	= 16 min

Hydrograph Volume = 8,170 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

DMA #1

Hydrograph type	= Manual	Peak discharge	= 2.61 cfs
Storm frequency	= 100 yrs	Time interval	= 16 min

Hydrograph Volume = 8,170 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
0.27	0.11
0.53	0.11
0.80	0.12
1.07	0.12
1.33	0.13
1.60	0.14
1.87	0.15
2.13	0.15
2.40	0.17
2.67	0.17
2.93	0.19
3.20	0.20
3.47	0.23
3.73	0.25
4.00	0.31
4.27	0.35
4.53	0.52
4.80	0.73
5.07	2.61 <<
5.33	0.41
5.60	0.28
5.87	0.22
6.13	0.18
6.40	0.16
6.67	0.14
6.93	0.13
7.20	0.12
7.47	0.11

...End

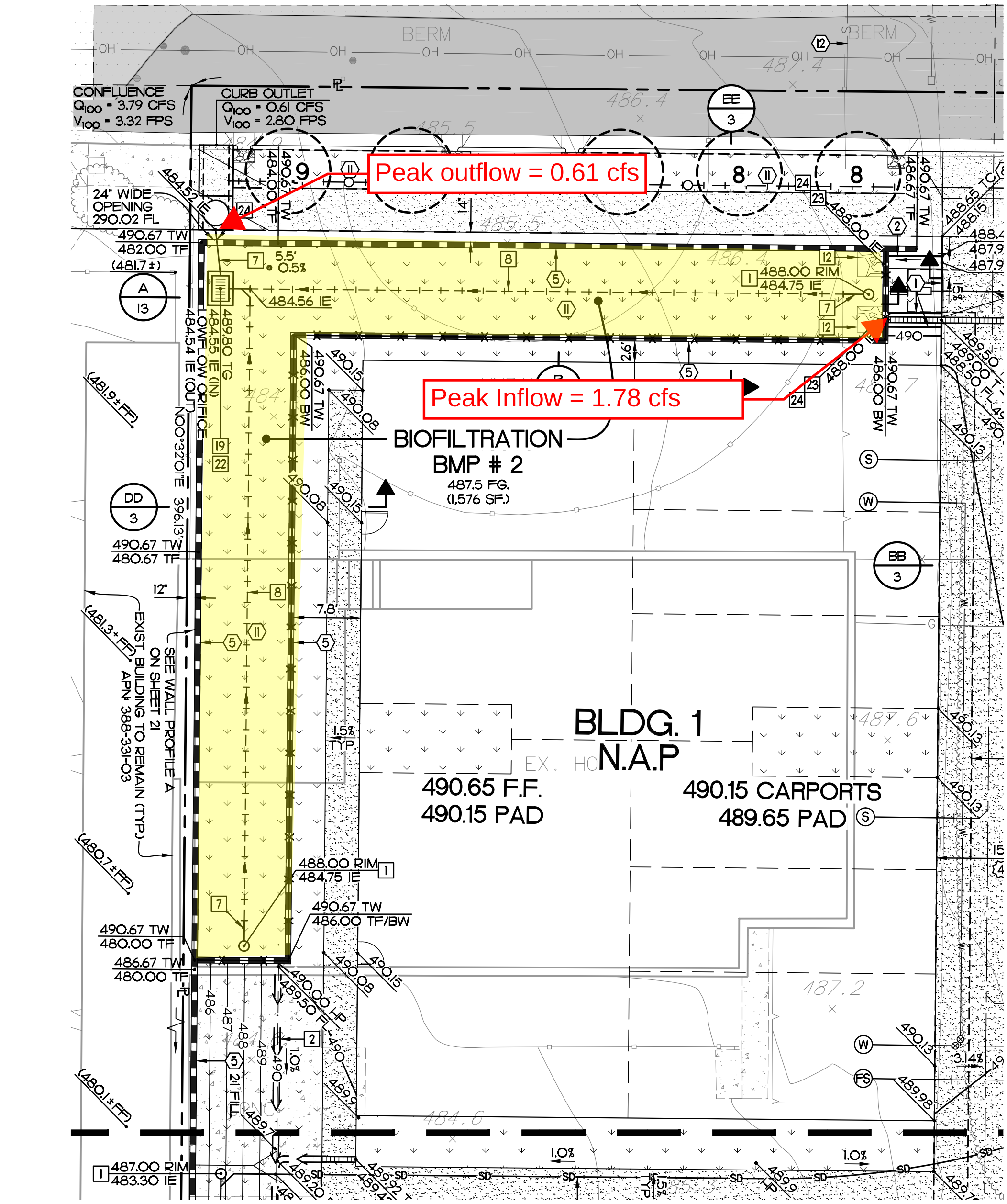
Hydrograph File Name	Inflow BMP #1	
Time of Concentration	15.82	Minutes
6-Hour Rainfall	2.6	Inches
Basin Area	0.94	Acres
Runoff Coefficient	0.85	Unitless
Intensity (I)	3.259	In/hr
Peak Discharge	2.61	CFS
N=	23	

Storm Vol. 7,568 CF

N	Rainfall $P_{T(N)}$ (inches)	Rainfall P_N (inches)	Peak Discharge Q_N (cfs)	Time (min)
1	0.86	0.86	2.61	247.91
2	1.10	0.24	0.73	232.09
3	1.27	0.17	0.52	216.27
4	1.41	0.14	0.41	263.73
5	1.52	0.12	0.35	200.45
6	1.62	0.10	0.31	184.63
7	1.71	0.09	0.28	279.55
8	1.80	0.08	0.25	168.81
9	1.87	0.08	0.23	152.99
10	1.95	0.07	0.22	295.37
11	2.01	0.07	0.20	137.17
12	2.08	0.06	0.19	121.35
13	2.14	0.06	0.18	311.19
14	2.19	0.06	0.17	105.53
15	2.25	0.05	0.17	89.71
16	2.30	0.05	0.16	327.01
17	2.35	0.05	0.15	73.89
18	2.40	0.05	0.15	58.07
19	2.44	0.05	0.14	342.83
20	2.49	0.04	0.14	42.25
21	2.53	0.04	0.13	26.43
22	2.57	0.04	0.13	358.65
23	2.62	0.04	0.12	10.61
24	2.66	0.04	0.12	-5.21
25	2.69	0.04	0.12	374.47
26	2.73	0.04	0.11	-21.03
27	2.77	0.04	0.11	-36.85
28	2.80	0.04	0.11	390.29

N	Rainfall P_N (inches)	Peak Discharge Q_N (cfs)	Time (min)
-	0.00	0.00	0
27	0.04	0.11	16
26	0.04	0.11	32
24	0.04	0.12	47
23	0.04	0.12	63
21	0.04	0.13	79
20	0.04	0.14	95
18	0.05	0.15	111
17	0.05	0.15	127
15	0.05	0.17	142
14	0.06	0.17	158
12	0.06	0.19	174
11	0.07	0.20	190
9	0.08	0.23	206
8	0.08	0.25	221
6	0.10	0.31	237
5	0.12	0.35	253
3	0.17	0.52	269
2	0.24	0.73	285
1	0.86	2.61	301
4	0.14	0.41	316
7	0.09	0.28	332
10	0.07	0.22	348
13	0.06	0.18	364
16	0.05	0.16	380
19	0.05	0.14	396
22	0.04	0.13	411
25	0.04	0.12	427
28	0.04	0.11	443
-	0	0.00	459

BIOFILTRATION BASIN
BMP #2



KEY NOTES

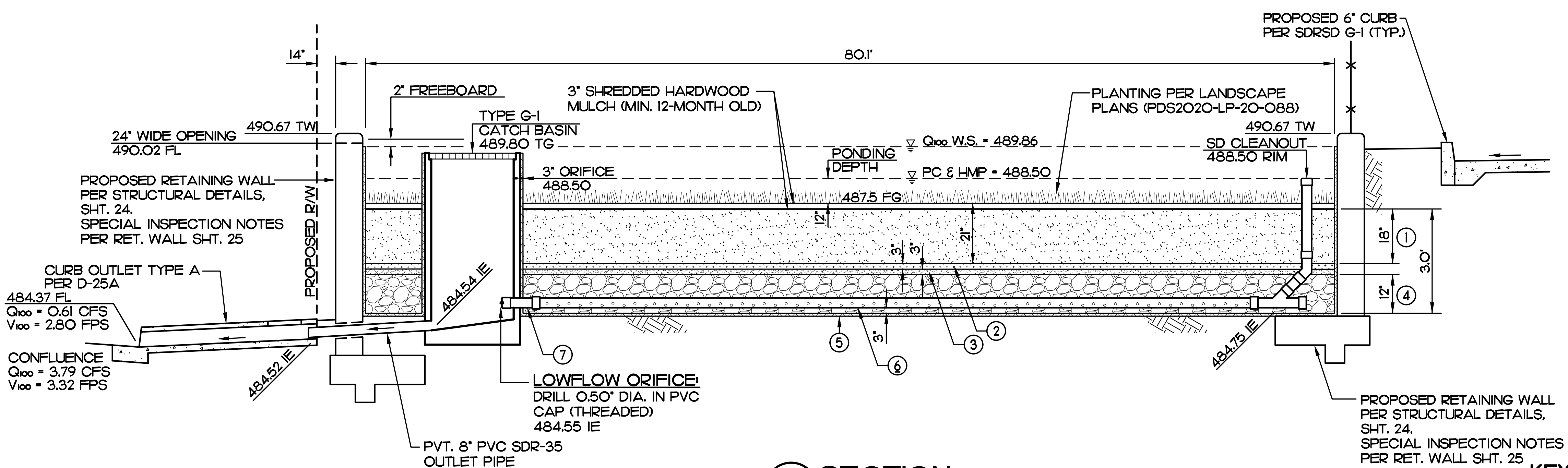
PVT. IMPROVEMENTS

1. PVT. 6" CURB PER SDRSD G-1 (TYP.).
2. PVT. 6" CURB/GUTTER TYPE G PER SDRSD G-2 (TYP.).
3. 6.5" CONCRETE (560-C-3550) PAVEMENT W/ #4 REBARS @ 18" O.C., BOTH DIRECTIONS.
5. RETAINING WALL PLAN/PROFILE PER SHT'S 22-25.
8. PVT. TOP OF CURB TRANSITION PER DETAIL 2, SHT. 2.
11. ALL PROPOSED VEGETATION TO BE CONSTRUCTED/INSTALLED WITHIN BIOFILTRATION BASIN AND TREE WELLS SHALL BE CONFORMANCE WITH APPROVED LANDSCAPE AND IRRIGATION PLAN NO. PDS2020-LP-20-088, AND SHALL BE INCLUDED IN PROJECT SWQMP.

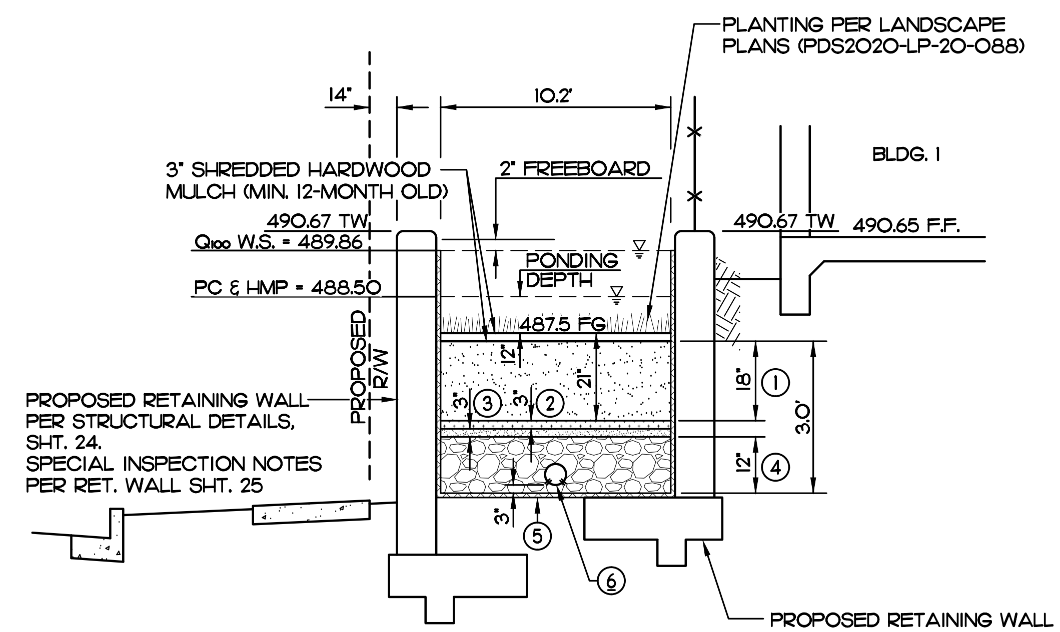
PVT. STORM DRAIN

1. PVT. STORM DRAIN CLEANOUT PER DETAIL 1 ON SHT. 2.
2. PVT. DRAINAGE DITCH TYPE D PER SDRSD D-75 (TYP.).
4. PVT. 4" TRENCH DRAIN PER DETAIL 3, SHT. 2.
7. PVT. 8" PVC SDR-35 PER SDRSD D-60.
8. PVT. 8" PVC SDR-35 PERFORATED PIPE.
12. PVT. 3"-6" ROCKS (3'X3'X0.7' THICK).
19. MARK ALL INLETS WITH THE WORDS "NO DUMPING-DRAINS TO WATERWAYS" OR SIMILAR. SEE STENCIL TEMPLATE ON SHT. 10.
22. PVT. CATCH BASIN TYPE G-1 PER SDRSD D-08.
23. 6" SLEEVE W/ BACK WATER CHECK VALVE (CCV 2HG SOLUTIONS) PER DETAIL 2, SHT. 14.
24. STORM DRAIN PIPE THRU STEM/ FOOTING PER DETAIL 3, SHT. 14.

BMP #2- BIOFILTRATION BASIN



A SECTION
NO SCALE



B SECTION
NO SCALE

NOTE:

ALL PROPOSED VEGETATION TO BE CONSTRUCTED/INSTALLED WITHIN BIOFILTRATION BASIN AND TREE WELLS SHALL BE CONFORMANCE WITH APPROVED LANDSCAPE AND IRRIGATION PLAN NO. PDS2020-LP-20-088, AND SHALL BE INCLUDED IN PROJECT SWQMP.

SECTIONS - BIOFILTRATION #2

KEY NOTES

1. BIORETENTION SOIL MEDIA (BSM) (5INCH/HR MIN. PERCOLATION RATE) PER BSM MIXTURE RIGHT.
2. 3" CLEAN & WASHED ASTMC 33 FINE AGGREGATE SAND.
3. 3" LAYER WASHED ASTM 8 STONE.
4. CLASS 2 PERMEABLE MATERIAL PER CALTRANS 68-2.02F(3).
5. IMPERMEABLE LINER (30 MIL PVC GEOMEMBRANE BY EPI OR APPROVED EQUAL) PER MANUFACTURER'S SPECIFICATIONS.
6. 8" PVC PERFORATED PIPE @ 0.5% SLOPE.
7. 8" PVC SDR-35 @ 0.5% SLOPE.

BSM MIXTURE[2,3]

BMP COMPOSITION	SAND	SANDY LOAM			COMPOST
		SAND	SILT	CLAY	
VOLUME	65%	20%			15%
WEIGHT	85% - 90%		10% MAX.	5% MAX.	9% MAX.[1]

1. [1]9% COMPOST BY WEIGHT SHOULD PRIMARILY FALL INTO SAND COMPONENT (SEE COMPOST GRADATION LIMITS RIGHT (ASTM D422 OR APPROVED EQUAL) AND SHOULD RESULT IN APPROXIMATELY 2%-5% ORGANIC MATTER BY WEIGHT.
2. EXTRACTABLE NUTRIENT: PHOSPHORUS SHOULD BE 15% MAX. MG/KG DRY WEIGHT.
3. FOR BSM SPECIFICATIONS, SEE APPENDIX G IN COUNTY OF SAN DIEGO LID MANUAL (JULY, 2014) AND APPENDIX F.2 OF THE COUNTY OF SAN DIEGO 2020 BMP DESIGN MANUAL.

COMPOST GRADATION

SIEVE SIZE	PERCENT PASSING (BY WEIGHT)	
	MIN.	MAX.
1/2 INCH.	97	100
NO. 200	0	5

Hydrograph Plot

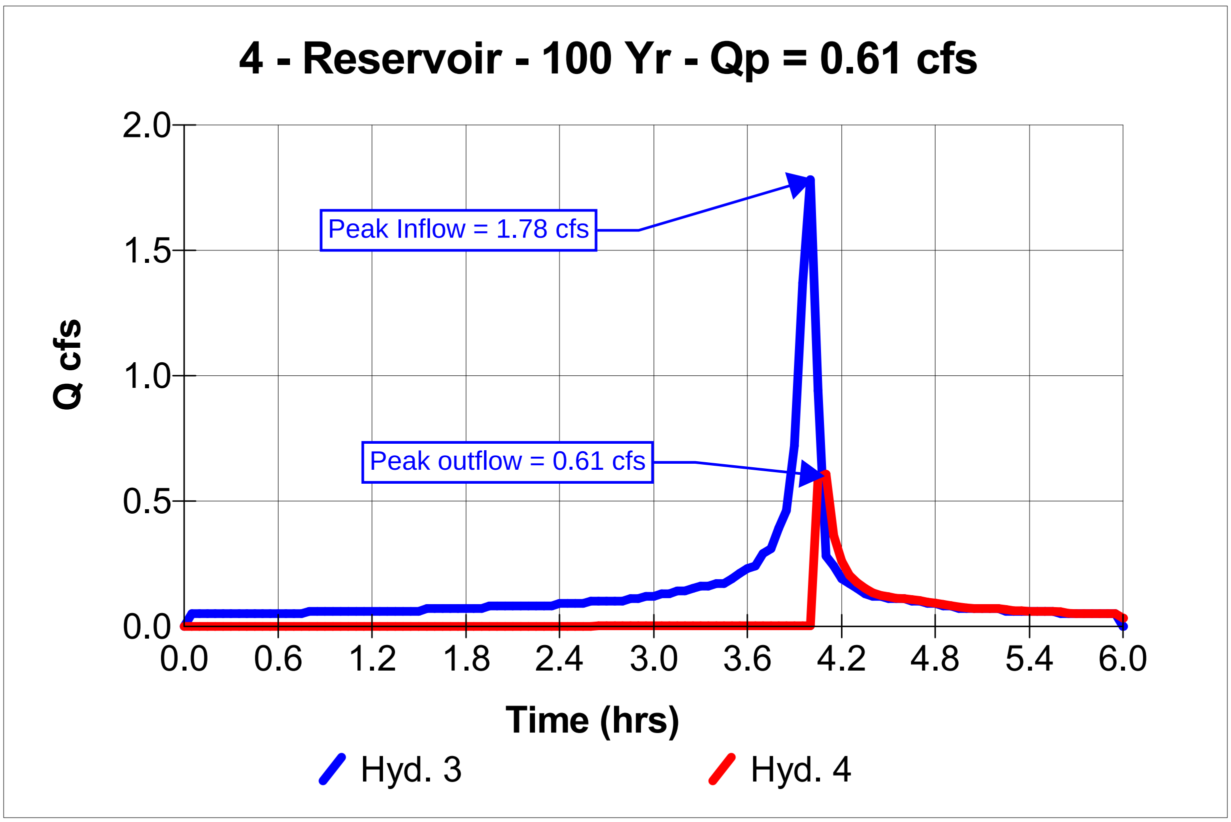
Hyd. No. 4

BMP #2

Hydrograph type	= Reservoir	Peak discharge	= 0.61 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Inflow hyd. No.	= 3	Reservoir name	= BMP #2
Max. Elevation	= 489.86 ft	Max. Storage	= 2,149 cuft

Storage Indication method used.

Hydrograph Volume = 1,293 cuft



Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 4 - BMP #2

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	488.50	1,576	0	0
1.00	489.50	1,576	1,576	1,576
2.00	490.50	1,576	1,576	3,152
2.17	490.67	1,576	268	3,420

Culvert / Orifice Structures

Midflow orifice

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.3	0.0	0.0
Span in	= 0.0	0.3	0.0	0.0
No. Barrels	= 0	1	0	0
Invert El. ft	= 0.00	488.50	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

Catch Basin

	[A]	[B]	[C]	[D]
Crest Len ft	= 12.00	0.00	0.00	0.00
Crest El. ft	= 489.80	0.00	0.00	0.00
Weir Coeff.	= 2.50	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	488.50	---	0.00	---	---	0.00	---	---	---	---	0.00
0.10	158	488.60	---	0.00	---	---	0.00	---	---	---	---	0.00
0.20	315	488.70	---	0.00	---	---	0.00	---	---	---	---	0.00
0.30	473	488.80	---	0.00	---	---	0.00	---	---	---	---	0.00
0.40	630	488.90	---	0.00	---	---	0.00	---	---	---	---	0.00
0.50	788	489.00	---	0.00	---	---	0.00	---	---	---	---	0.00
0.60	946	489.10	---	0.00	---	---	0.00	---	---	---	---	0.00
0.70	1,103	489.20	---	0.00	---	---	0.00	---	---	---	---	0.00
0.80	1,261	489.30	---	0.00	---	---	0.00	---	---	---	---	0.00
0.90	1,418	489.40	---	0.00	---	---	0.00	---	---	---	---	0.00
1.00	1,576	489.50	---	0.00	---	---	0.00	---	---	---	---	0.00
1.10	1,734	489.60	---	0.00	---	---	0.00	---	---	---	---	0.00
1.20	1,891	489.70	---	0.00	---	---	0.00	---	---	---	---	0.00
1.30	2,049	489.80	---	0.00	---	---	0.00	---	---	---	---	0.00
1.40	2,206	489.90	---	0.00	---	---	0.95	---	---	---	---	0.95
1.50	2,364	490.00	---	0.00	---	---	2.68	---	---	---	---	2.69
1.60	2,522	490.10	---	0.00	---	---	4.93	---	---	---	---	4.93
1.70	2,679	490.20	---	0.00	---	---	7.59	---	---	---	---	7.59
1.80	2,837	490.30	---	0.00	---	---	10.61	---	---	---	---	10.61
1.90	2,994	490.40	---	0.00	---	---	13.95	---	---	---	---	13.95
2.00	3,152	490.50	---	0.00	---	---	17.57	---	---	---	---	17.57
2.02	3,179	490.52	---	0.00	---	---	18.21	---	---	---	---	18.22
2.03	3,206	490.53	---	0.00	---	---	18.87	---	---	---	---	18.87
2.05	3,232	490.55	---	0.00	---	---	19.52	---	---	---	---	19.53
2.07	3,259	490.57	---	0.00	---	---	20.19	---	---	---	---	20.19
2.09	3,286	490.59	---	0.00	---	---	20.87	---	---	---	---	20.87
2.10	3,313	490.60	---	0.00	---	---	21.55	---	---	---	---	21.55
2.12	3,340	490.62	---	0.00	---	---	22.24	---	---	---	---	22.24
2.14	3,366	490.64	---	0.00	---	---	22.93	---	---	---	---	22.93
2.15	3,393	490.65	---	0.00	---	---	23.63	---	---	---	---	23.64
2.17	3,420	490.67	---	0.00	---	---	24.35	---	---	---	---	24.35

Hydrograph Report

Hyd. No. 4

BMP #2

Hydrograph type	= Reservoir	Peak discharge	= 0.61 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Inflow hyd. No.	= 3	Reservoir name	= BMP #2
Max. Elevation	= 489.86 ft	Max. Storage	= 2,149 cuft

Storage Indication method used.

Outflow hydrograph volume = 1,293 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
4.05	0.94	489.86	-----	0.00	-----	-----	0.59	-----	-----	-----	-----	0.59
4.10	0.28	489.86 <<	-----	0.00	-----	-----	0.60	-----	-----	-----	-----	0.61 <<
4.15	0.24	489.84	-----	0.00	-----	-----	0.36	-----	-----	-----	-----	0.36
4.20	0.19	489.83	-----	0.00	-----	-----	0.26	-----	-----	-----	-----	0.26
4.25	0.17	489.82	-----	0.00	-----	-----	0.20	-----	-----	-----	-----	0.20
4.30	0.15	489.82	-----	0.00	-----	-----	0.17	-----	-----	-----	-----	0.17
4.35	0.13	489.82	-----	0.00	-----	-----	0.15	-----	-----	-----	-----	0.15
4.40	0.12	489.81	-----	0.00	-----	-----	0.13	-----	-----	-----	-----	0.13
4.45	0.12	489.81	-----	0.00	-----	-----	0.12	-----	-----	-----	-----	0.12
4.50	0.11	489.81	-----	0.00	-----	-----	0.12	-----	-----	-----	-----	0.12
4.55	0.11	489.81	-----	0.00	-----	-----	0.11	-----	-----	-----	-----	0.11
4.60	0.11	489.81	-----	0.00	-----	-----	0.11	-----	-----	-----	-----	0.11
4.65	0.10	489.81	-----	0.00	-----	-----	0.10	-----	-----	-----	-----	0.11
4.70	0.10	489.81	-----	0.00	-----	-----	0.10	-----	-----	-----	-----	0.10
4.75	0.09	489.81	-----	0.00	-----	-----	0.10	-----	-----	-----	-----	0.10
4.80	0.09	489.81	-----	0.00	-----	-----	0.09	-----	-----	-----	-----	0.09
4.85	0.08	489.81	-----	0.00	-----	-----	0.09	-----	-----	-----	-----	0.09
4.90	0.08	489.81	-----	0.00	-----	-----	0.08	-----	-----	-----	-----	0.08
4.95	0.07	489.81	-----	0.00	-----	-----	0.08	-----	-----	-----	-----	0.08
5.00	0.07	489.81	-----	0.00	-----	-----	0.07	-----	-----	-----	-----	0.07
5.05	0.07	489.81	-----	0.00	-----	-----	0.07	-----	-----	-----	-----	0.07
5.10	0.07	489.81	-----	0.00	-----	-----	0.07	-----	-----	-----	-----	0.07
5.15	0.07	489.81	-----	0.00	-----	-----	0.07	-----	-----	-----	-----	0.07
5.20	0.07	489.81	-----	0.00	-----	-----	0.07	-----	-----	-----	-----	0.07
5.25	0.06	489.81	-----	0.00	-----	-----	0.06	-----	-----	-----	-----	0.07
5.30	0.06	489.81	-----	0.00	-----	-----	0.06	-----	-----	-----	-----	0.06
5.35	0.06	489.81	-----	0.00	-----	-----	0.06	-----	-----	-----	-----	0.06
5.40	0.06	489.81	-----	0.00	-----	-----	0.06	-----	-----	-----	-----	0.06
5.45	0.06	489.81	-----	0.00	-----	-----	0.06	-----	-----	-----	-----	0.06
5.50	0.06	489.81	-----	0.00	-----	-----	0.06	-----	-----	-----	-----	0.06
5.55	0.06	489.81	-----	0.00	-----	-----	0.06	-----	-----	-----	-----	0.06
5.60	0.05	489.81	-----	0.00	-----	-----	0.05	-----	-----	-----	-----	0.06
5.65	0.05	489.81	-----	0.00	-----	-----	0.05	-----	-----	-----	-----	0.05
5.70	0.05	489.81	-----	0.00	-----	-----	0.05	-----	-----	-----	-----	0.05
5.75	0.05	489.81	-----	0.00	-----	-----	0.05	-----	-----	-----	-----	0.05
5.80	0.05	489.81	-----	0.00	-----	-----	0.05	-----	-----	-----	-----	0.05
5.85	0.05	489.81	-----	0.00	-----	-----	0.05	-----	-----	-----	-----	0.05
5.90	0.05	489.81	-----	0.00	-----	-----	0.05	-----	-----	-----	-----	0.05

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
5.95	0.05	489.81	-----	0.00	-----	-----	0.05	-----	-----	-----	-----	0.05
6.00	0.00	489.80	-----	0.00	-----	-----	0.03	-----	-----	-----	-----	0.03
6.05	0.00	489.80	-----	0.00	-----	-----	0.01	-----	-----	-----	-----	0.01

...End

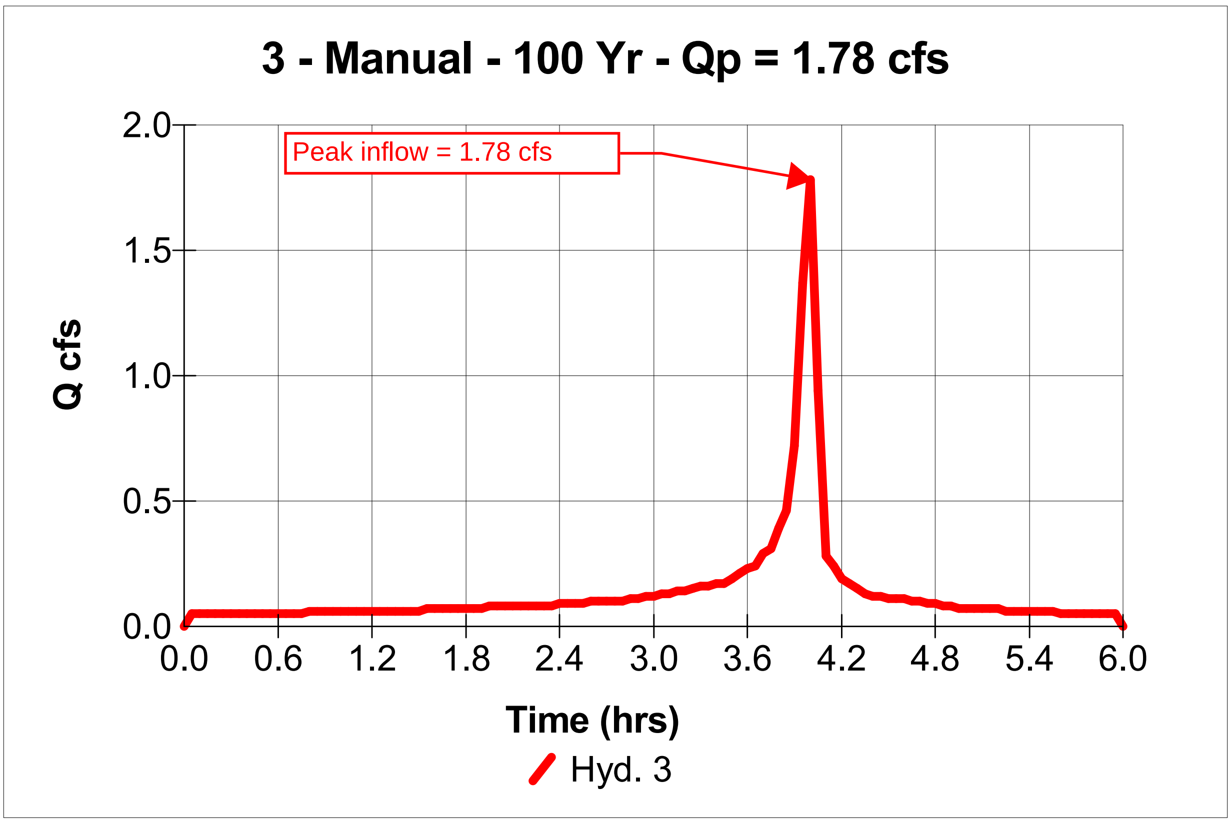
Hydrograph Plot

Hyd. No. 3

DMA #2

Hydrograph type	= Manual	Peak discharge	= 1.78 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min

Hydrograph Volume = 2,923 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

DMA #2

Hydrograph type	= Manual	Peak discharge	= 1.78 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min

Hydrograph Volume = 2,923 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)	Time -- (hrs	Outflow cfs)	Time -- (hrs	Outflow cfs)	Time -- (hrs	Outflow cfs)
0.05	0.05	1.75	0.07	3.45	0.17	5.15	0.07
0.10	0.05	1.80	0.07	3.50	0.19	5.20	0.07
0.15	0.05	1.85	0.07	3.55	0.21	5.25	0.06
0.20	0.05	1.90	0.07	3.60	0.23	5.30	0.06
0.25	0.05	1.95	0.08	3.65	0.24	5.35	0.06
0.30	0.05	2.00	0.08	3.70	0.29	5.40	0.06
0.35	0.05	2.05	0.08	3.75	0.31	5.45	0.06
0.40	0.05	2.10	0.08	3.80	0.39	5.50	0.06
0.45	0.05	2.15	0.08	3.85	0.46	5.55	0.06
0.50	0.05	2.20	0.08	3.90	0.72	5.60	0.05
0.55	0.05	2.25	0.08	3.95	1.37	5.65	0.05
0.60	0.05	2.30	0.08	4.00	1.78 <<	5.70	0.05
0.65	0.05	2.35	0.08	4.05	0.94	5.75	0.05
0.70	0.05	2.40	0.09	4.10	0.28	5.80	0.05
0.75	0.05	2.45	0.09	4.15	0.24	5.85	0.05
0.80	0.06	2.50	0.09	4.20	0.19	5.90	0.05
0.85	0.06	2.55	0.09	4.25	0.17	5.95	0.05
0.90	0.06	2.60	0.10	4.30	0.15		
0.95	0.06	2.65	0.10	4.35	0.13		
1.00	0.06	2.70	0.10	4.40	0.12	*...End*	
1.05	0.06	2.75	0.10	4.45	0.12		
1.10	0.06	2.80	0.10	4.50	0.11		
1.15	0.06	2.85	0.11	4.55	0.11		
1.20	0.06	2.90	0.11	4.60	0.11		
1.25	0.06	2.95	0.12	4.65	0.10		
1.30	0.06	3.00	0.12	4.70	0.10		
1.35	0.06	3.05	0.13	4.75	0.09		
1.40	0.06	3.10	0.13	4.80	0.09		
1.45	0.06	3.15	0.14	4.85	0.08		
1.50	0.06	3.20	0.14	4.90	0.08		
1.55	0.07	3.25	0.15	4.95	0.07		
1.60	0.07	3.30	0.16	5.00	0.07		
1.65	0.07	3.35	0.16	5.05	0.07		
1.70	0.07	3.40	0.17	5.10	0.07		

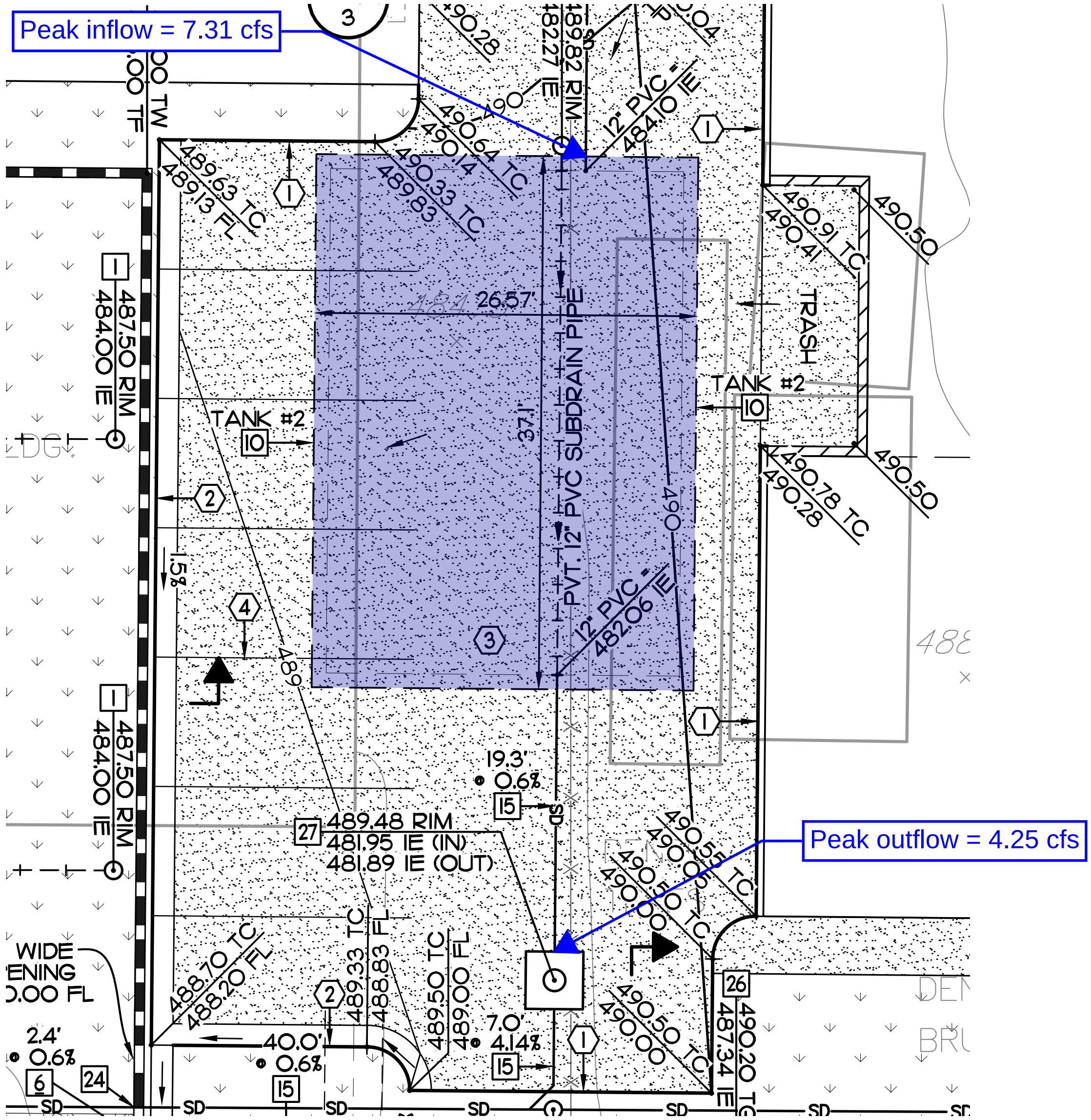
Hydrograph File Name	Inflow BMP #2	
Time of Concentration	6.55	Minutes
6-Hour Rainfall	2.6	Inches
Basin Area	0.43	Acres
Runoff Coefficient	0.72	Unitless
Intensity (I)	5.754	In/hr
Peak Discharge	1.78	CFS
N=	55	

Storm Vol. 2,922 CF

N	Rainfall $P_{T(N)}$ (inches)	Rainfall P_N (inches)	Peak Discharge Q_N (cfs)	Time (min)
1	0.63	0.63	1.78	243.276
2	0.80	0.18	0.50	236.724
3	0.93	0.12	0.35	230.172
4	1.03	0.10	0.28	249.828
5	1.11	0.08	0.24	223.62
6	1.19	0.07	0.21	217.068
7	1.25	0.07	0.19	256.38
8	1.31	0.06	0.17	210.516
9	1.37	0.06	0.16	203.964
10	1.42	0.05	0.15	262.932
11	1.47	0.05	0.14	197.412
12	1.52	0.05	0.13	190.86
13	1.56	0.04	0.12	269.484
14	1.60	0.04	0.12	184.308
15	1.64	0.04	0.11	177.756
16	1.68	0.04	0.11	276.036
17	1.72	0.04	0.10	171.204
18	1.75	0.04	0.10	164.652
19	1.79	0.03	0.10	282.588
20	1.82	0.03	0.09	158.1
21	1.85	0.03	0.09	151.548
22	1.88	0.03	0.09	289.14
23	1.91	0.03	0.08	144.996
24	1.94	0.03	0.08	138.444
25	1.97	0.03	0.08	295.692
26	2.00	0.03	0.08	131.892
27	2.02	0.03	0.08	125.34
28	2.05	0.03	0.07	302.244
29	2.08	0.03	0.07	118.788
30	2.10	0.03	0.07	112.236
31	2.13	0.02	0.07	308.796
32	2.15	0.02	0.07	105.684
33	2.17	0.02	0.07	99.132
34	2.20	0.02	0.07	315.348
35	2.22	0.02	0.06	92.58
36	2.24	0.02	0.06	86.028
37	2.26	0.02	0.06	321.9
38	2.29	0.02	0.06	79.476
39	2.31	0.02	0.06	72.924
40	2.33	0.02	0.06	328.452
41	2.35	0.02	0.06	66.372
42	2.37	0.02	0.06	59.82
43	2.39	0.02	0.06	335.004
44	2.41	0.02	0.06	53.268
45	2.43	0.02	0.05	46.716
46	2.45	0.02	0.05	341.556
47	2.46	0.02	0.05	40.164
48	2.48	0.02	0.05	33.612
49	2.50	0.02	0.05	348.108
50	2.52	0.02	0.05	27.06
51	2.54	0.02	0.05	20.508
52	2.55	0.02	0.05	354.66
53	2.57	0.02	0.05	13.956
54	2.59	0.02	0.05	7.404
55	2.61	0.02	0.05	361.212

N	Rainfall P_N (inches)	Peak Discharge Q_N (cfs)	Time (min)
-	0.00	0.00	0
54	0.02	0.05	3
53	0.02	0.05	10
51	0.02	0.05	16
50	0.02	0.05	23
48	0.02	0.05	29
47	0.02	0.05	36
45	0.02	0.05	43
44	0.02	0.06	49
42	0.02	0.06	56
41	0.02	0.06	62
39	0.02	0.06	69
38	0.02	0.06	75
36	0.02	0.06	82
35	0.02	0.06	88
33	0.02	0.07	95
32	0.02	0.07	102
30	0.03	0.07	108
29	0.03	0.07	115
27	0.03	0.08	121
26	0.03	0.08	128
24	0.03	0.08	134
23	0.03	0.08	141
21	0.03	0.09	147
20	0.03	0.09	154
18	0.04	0.10	161
17	0.04	0.10	167
15	0.04	0.11	174
14	0.04	0.12	180
12	0.05	0.13	187
11	0.05	0.14	193
9	0.06	0.16	200
8	0.06	0.17	206
6	0.07	0.21	213
5	0.08	0.24	219
3	0.12	0.35	226
2	0.18	0.50	233
1	0.63	1.78	239
4	0.10	0.28	246
7	0.07	0.19	252
10	0.05	0.15	259
13	0.04	0.12	265
16	0.04	0.11	272
19	0.03	0.10	278
22	0.03	0.09	285
25	0.03	0.08	292
28	0.03	0.07	298
31	0.02	0.07	305
34	0.02	0.07	311
37	0.02	0.06	318
40	0.02	0.06	324
43	0.02	0.06	331
46	0.02	0.05	337
49	0.02	0.05	344
52	0.02	0.05	351
55	0.02	0.05	357
-	0.00	0.00	364

UNDERGROUND DETENTION TANK #2



N

PVT. STORM DRAIN

- 1 PVT. STORM DRAIN CLEANOUT PER DETAIL 1 ON SHT. 2.
- 2 PVT. DRAINAGE DITCH TYPE D PER SDRSD D-75 (TYP.).
- 5 PVT. 4" PVC SDR-35 PER SDRSD D-60.
- 6 PVT. 6" PVC SDR-35 PER SDRSD D-60.
- 7 PVT. 8" PVC SDR-35 PER SDRSD D-60.
- 8 PVT. 8" PVC SDR-35 PERFORATED PIPE.
- 10 PVT. BRENTWOOD STORMTANK #1 & #2 SYSTEM (LAYFIELD) PER DETAILS ON SHT'S 15-23.
- 11 PVT. NO. 2 BACKING (10'X28.5'X1.1' THICK) ROCK RIP-RAP PER SDRSD D-40, TYPE 2.
- 13 PVT. 3"-6" ROCKS (3'X10'X0.7' THICK).
- 15 PVT. 12" PVC SDR-35 PER SDRSD D-60.
- 18 PVT. 6" ATRIUM DRAIN PER DETAIL 5, SHT. 2.
- 19 MARK ALL INLETS WITH THE WORDS "NO DUMPING-DRAINS TO WATERWAYS" OR SIMILAR. SEE STENCIL TEMPLATE ON SHT. 10.
- 20 STORM DRAIN CLEANOUT TYPE A PER SDRSD D-09 W/ 0.81" LOWFLOW ORIFICE.
- 24 STORM DRAIN PIPE THRU STEM/ FOOTING PER DETAIL 3, SHT. 14.
- 25 PVT. MODIFIED CATCH BASIN TYPE G-1 W/ 2-OPENINGS PER SDRSD D-08.
- 26 PVT. 18" CATCH BASIN PER DETAIL 4, SHT. 2.
- 27 STORM DRAIN CLEANOUT TYPE A PER SDRSD D-09 W/ WEIR 1"X2' @ 481.93 ORIFICE. SEE DETAIL 5, SHT. 14.

Low Flow Orifice Discharge

1) $Q = C_d \times A \times (2gH)^{0.5}$ Orifice Discharge Equation

C_d = Orifice Coefficient = 0.60 (sharp, clean edge)

H = Water Head above orifice

g = Gravitational Acceleration = 32.2 ft/s^2

A = Area of the Orifice

BMP	Orifice Coefficient Cd	Orifice Diameter (inches)	Max. Orifice Area (inch^2)	Gravitational Acceleration ft/s^2	H (in)	H (ft)	Orifice Discharge Q (cfs)
Tank #1	0.6	0.81	0.52	32.2	36	3	0.030
Tank #2	0.6	12.0	113.04	32.2	21.24	1.77	5.029

See Drainage report for 100-year water surface elevation in tank.

Drawdown Time

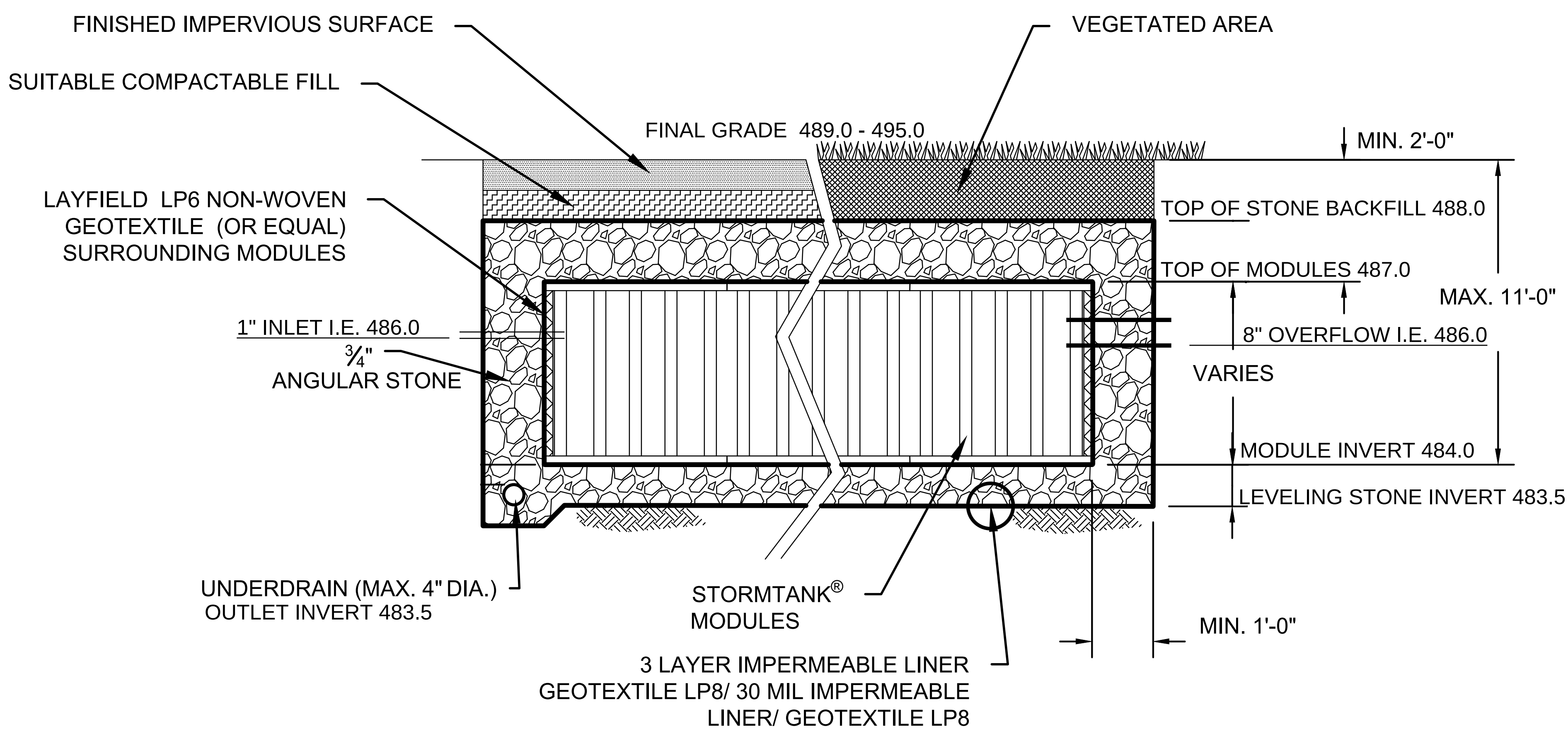
3) $D = V / Q_{\text{Orifice}}$ Drawdown Time

BMP	Volume (cf)	$Q_{orifice}$ (cfs)	Drawdown Time (hours)	Conclusion
Tank #1	12871.0	0.03	119.9	> 96 hours - See Vector Control Plan
Tank #2	2592.0	5.03	0.1	< 96 hours - No Vector Control Required

VCP in project SWQMP.

Prepared by:
Snipes-Dye Associates

11/9/2023



TYPICAL SINGLE STACKED SYSTEM

BASIC CROSS-SECTION

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

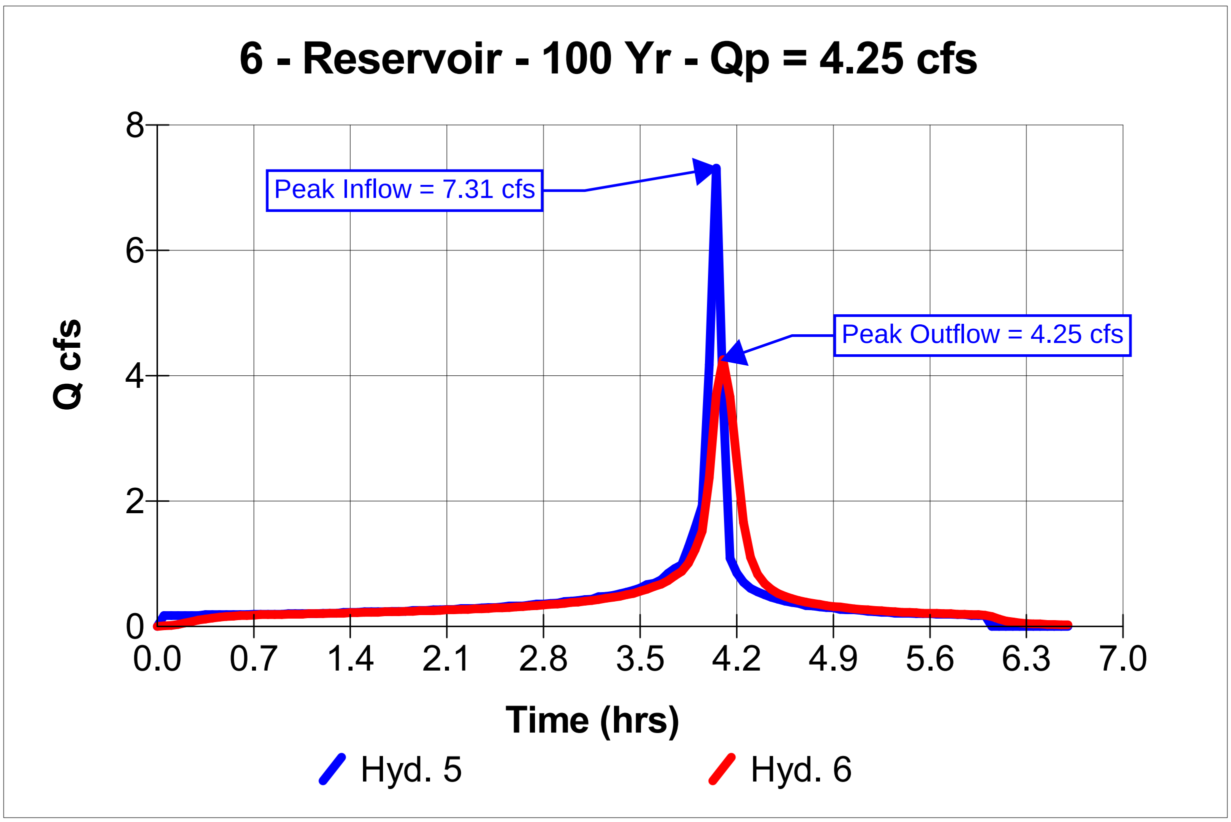
Hyd. No. 6

BMP #3

Hydrograph type	= Reservoir	Peak discharge	= 4.25 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Inflow hyd. No.	= 5	Reservoir name	= BMP #3
Max. Elevation	= 485.52 ft	Max. Storage	= 1,526 cuft

Storage Indication method used.

Hydrograph Volume = 10,189 cuft



OUTLET OF MWS - 12" PVC

****

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 1.000

PIPE SLOPE(FEET/FEET) = 0.1333

PIPEFLOW(CFS) = 7.31

MANNINGS FRICTION FACTOR = 0.013000

===

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.98

CRITICAL FLOW AREA(SQUARE FEET) = 0.781

CRITICAL FLOW TOP-WIDTH(FEET) = 0.287

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 156.02

CRITICAL FLOW VELOCITY(FEET/SEC.) = 9.356

CRITICAL FLOW VELOCITY HEAD(FEET) = 1.36

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 2.72

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 2.34

===

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.54

FLOW AREA(SQUARE FEET) = 0.43

FLOW TOP-WIDTH(FEET) = 0.997

FLOW PRESSURE + MOMENTUM(POUNDS) = 247.56

FLOW VELOCITY(FEET/SEC.) = 17.044

FLOW VELOCITY HEAD(FEET) = 4.511

HYDRAULIC DEPTH(FEET) = 0.43

FROUDE NUMBER = 4.581

SPECIFIC ENERGY(FEET) = 5.05

===

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 3 - BMP #3

Pond Data

Bottom LxW = 24.0 x 36.0 ft   Side slope = 0.0:1   Bottom elev. = 483.75 ft   Depth = 4.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	483.75	864	0	0
0.20	483.95	864	173	173
0.40	484.15	864	173	346
0.60	484.35	864	173	518
0.80	484.55	864	173	691
1.00	484.75	864	173	864
1.20	484.95	864	173	1,037
1.40	485.15	864	173	1,210
1.60	485.35	864	173	1,382
1.80	485.55	864	173	1,555
2.00	485.75	864	173	1,728
2.20	485.95	864	173	1,901
2.40	486.15	864	173	2,074
2.60	486.35	864	173	2,246
2.80	486.55	864	173	2,419
3.00	486.75	864	173	2,592
3.20	486.95	864	173	2,765
3.40	487.15	864	173	2,938
3.60	487.35	864	173	3,110
3.80	487.55	864	173	3,283
4.00	487.75	864	173	3,456

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 12.0	0.0	0.0	0.0
Span in	= 12.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 483.75	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.00	0.00	0.00	0.00
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	483.75	0.00	---	---	---	---	---	---	---	---	0.00
0.02	17	483.77	0.00	---	---	---	---	---	---	---	---	0.00
0.04	35	483.79	0.01	---	---	---	---	---	---	---	---	0.01
0.06	52	483.81	0.02	---	---	---	---	---	---	---	---	0.02
0.08	69	483.83	0.03	---	---	---	---	---	---	---	---	0.03
0.10	86	483.85	0.04	---	---	---	---	---	---	---	---	0.04
0.12	104	483.87	0.06	---	---	---	---	---	---	---	---	0.06
0.14	121	483.89	0.09	---	---	---	---	---	---	---	---	0.09
0.16	138	483.91	0.11	---	---	---	---	---	---	---	---	0.11
0.18	156	483.93	0.14	---	---	---	---	---	---	---	---	0.14
0.20	173	483.95	0.17	---	---	---	---	---	---	---	---	0.17
0.22	190	483.97	0.20	---	---	---	---	---	---	---	---	0.20
0.24	207	483.99	0.24	---	---	---	---	---	---	---	---	0.24
0.26	225	484.01	0.28	---	---	---	---	---	---	---	---	0.28
0.28	242	484.03	0.32	---	---	---	---	---	---	---	---	0.32
0.30	259	484.05	0.37	---	---	---	---	---	---	---	---	0.37
0.32	276	484.07	0.42	---	---	---	---	---	---	---	---	0.42

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Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.34	294	484.09	0.47	---	---	---	---	---	---	---	---	0.47
0.36	311	484.11	0.52	---	---	---	---	---	---	---	---	0.52
0.38	328	484.13	0.58	---	---	---	---	---	---	---	---	0.58
0.40	346	484.15	0.63	---	---	---	---	---	---	---	---	0.63
0.42	363	484.17	0.69	---	---	---	---	---	---	---	---	0.69
0.44	380	484.19	0.75	---	---	---	---	---	---	---	---	0.75
0.46	397	484.21	0.81	---	---	---	---	---	---	---	---	0.81
0.48	415	484.23	0.88	---	---	---	---	---	---	---	---	0.88
0.50	432	484.25	0.95	---	---	---	---	---	---	---	---	0.95
0.52	449	484.27	1.01	---	---	---	---	---	---	---	---	1.01
0.54	467	484.29	1.08	---	---	---	---	---	---	---	---	1.08
0.56	484	484.31	1.15	---	---	---	---	---	---	---	---	1.15
0.58	501	484.33	1.23	---	---	---	---	---	---	---	---	1.23
0.60	518	484.35	1.30	---	---	---	---	---	---	---	---	1.30
0.62	536	484.37	1.37	---	---	---	---	---	---	---	---	1.37
0.64	553	484.39	1.45	---	---	---	---	---	---	---	---	1.45
0.66	570	484.41	1.52	---	---	---	---	---	---	---	---	1.52
0.68	588	484.43	1.60	---	---	---	---	---	---	---	---	1.60
0.70	605	484.45	1.67	---	---	---	---	---	---	---	---	1.67
0.72	622	484.47	1.75	---	---	---	---	---	---	---	---	1.75
0.74	639	484.49	1.83	---	---	---	---	---	---	---	---	1.83
0.76	657	484.51	1.90	---	---	---	---	---	---	---	---	1.90
0.78	674	484.53	1.98	---	---	---	---	---	---	---	---	1.98
0.80	691	484.55	2.05	---	---	---	---	---	---	---	---	2.05
0.82	708	484.57	2.13	---	---	---	---	---	---	---	---	2.13
0.84	726	484.59	2.20	---	---	---	---	---	---	---	---	2.20
0.86	743	484.61	2.27	---	---	---	---	---	---	---	---	2.27
0.88	760	484.63	2.34	---	---	---	---	---	---	---	---	2.34
0.90	778	484.65	2.41	---	---	---	---	---	---	---	---	2.41
0.92	795	484.67	2.47	---	---	---	---	---	---	---	---	2.47
0.94	812	484.69	2.53	---	---	---	---	---	---	---	---	2.53
0.96	829	484.71	2.58	---	---	---	---	---	---	---	---	2.58
0.98	847	484.73	2.63	---	---	---	---	---	---	---	---	2.63
1.00	864	484.75	2.67	---	---	---	---	---	---	---	---	2.67
1.02	881	484.77	2.73	---	---	---	---	---	---	---	---	2.73
1.04	899	484.79	2.78	---	---	---	---	---	---	---	---	2.78
1.06	916	484.81	2.83	---	---	---	---	---	---	---	---	2.83
1.08	933	484.83	2.88	---	---	---	---	---	---	---	---	2.88
1.10	950	484.85	2.93	---	---	---	---	---	---	---	---	2.93
1.12	968	484.87	2.98	---	---	---	---	---	---	---	---	2.98
1.14	985	484.89	3.02	---	---	---	---	---	---	---	---	3.02
1.16	1,002	484.91	3.07	---	---	---	---	---	---	---	---	3.07
1.18	1,020	484.93	3.12	---	---	---	---	---	---	---	---	3.12
1.20	1,037	484.95	3.16	---	---	---	---	---	---	---	---	3.16
1.22	1,054	484.97	3.21	---	---	---	---	---	---	---	---	3.21
1.24	1,071	484.99	3.25	---	---	---	---	---	---	---	---	3.25
1.26	1,089	485.01	3.30	---	---	---	---	---	---	---	---	3.30
1.28	1,106	485.03	3.34	---	---	---	---	---	---	---	---	3.34
1.30	1,123	485.05	3.38	---	---	---	---	---	---	---	---	3.38
1.32	1,140	485.07	3.42	---	---	---	---	---	---	---	---	3.42
1.34	1,158	485.09	3.47	---	---	---	---	---	---	---	---	3.47
1.36	1,175	485.11	3.51	---	---	---	---	---	---	---	---	3.51
1.38	1,192	485.13	3.55	---	---	---	---	---	---	---	---	3.55
1.40	1,210	485.15	3.59	---	---	---	---	---	---	---	---	3.59
1.42	1,227	485.17	3.63	---	---	---	---	---	---	---	---	3.63
1.44	1,244	485.19	3.67	---	---	---	---	---	---	---	---	3.67
1.46	1,261	485.21	3.70	---	---	---	---	---	---	---	---	3.70
1.48	1,279	485.23	3.74	---	---	---	---	---	---	---	---	3.74
1.50	1,296	485.25	3.78	---	---	---	---	---	---	---	---	3.78
1.52	1,313	485.27	3.82	---	---	---	---	---	---	---	---	3.82
1.54	1,331	485.29	3.86	---	---	---	---	---	---	---	---	3.86
1.56	1,348	485.31	3.89	---	---	---	---	---	---	---	---	3.89
1.58	1,365	485.33	3.93	---	---	---	---	---	---	---	---	3.93
1.60	1,382	485.35	3.97	---	---	---	---	---	---	---	---	3.97
1.62	1,400	485.37	4.00	---	---	---	---	---	---	---	---	4.00
1.64	1,417	485.39	4.04	---	---	---	---	---	---	---	---	4.04
1.66	1,434	485.41	4.07	---	---	---	---	---	---	---	---	4.07
1.68	1,452	485.43	4.11	---	---	---	---	---	---	---	---	4.11
1.70	1,469	485.45	4.14	---	---	---	---	---	---	---	---	4.14
1.72	1,486	485.47	4.18	---	---	---	---	---	---	---	---	4.18

Continues on next page...

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
1.74	1,503	485.49	4.21	---	---	---	---	---	---	---	---	4.21
1.76	1,521	485.51	4.24	---	---	---	---	---	---	---	---	4.24
1.78	1,538	485.53	4.28	---	---	---	---	---	---	---	---	4.28
1.80	1,555	485.55	4.31	---	---	---	---	---	---	---	---	4.31
1.82	1,572	485.57	4.34	---	---	---	---	---	---	---	---	4.34
1.84	1,590	485.59	4.38	---	---	---	---	---	---	---	---	4.38
1.86	1,607	485.61	4.41	---	---	---	---	---	---	---	---	4.41
1.88	1,624	485.63	4.44	---	---	---	---	---	---	---	---	4.44
1.90	1,642	485.65	4.47	---	---	---	---	---	---	---	---	4.47
1.92	1,659	485.67	4.51	---	---	---	---	---	---	---	---	4.51
1.94	1,676	485.69	4.54	---	---	---	---	---	---	---	---	4.54
1.96	1,693	485.71	4.57	---	---	---	---	---	---	---	---	4.57
1.98	1,711	485.73	4.60	---	---	---	---	---	---	---	---	4.60
2.00	1,728	485.75	4.63	---	---	---	---	---	---	---	---	4.63
2.02	1,745	485.77	4.66	---	---	---	---	---	---	---	---	4.66
2.04	1,763	485.79	4.69	---	---	---	---	---	---	---	---	4.69
2.06	1,780	485.81	4.72	---	---	---	---	---	---	---	---	4.72
2.08	1,797	485.83	4.75	---	---	---	---	---	---	---	---	4.75
2.10	1,814	485.85	4.78	---	---	---	---	---	---	---	---	4.78
2.12	1,832	485.87	4.81	---	---	---	---	---	---	---	---	4.81
2.14	1,849	485.89	4.84	---	---	---	---	---	---	---	---	4.84
2.16	1,866	485.91	4.87	---	---	---	---	---	---	---	---	4.87
2.18	1,884	485.93	4.90	---	---	---	---	---	---	---	---	4.90
2.20	1,901	485.95	4.93	---	---	---	---	---	---	---	---	4.93
2.22	1,918	485.97	4.96	---	---	---	---	---	---	---	---	4.96
2.24	1,935	485.99	4.99	---	---	---	---	---	---	---	---	4.99
2.26	1,953	486.01	5.02	---	---	---	---	---	---	---	---	5.02
2.28	1,970	486.03	5.04	---	---	---	---	---	---	---	---	5.04
2.30	1,987	486.05	5.07	---	---	---	---	---	---	---	---	5.07
2.32	2,004	486.07	5.10	---	---	---	---	---	---	---	---	5.10
2.34	2,022	486.09	5.13	---	---	---	---	---	---	---	---	5.13
2.36	2,039	486.11	5.16	---	---	---	---	---	---	---	---	5.16
2.38	2,056	486.13	5.18	---	---	---	---	---	---	---	---	5.18
2.40	2,074	486.15	5.21	---	---	---	---	---	---	---	---	5.21
2.42	2,091	486.17	5.24	---	---	---	---	---	---	---	---	5.24
2.44	2,108	486.19	5.27	---	---	---	---	---	---	---	---	5.27
2.46	2,125	486.21	5.29	---	---	---	---	---	---	---	---	5.29
2.48	2,143	486.23	5.32	---	---	---	---	---	---	---	---	5.32
2.50	2,160	486.25	5.35	---	---	---	---	---	---	---	---	5.35
2.52	2,177	486.27	5.37	---	---	---	---	---	---	---	---	5.37
2.54	2,195	486.29	5.40	---	---	---	---	---	---	---	---	5.40
2.56	2,212	486.31	5.43	---	---	---	---	---	---	---	---	5.43
2.58	2,229	486.33	5.45	---	---	---	---	---	---	---	---	5.45
2.60	2,246	486.35	5.48	---	---	---	---	---	---	---	---	5.48
2.62	2,264	486.37	5.51	---	---	---	---	---	---	---	---	5.51
2.64	2,281	486.39	5.53	---	---	---	---	---	---	---	---	5.53
2.66	2,298	486.41	5.56	---	---	---	---	---	---	---	---	5.56
2.68	2,316	486.43	5.58	---	---	---	---	---	---	---	---	5.58
2.70	2,333	486.45	5.61	---	---	---	---	---	---	---	---	5.61
2.72	2,350	486.47	5.63	---	---	---	---	---	---	---	---	5.63
2.74	2,367	486.49	5.66	---	---	---	---	---	---	---	---	5.66
2.76	2,385	486.51	5.68	---	---	---	---	---	---	---	---	5.68
2.78	2,402	486.53	5.71	---	---	---	---	---	---	---	---	5.71
2.80	2,419	486.55	5.73	---	---	---	---	---	---	---	---	5.73
2.82	2,436	486.57	5.76	---	---	---	---	---	---	---	---	5.76
2.84	2,454	486.59	5.78	---	---	---	---	---	---	---	---	5.78
2.86	2,471	486.61	5.81	---	---	---	---	---	---	---	---	5.81
2.88	2,488	486.63	5.83	---	---	---	---	---	---	---	---	5.83
2.90	2,506	486.65	5.86	---	---	---	---	---	---	---	---	5.86
2.92	2,523	486.67	5.88	---	---	---	---	---	---	---	---	5.88
2.94	2,540	486.69	5.91	---	---	---	---	---	---	---	---	5.91
2.96	2,557	486.71	5.93	---	---	---	---	---	---	---	---	5.93
2.98	2,575	486.73	5.95	---	---	---	---	---	---	---	---	5.95
3.00	2,592	486.75	5.98	---	---	---	---	---	---	---	---	5.98
3.02	2,609	486.77	6.00	---	---	---	---	---	---	---	---	6.00
3.04	2,627	486.79	6.03	---	---	---	---	---	---	---	---	6.03
3.06	2,644	486.81	6.05	---	---	---	---	---	---	---	---	6.05
3.08	2,661	486.83	6.07	---	---	---	---	---	---	---	---	6.07
3.10	2,678	486.85	6.10	---	---	---	---	---	---	---	---	6.10
3.12	2,696	486.87	6.12	---	---	---	---	---	---	---	---	6.12

Continues on next page...

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
3.14	2,713	486.89	6.14	---	---	---	---	---	---	---	---	6.14
3.16	2,730	486.91	6.17	---	---	---	---	---	---	---	---	6.17
3.18	2,748	486.93	6.19	---	---	---	---	---	---	---	---	6.19
3.20	2,765	486.95	6.21	---	---	---	---	---	---	---	---	6.21
3.22	2,782	486.97	6.24	---	---	---	---	---	---	---	---	6.24
3.24	2,799	486.99	6.26	---	---	---	---	---	---	---	---	6.26
3.26	2,817	487.01	6.28	---	---	---	---	---	---	---	---	6.28
3.28	2,834	487.03	6.30	---	---	---	---	---	---	---	---	6.30
3.30	2,851	487.05	6.33	---	---	---	---	---	---	---	---	6.33
3.32	2,868	487.07	6.35	---	---	---	---	---	---	---	---	6.35
3.34	2,886	487.09	6.37	---	---	---	---	---	---	---	---	6.37
3.36	2,903	487.11	6.39	---	---	---	---	---	---	---	---	6.39
3.38	2,920	487.13	6.42	---	---	---	---	---	---	---	---	6.42
3.40	2,938	487.15	6.44	---	---	---	---	---	---	---	---	6.44
3.42	2,955	487.17	6.46	---	---	---	---	---	---	---	---	6.46
3.44	2,972	487.19	6.48	---	---	---	---	---	---	---	---	6.48
3.46	2,989	487.21	6.51	---	---	---	---	---	---	---	---	6.51
3.48	3,007	487.23	6.53	---	---	---	---	---	---	---	---	6.53
3.50	3,024	487.25	6.55	---	---	---	---	---	---	---	---	6.55
3.52	3,041	487.27	6.57	---	---	---	---	---	---	---	---	6.57
3.54	3,059	487.29	6.59	---	---	---	---	---	---	---	---	6.59
3.56	3,076	487.31	6.61	---	---	---	---	---	---	---	---	6.61
3.58	3,093	487.33	6.64	---	---	---	---	---	---	---	---	6.64
3.60	3,110	487.35	6.66	---	---	---	---	---	---	---	---	6.66
3.62	3,128	487.37	6.68	---	---	---	---	---	---	---	---	6.68
3.64	3,145	487.39	6.70	---	---	---	---	---	---	---	---	6.70
3.66	3,162	487.41	6.72	---	---	---	---	---	---	---	---	6.72
3.68	3,180	487.43	6.74	---	---	---	---	---	---	---	---	6.74
3.70	3,197	487.45	6.76	---	---	---	---	---	---	---	---	6.76
3.72	3,214	487.47	6.79	---	---	---	---	---	---	---	---	6.79
3.74	3,231	487.49	6.81	---	---	---	---	---	---	---	---	6.81
3.76	3,249	487.51	6.83	---	---	---	---	---	---	---	---	6.83
3.78	3,266	487.53	6.85	---	---	---	---	---	---	---	---	6.85
3.80	3,283	487.55	6.87	---	---	---	---	---	---	---	---	6.87
3.82	3,300	487.57	6.89	---	---	---	---	---	---	---	---	6.89
3.84	3,318	487.59	6.91	---	---	---	---	---	---	---	---	6.91
3.86	3,335	487.61	6.93	---	---	---	---	---	---	---	---	6.93
3.88	3,352	487.63	6.95	---	---	---	---	---	---	---	---	6.95
3.90	3,370	487.65	6.97	---	---	---	---	---	---	---	---	6.97
3.92	3,387	487.67	6.99	---	---	---	---	---	---	---	---	6.99
3.94	3,404	487.69	7.01	---	---	---	---	---	---	---	---	7.01
3.96	3,421	487.71	7.03	---	---	---	---	---	---	---	---	7.03
3.98	3,439	487.73	7.05	---	---	---	---	---	---	---	---	7.05
4.00	3,456	487.75	7.07	---	---	---	---	---	---	---	---	7.07

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 6

BMP #3

Hydrograph type	= Reservoir	Peak discharge	= 4.25 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Inflow hyd. No.	= 5	Reservoir name	= BMP #3
Max. Elevation	= 485.52 ft	Max. Storage	= 1,526 cuft

Storage Indication method used.

Outflow hydrograph volume = 10,189 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.20	0.17	483.86	0.05	-----	-----	-----	-----	-----	-----	-----	-----	0.05
0.25	0.17	483.88	0.08	-----	-----	-----	-----	-----	-----	-----	-----	0.08
0.30	0.17	483.90	0.10	-----	-----	-----	-----	-----	-----	-----	-----	0.10
0.35	0.18	483.91	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
0.40	0.18	483.92	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
0.45	0.18	483.93	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
0.50	0.18	483.94	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
0.55	0.18	483.94	0.16	-----	-----	-----	-----	-----	-----	-----	-----	0.16
0.60	0.18	483.95	0.17	-----	-----	-----	-----	-----	-----	-----	-----	0.17
0.65	0.18	483.95	0.17	-----	-----	-----	-----	-----	-----	-----	-----	0.17
0.70	0.19	483.95	0.18	-----	-----	-----	-----	-----	-----	-----	-----	0.18
0.75	0.19	483.96	0.18	-----	-----	-----	-----	-----	-----	-----	-----	0.18
0.80	0.19	483.96	0.18	-----	-----	-----	-----	-----	-----	-----	-----	0.18
0.85	0.19	483.96	0.18	-----	-----	-----	-----	-----	-----	-----	-----	0.18
0.90	0.19	483.96	0.19	-----	-----	-----	-----	-----	-----	-----	-----	0.19
0.95	0.20	483.96	0.19	-----	-----	-----	-----	-----	-----	-----	-----	0.19
1.00	0.20	483.96	0.19	-----	-----	-----	-----	-----	-----	-----	-----	0.19
1.05	0.20	483.96	0.19	-----	-----	-----	-----	-----	-----	-----	-----	0.19
1.10	0.20	483.96	0.20	-----	-----	-----	-----	-----	-----	-----	-----	0.20
1.15	0.20	483.97	0.20	-----	-----	-----	-----	-----	-----	-----	-----	0.20
1.20	0.21	483.97	0.20	-----	-----	-----	-----	-----	-----	-----	-----	0.20
1.25	0.21	483.97	0.20	-----	-----	-----	-----	-----	-----	-----	-----	0.20
1.30	0.21	483.97	0.20	-----	-----	-----	-----	-----	-----	-----	-----	0.20
1.35	0.22	483.97	0.21	-----	-----	-----	-----	-----	-----	-----	-----	0.21
1.40	0.22	483.97	0.21	-----	-----	-----	-----	-----	-----	-----	-----	0.21
1.45	0.22	483.98	0.21	-----	-----	-----	-----	-----	-----	-----	-----	0.21
1.50	0.23	483.98	0.22	-----	-----	-----	-----	-----	-----	-----	-----	0.22
1.55	0.23	483.98	0.22	-----	-----	-----	-----	-----	-----	-----	-----	0.22
1.60	0.23	483.98	0.22	-----	-----	-----	-----	-----	-----	-----	-----	0.22
1.65	0.23	483.98	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
1.70	0.24	483.98	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
1.75	0.24	483.99	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
1.80	0.24	483.99	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.23
1.85	0.25	483.99	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
1.90	0.25	483.99	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
1.95	0.25	483.99	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
2.00	0.26	483.99	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
2.05	0.26	484.00	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25

Continues on next page...

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
2.10	0.27	484.00	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
2.15	0.27	484.00	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
2.20	0.28	484.00	0.27	-----	-----	-----	-----	-----	-----	-----	-----	0.27
2.25	0.28	484.00	0.27	-----	-----	-----	-----	-----	-----	-----	-----	0.27
2.30	0.28	484.01	0.27	-----	-----	-----	-----	-----	-----	-----	-----	0.27
2.35	0.29	484.01	0.28	-----	-----	-----	-----	-----	-----	-----	-----	0.28
2.40	0.30	484.01	0.28	-----	-----	-----	-----	-----	-----	-----	-----	0.28
2.45	0.30	484.01	0.29	-----	-----	-----	-----	-----	-----	-----	-----	0.29
2.50	0.31	484.02	0.30	-----	-----	-----	-----	-----	-----	-----	-----	0.30
2.55	0.32	484.02	0.30	-----	-----	-----	-----	-----	-----	-----	-----	0.30
2.60	0.32	484.02	0.31	-----	-----	-----	-----	-----	-----	-----	-----	0.31
2.65	0.32	484.02	0.31	-----	-----	-----	-----	-----	-----	-----	-----	0.31
2.70	0.34	484.03	0.32	-----	-----	-----	-----	-----	-----	-----	-----	0.32
2.75	0.35	484.03	0.33	-----	-----	-----	-----	-----	-----	-----	-----	0.33
2.80	0.35	484.04	0.34	-----	-----	-----	-----	-----	-----	-----	-----	0.34
2.85	0.36	484.04	0.34	-----	-----	-----	-----	-----	-----	-----	-----	0.34
2.90	0.37	484.04	0.35	-----	-----	-----	-----	-----	-----	-----	-----	0.35
2.95	0.39	484.05	0.36	-----	-----	-----	-----	-----	-----	-----	-----	0.36
3.00	0.40	484.05	0.38	-----	-----	-----	-----	-----	-----	-----	-----	0.38
3.05	0.41	484.06	0.39	-----	-----	-----	-----	-----	-----	-----	-----	0.39
3.10	0.42	484.06	0.40	-----	-----	-----	-----	-----	-----	-----	-----	0.40
3.15	0.43	484.07	0.41	-----	-----	-----	-----	-----	-----	-----	-----	0.41
3.20	0.47	484.07	0.43	-----	-----	-----	-----	-----	-----	-----	-----	0.43
3.25	0.48	484.08	0.45	-----	-----	-----	-----	-----	-----	-----	-----	0.45
3.30	0.49	484.09	0.46	-----	-----	-----	-----	-----	-----	-----	-----	0.46
3.35	0.52	484.09	0.48	-----	-----	-----	-----	-----	-----	-----	-----	0.48
3.40	0.54	484.10	0.50	-----	-----	-----	-----	-----	-----	-----	-----	0.50
3.45	0.57	484.11	0.52	-----	-----	-----	-----	-----	-----	-----	-----	0.52
3.50	0.61	484.12	0.55	-----	-----	-----	-----	-----	-----	-----	-----	0.55
3.55	0.66	484.14	0.59	-----	-----	-----	-----	-----	-----	-----	-----	0.59
3.60	0.69	484.15	0.63	-----	-----	-----	-----	-----	-----	-----	-----	0.63
3.65	0.74	484.16	0.67	-----	-----	-----	-----	-----	-----	-----	-----	0.67
3.70	0.84	484.18	0.73	-----	-----	-----	-----	-----	-----	-----	-----	0.73
3.75	0.92	484.21	0.80	-----	-----	-----	-----	-----	-----	-----	-----	0.80
3.80	0.98	484.23	0.88	-----	-----	-----	-----	-----	-----	-----	-----	0.88
3.85	1.26	484.27	1.00	-----	-----	-----	-----	-----	-----	-----	-----	1.00
3.90	1.57	484.33	1.22	-----	-----	-----	-----	-----	-----	-----	-----	1.22
3.95	1.93	484.41	1.52	-----	-----	-----	-----	-----	-----	-----	-----	1.52
4.00	4.17	484.64	2.37	-----	-----	-----	-----	-----	-----	-----	-----	2.37
4.05	7.31 <<	485.20	3.69	-----	-----	-----	-----	-----	-----	-----	-----	3.69
4.10	3.64	485.52 <<	4.25	-----	-----	-----	-----	-----	-----	-----	-----	4.25 <<
4.15	1.08	485.18	3.65	-----	-----	-----	-----	-----	-----	-----	-----	3.65
4.20	0.85	484.73	2.63	-----	-----	-----	-----	-----	-----	-----	-----	2.63
4.25	0.70	484.44	1.65	-----	-----	-----	-----	-----	-----	-----	-----	1.65
4.30	0.60	484.29	1.10	-----	-----	-----	-----	-----	-----	-----	-----	1.10
4.35	0.55	484.21	0.83	-----	-----	-----	-----	-----	-----	-----	-----	0.83
4.40	0.50	484.17	0.68	-----	-----	-----	-----	-----	-----	-----	-----	0.68
4.45	0.46	484.13	0.59	-----	-----	-----	-----	-----	-----	-----	-----	0.59
4.50	0.43	484.11	0.52	-----	-----	-----	-----	-----	-----	-----	-----	0.52
4.55	0.40	484.09	0.48	-----	-----	-----	-----	-----	-----	-----	-----	0.48
4.60	0.38	484.08	0.44	-----	-----	-----	-----	-----	-----	-----	-----	0.44

Continues on next page...

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
4.65	0.36	484.07	0.41	-----	-----	-----	-----	-----	-----	-----	-----	0.41
4.70	0.33	484.06	0.38	-----	-----	-----	-----	-----	-----	-----	-----	0.38
4.75	0.32	484.05	0.36	-----	-----	-----	-----	-----	-----	-----	-----	0.36
4.80	0.31	484.04	0.34	-----	-----	-----	-----	-----	-----	-----	-----	0.34
4.85	0.30	484.03	0.33	-----	-----	-----	-----	-----	-----	-----	-----	0.33
4.90	0.29	484.03	0.32	-----	-----	-----	-----	-----	-----	-----	-----	0.32
4.95	0.27	484.02	0.30	-----	-----	-----	-----	-----	-----	-----	-----	0.30
5.00	0.26	484.01	0.29	-----	-----	-----	-----	-----	-----	-----	-----	0.29
5.05	0.26	484.01	0.28	-----	-----	-----	-----	-----	-----	-----	-----	0.28
5.10	0.25	484.00	0.27	-----	-----	-----	-----	-----	-----	-----	-----	0.27
5.15	0.24	484.00	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
5.20	0.23	484.00	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
5.25	0.22	483.99	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
5.30	0.22	483.99	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
5.35	0.21	483.98	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
5.40	0.21	483.98	0.22	-----	-----	-----	-----	-----	-----	-----	-----	0.22
5.45	0.21	483.98	0.22	-----	-----	-----	-----	-----	-----	-----	-----	0.22
5.50	0.20	483.98	0.21	-----	-----	-----	-----	-----	-----	-----	-----	0.21
5.55	0.20	483.97	0.21	-----	-----	-----	-----	-----	-----	-----	-----	0.21
5.60	0.20	483.97	0.21	-----	-----	-----	-----	-----	-----	-----	-----	0.21
5.65	0.19	483.97	0.20	-----	-----	-----	-----	-----	-----	-----	-----	0.20
5.70	0.19	483.97	0.20	-----	-----	-----	-----	-----	-----	-----	-----	0.20
5.75	0.19	483.97	0.20	-----	-----	-----	-----	-----	-----	-----	-----	0.20
5.80	0.18	483.96	0.19	-----	-----	-----	-----	-----	-----	-----	-----	0.19
5.85	0.18	483.96	0.19	-----	-----	-----	-----	-----	-----	-----	-----	0.19
5.90	0.17	483.96	0.18	-----	-----	-----	-----	-----	-----	-----	-----	0.18
5.95	0.17	483.96	0.18	-----	-----	-----	-----	-----	-----	-----	-----	0.18
6.00	0.17	483.95	0.18	-----	-----	-----	-----	-----	-----	-----	-----	0.18
6.05	0.00	483.94	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
6.10	0.00	483.91	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
6.15	0.00	483.89	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
6.20	0.00	483.87	0.07	-----	-----	-----	-----	-----	-----	-----	-----	0.07
6.25	0.00	483.86	0.05	-----	-----	-----	-----	-----	-----	-----	-----	0.05
6.30	0.00	483.85	0.04	-----	-----	-----	-----	-----	-----	-----	-----	0.04

...End

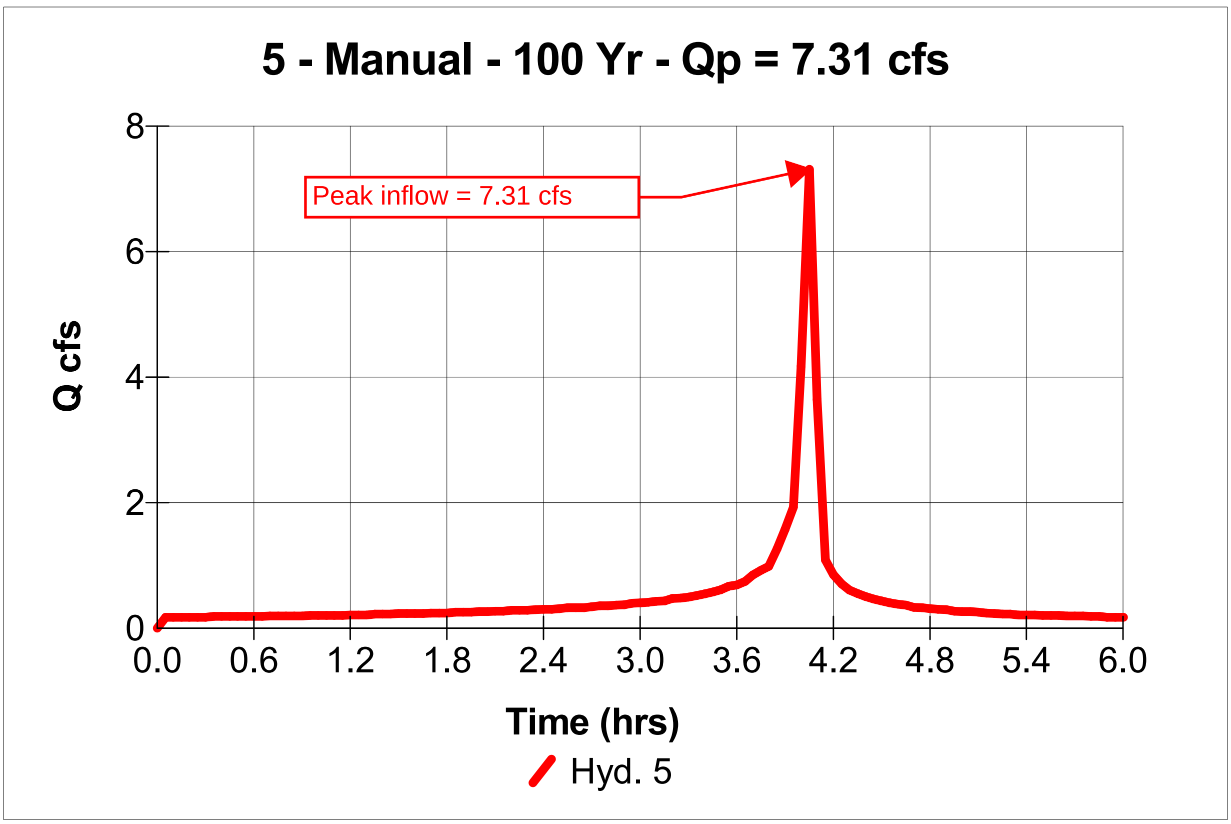
Hydrograph Plot

Hyd. No. 5

DMA #3

Hydrograph type	= Manual	Peak discharge	= 7.31 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min

Hydrograph Volume = 10,199 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 5

DMA #3

Hydrograph type	= Manual	Peak discharge	= 7.31 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min

Hydrograph Volume = 10,199 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)	Time -- (hrs	Outflow cfs)	Time -- (hrs	Outflow cfs)	Time -- (hrs	Outflow cfs)
0.05	0.17	1.75	0.24	3.45	0.57	5.15	0.24
0.10	0.17	1.80	0.24	3.50	0.61	5.20	0.23
0.15	0.17	1.85	0.25	3.55	0.66	5.25	0.22
0.20	0.17	1.90	0.25	3.60	0.69	5.30	0.22
0.25	0.17	1.95	0.25	3.65	0.74	5.35	0.21
0.30	0.17	2.00	0.26	3.70	0.84	5.40	0.21
0.35	0.18	2.05	0.26	3.75	0.92	5.45	0.21
0.40	0.18	2.10	0.27	3.80	0.98	5.50	0.20
0.45	0.18	2.15	0.27	3.85	1.26	5.55	0.20
0.50	0.18	2.20	0.28	3.90	1.57	5.60	0.20
0.55	0.18	2.25	0.28	3.95	1.93	5.65	0.19
0.60	0.18	2.30	0.28	4.00	4.17	5.70	0.19
0.65	0.18	2.35	0.29	4.05	7.31 <<	5.75	0.19
0.70	0.19	2.40	0.30	4.10	3.64	5.80	0.18
0.75	0.19	2.45	0.30	4.15	1.08	5.85	0.18
0.80	0.19	2.50	0.31	4.20	0.85	5.90	0.17
0.85	0.19	2.55	0.32	4.25	0.70	5.95	0.17
0.90	0.19	2.60	0.32	4.30	0.60	6.00	0.17
0.95	0.20	2.65	0.32	4.35	0.55		
1.00	0.20	2.70	0.34	4.40	0.50		
1.05	0.20	2.75	0.35	4.45	0.46	*...End*	
1.10	0.20	2.80	0.35	4.50	0.43		
1.15	0.20	2.85	0.36	4.55	0.40		
1.20	0.21	2.90	0.37	4.60	0.38		
1.25	0.21	2.95	0.39	4.65	0.36		
1.30	0.21	3.00	0.40	4.70	0.33		
1.35	0.22	3.05	0.41	4.75	0.32		
1.40	0.22	3.10	0.42	4.80	0.31		
1.45	0.22	3.15	0.43	4.85	0.30		
1.50	0.23	3.20	0.47	4.90	0.29		
1.55	0.23	3.25	0.48	4.95	0.27		
1.60	0.23	3.30	0.49	5.00	0.26		
1.65	0.23	3.35	0.52	5.05	0.26		
1.70	0.24	3.40	0.54	5.10	0.25		

Hydrograph File Name	Inflow BMP #3	
Time of Concentration	5	Minutes
6-Hour Rainfall	2.6	Inches
Basin Area	1.25	Acres
Runoff Coefficient	0.86	Unitless
Intensity (I)	6.850	In/hr
Peak Discharge	7.31	CFS
N=	72	

7.31 cfs was calculated from post-development AES calculations earlier in report.

Storm Vol. 10,158 CF

N	Rainfall $P_{T(N)}$ (inches)	Rainfall P_N (inches)	Peak Discharge Q_N (cfs)	Time (min)	N	Rainfall P_N (inches)	Peak Discharge Q_N (cfs)	Time (min)
1	0.57	0.57	7.37	242.5	-	0.00	0.00	0
2	0.73	0.16	2.06	237.5	72	0.01	0.17	3
3	0.84	0.11	1.46	232.5	71	0.01	0.17	8
4	0.93	0.09	1.17	247.5	69	0.01	0.17	13
5	1.01	0.08	0.99	227.5	68	0.01	0.17	18
6	1.08	0.07	0.87	222.5	66	0.01	0.18	23
7	1.14	0.06	0.78	252.5	65	0.01	0.18	28
8	1.19	0.06	0.71	217.5	63	0.01	0.18	33
9	1.25	0.05	0.66	212.5	62	0.01	0.18	38
10	1.29	0.05	0.61	257.5	60	0.01	0.19	43
11	1.34	0.04	0.57	207.5	59	0.01	0.19	48
12	1.38	0.04	0.54	202.5	57	0.02	0.19	53
13	1.42	0.04	0.51	262.5	56	0.02	0.20	58
14	1.46	0.04	0.49	197.5	54	0.02	0.20	63
15	1.49	0.04	0.47	192.5	53	0.02	0.20	68
16	1.53	0.03	0.45	267.5	51	0.02	0.21	73
17	1.56	0.03	0.43	187.5	50	0.02	0.21	78
18	1.59	0.03	0.41	182.5	48	0.02	0.22	83
19	1.62	0.03	0.40	272.5	47	0.02	0.22	88
20	1.65	0.03	0.39	177.5	45	0.02	0.23	93
21	1.68	0.03	0.37	172.5	44	0.02	0.23	98
22	1.71	0.03	0.36	277.5	42	0.02	0.24	103
23	1.74	0.03	0.35	167.5	41	0.02	0.24	108
24	1.76	0.03	0.34	162.5	39	0.02	0.25	113
25	1.79	0.03	0.33	282.5	38	0.02	0.25	118
26	1.81	0.03	0.32	157.5	36	0.02	0.26	123
27	1.84	0.02	0.32	152.5	35	0.02	0.27	128
28	1.86	0.02	0.31	287.5	33	0.02	0.28	133
29	1.89	0.02	0.30	147.5	32	0.02	0.28	138
30	1.91	0.02	0.30	142.5	30	0.02	0.30	143
31	1.93	0.02	0.29	292.5	29	0.02	0.30	148
32	1.95	0.02	0.28	137.5	27	0.02	0.32	153
33	1.98	0.02	0.28	132.5	26	0.03	0.32	158
34	2.00	0.02	0.27	297.5	24	0.03	0.34	163
35	2.02	0.02	0.27	127.5	23	0.03	0.35	168
36	2.04	0.02	0.26	122.5	21	0.03	0.37	173
37	2.06	0.02	0.26	302.5	20	0.03	0.39	178
38	2.08	0.02	0.25	117.5	18	0.03	0.41	183
39	2.10	0.02	0.25	112.5	17	0.03	0.43	188
40	2.11	0.02	0.24	307.5	15	0.04	0.47	193
41	2.13	0.02	0.24	107.5	14	0.04	0.49	198
42	2.15	0.02	0.24	102.5	12	0.04	0.54	203
43	2.17	0.02	0.23	312.5	11	0.04	0.57	208
44	2.19	0.02	0.23	97.5	9	0.05	0.66	213
45	2.21	0.02	0.23	92.5	8	0.06	0.71	218
46	2.22	0.02	0.22	317.5	6	0.07	0.87	223
47	2.24	0.02	0.22	87.5	5	0.08	0.99	228
48	2.26	0.02	0.22	82.5	3	0.11	1.46	233
49	2.27	0.02	0.21	322.5	2	0.16	2.06	238
50	2.29	0.02	0.21	77.5	1	0.57	7.31	243
51	2.31	0.02	0.21	72.5	4	0.09	1.17	248
52	2.32	0.02	0.21	327.5	7	0.06	0.78	253
53	2.34	0.02	0.20	67.5	10	0.05	0.61	258
54	2.35	0.02	0.20	62.5	13	0.04	0.51	263
55	2.37	0.02	0.20	332.5	16	0.03	0.45	268
56	2.38	0.02	0.20	57.5	19	0.03	0.40	273
57	2.40	0.02	0.19	52.5	22	0.03	0.36	278
58	2.41	0.01	0.19	337.5	25	0.03	0.33	283
59	2.43	0.01	0.19	47.5	28	0.02	0.31	288
60	2.44	0.01	0.19	42.5	31	0.02	0.29	293
61	2.46	0.01	0.19	342.5	34	0.02	0.27	298
62	2.47	0.01	0.18	37.5	37	0.02	0.26	303
63	2.48	0.01	0.18	32.5	40	0.02	0.24	308
64	2.50	0.01	0.18	347.5	43	0.02	0.23	313
65	2.51	0.01	0.18	27.5	46	0.02	0.22	318
66	2.53	0.01	0.18	22.5	49	0.02	0.21	323
67	2.54	0.01	0.17	352.5	52	0.02	0.21	328
68	2.55	0.01	0.17	17.5	55	0.02	0.20	333
69	2.57	0.01	0.17	12.5	58	0.01	0.19	338
70	2.58	0.01	0.17	357.5	61	0.01	0.19	343
71	2.59	0.01	0.17	7.5	64	0.01	0.18	348
72	2.61	0.01	0.17	2.5	67	0.01	0.17	353
					70	0.01	0.17	358
					-	0	0.00	363