

Rancho Estates Mobile Home Park
Fire Improvements Project

APPENDIX

F

HYDROLOGY REPORT

SID GOLDSTIEN - CIVIL ENGINEER, INC.

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February 24, 2016

Mr. Joe Pearson
City of Goleta
Planning Department
130 Cremona Drive, Suite B
Goleta, CA 93117

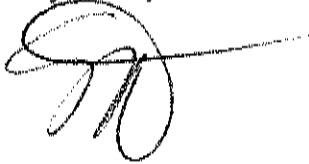
Re: Rancho Goleta MHP

Dear Joe:

As requested, I am providing this narrative to augment the attached Hydrology Report dated January 14, 2015.

The area to be used, within the City owned parcel, for the emergency access road is currently undeveloped open space with vegetative cover and walking path. The proposed access road will be unpaved compacted road base. The additional peak discharge in the 2-year to 100-year storm event ranges from .07 to .12 cfs resulting from the proposed emergency road. This additional runoff, as is the case with existing runoff, sheet drains generally to vegetated areas within this parcel and to a natural bio-swale to the south of the existing hiking path and proposed road.

Sincerely yours,



Sid Goldstien

SG:kg

Enc.

C.C. Susy Forbath w/attach.

14-05-100

HYDROLOGY REPORT
STORM WATER RUNOFF ANALYSIS
for
EMERGENCY ACCESS ROAD CONSTRUCTION AREA

on
RANCHO GOLETA MOBILE HOME PARK
7465 HOLLISTER AVENUE
GOLETA, CA 93110
A.P.N. 079-210-058
and
CITY OF GOLETA PARCEL at
SOUTH END of CORONADO DRIVE
GOLETA, CA 93110
A.P.N. 079-442-023

PREPARED 14 JAN 2015 By:

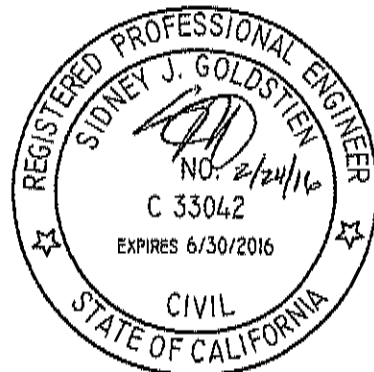
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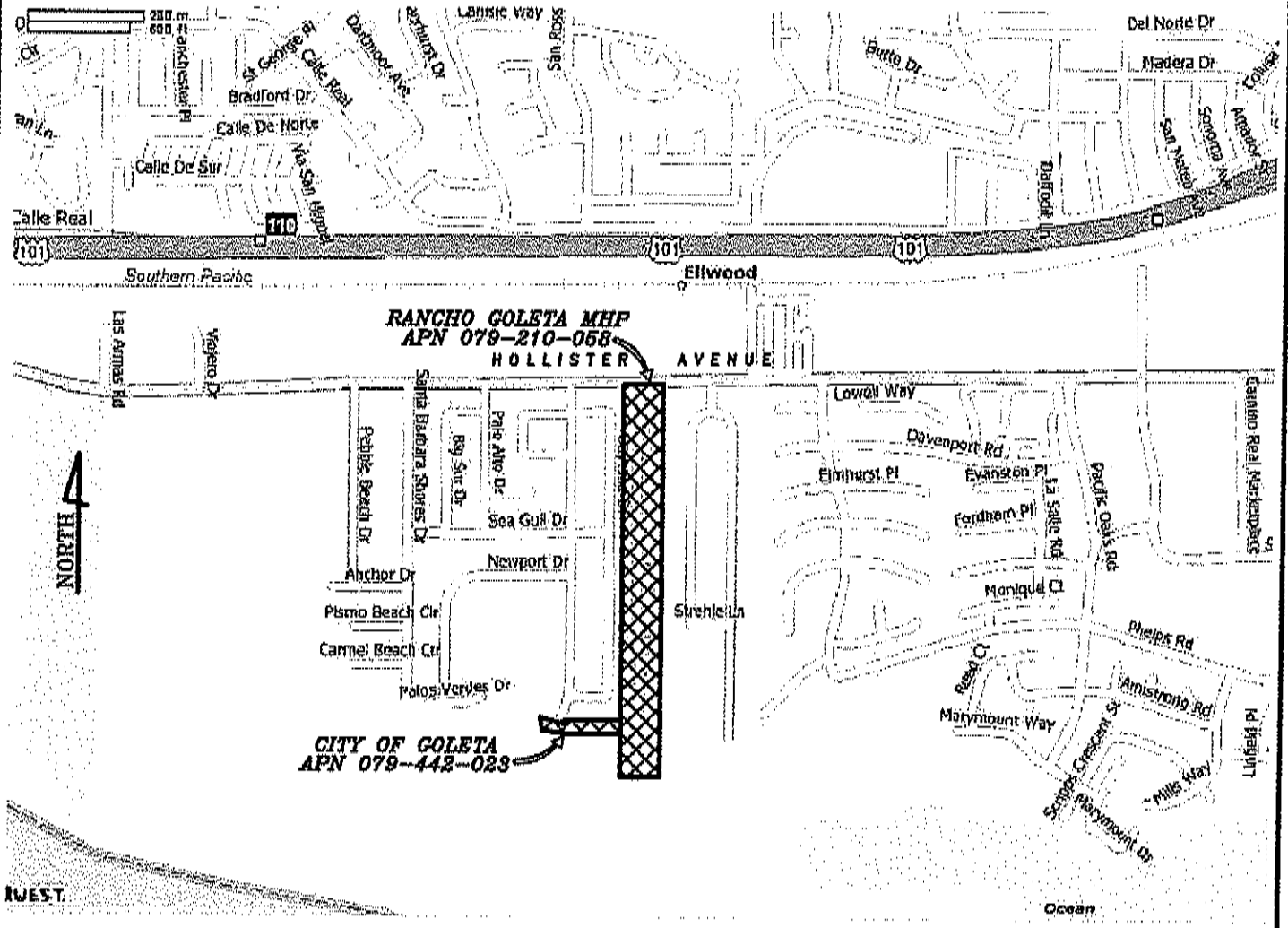
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RANCHO GOLETA MOBILE HOME PARK FIRE IMPROVEMENTS

A.P.N. 079-210-058



VICINITY MAP

NO SCALE

14 JAN 2015

RANCHO GOLETA MOBILE HOME PARK FIRE IMPROVEMENTS

HYDROLOGY REPORT INTRODUCTION

PROJECT DESCRIPTION

The proposed RANCHO GOLETA MOBILE HOME PARK FIRE IMPROVEMENTS include construction of a 20' wide all weather emergency access road along the north side of Devereux Creek from Coronado Drive to the existing street system within the MHP property, terminating at the existing paved car washing area. The surface of the proposed emergency access road will be compacted Class II Base material. The surface area of the new access road is 9,545 square feet. A CMU retaining wall is proposed along a portion of the north side of the access road. Construction of the proposed emergency access road will occur on a parcel owned by the City of Goleta and on the Rancho Goleta Mobile Home Park property.

The City of Goleta parcel is located at the south end of Coronado Drive and is identified as A.P.N. 079-442-023. The portion of the City parcel on which the all weather access road is to be constructed is parallel to Devereux Creek with a slope of approximately 0.5%.

The Rancho Goleta Mobile Home Park is located at 7465 Hollister Avenue in the City of Goleta and is identified as A.P.N. 079-210-058. The proposed all weather access road will terminate at the existing paved car wash area of the MHP, where the proposed fire truck hammerhead turnaround is to be located. The turnaround area slopes at approximately 12% to the south.

PRE-DEVELOPMENT HYDROLOGIC ANALYSIS

The construction area was modeled using the Hydroflow Hydrographs program per County of Santa Barbara standards to analyze the pre-development runoff totals. The project site is comprised of the Soil Types "Cb", "CgC2" and "CgE2" according to NRCS Web Soil Survey mapping. These soils are classified as Hydrologic Soil Group "D". Runoff Curve Numbers were assigned using Tables 2-2a through 2-2d of the USDA TR-55 Manual.

The Pre-Development flows leaving the construction area are summarized on the following page of this report. Pre-Development Hydrographs for the 2yr through 100yr storms are also provided in this report.

POST-DEVELOPMENT HYDROLOGIC ANALYSIS

The Hydroflow Hydrographs program was utilized to model the construction areas on the post developed site similarly to the pre-development analysis. The Post-Development flows leaving the construction area are summarized on the following page of this report. Post-Development Hydrographs for the 2yr through 100yr storms are also provided in this report.

14 JAN 2015

RANCHO GOLETA MOBILE HOME PARK FIRE IMPROVEMENTS
STORM WATER RUNOFF ANALYSIS

SUMMARY

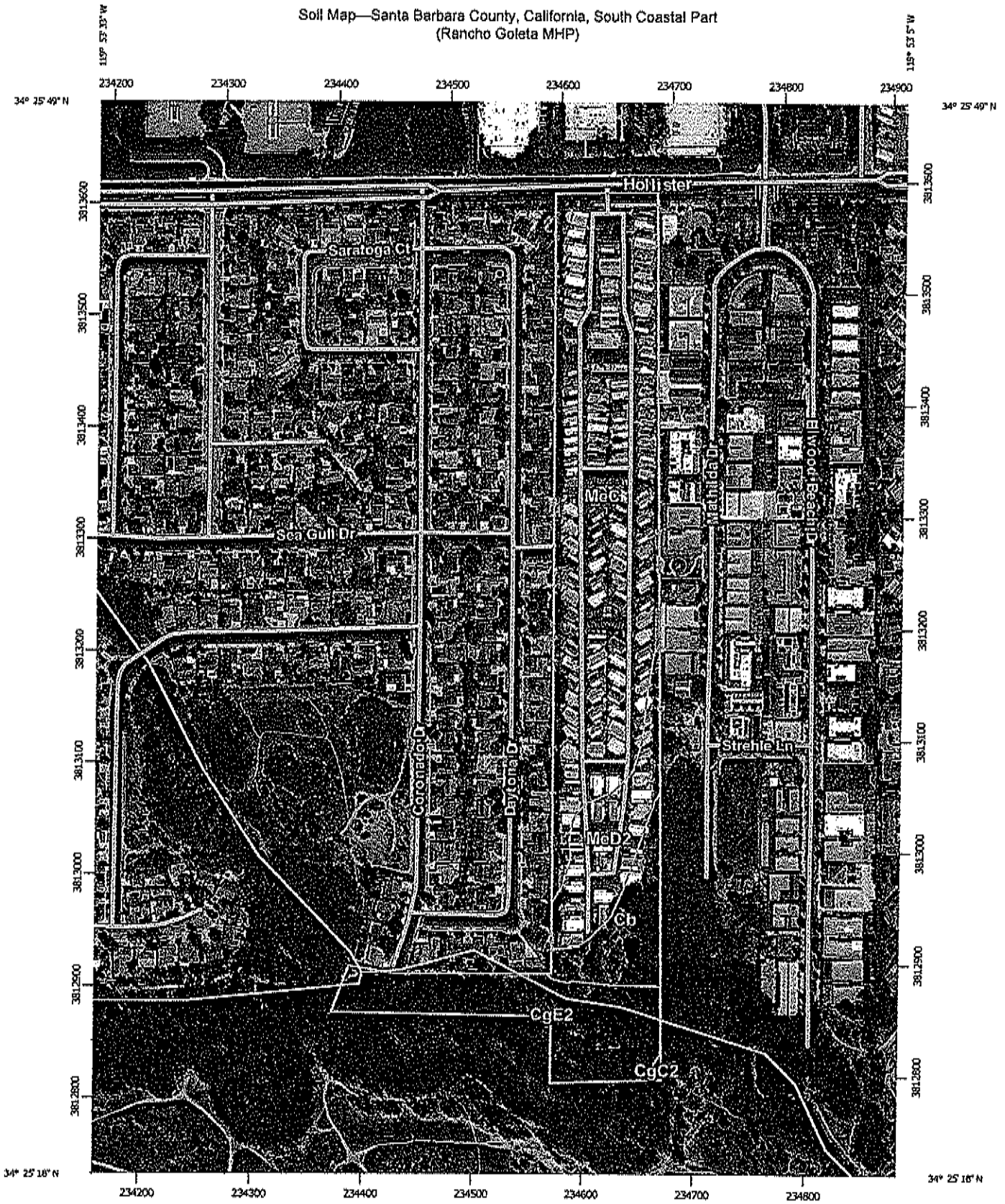
20' WIDE EMERGENCY ACCESS ROAD

<u>PRE-DEVELOPMENT</u>	<u>POST-DEVELOPMENT</u>
Q ₂ = 0.48 cfs	Q ₂ = 0.55 cfs
Q ₅ = 0.81 cfs	Q ₅ = 0.89 cfs
Q ₁₀ = 1.03 cfs	Q ₁₀ = 1.13 cfs
Q ₂₅ = 1.30 cfs	Q ₂₅ = 1.41 cfs
Q ₅₀ = 1.50 cfs	Q ₅₀ = 1.62 cfs
Q ₁₀₀ = 1.70 cfs	Q ₁₀₀ = 1.82 cfs

INCREASE IN RUNOFF

Q ₂ = +0.07 cfs
Q ₅ = +0.08 cfs
Q ₁₀ = +0.10 cfs
Q ₂₅ = +0.11 cfs
Q ₅₀ = +0.12 cfs
Q ₁₀₀ = +0.12 cfs

Soil Map—Santa Barbara County, California, South Coastal Part
(Rancho Goleta MHP)



Map Scale: 1:4,680 if printed on A portrait (8.5" x 11") sheet.

0 50 100 200 300 Meters

0 200 400 800 1200 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

1/13/2015
Page 1 of 3

MAP LEGEND

	Area of Interest (AOI)		Soil Map Unit Polygons
	Soils		Soil Map Unit Lines
	Soil Map Unit Points		Special Point Features
	Blowout		Water Features
	Borrow Pit		Streams and Canals
	Clay Spot		Transportation
	Closed Depression		Rails
	Gravel Pit		Interstate Highways
	Gravelly Spot		US Routes
	Landfill		Major Roads
	Lava Flow		Local Roads
	Marsh or swamp		Background
	Mine or Quarry		Aerial Photography
	Miscellaneous Water		
	Perennial Water		
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		

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: <http://websoilsurvey.nrcs.usda.gov>
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: Santa Barbara County, California, South Coastal Part

Survey Area Data: Version 7, Sep 19, 2014

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

Date(s) aerial images were photographed: Aug 28, 2013—Sep 14, 2013

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

Santa Barbara County, California, South Coastal Part (CA673)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Cb	Camarillo, variant, fine sandy loam	1.8	8.7%
CgC2	Concepcion fine sandy loam, 2 to 9 percent slopes, eroded	0.0	0.2%
CgE2	Concepcion fine sandy loam, 15 to 30 percent slopes, eroded	3.9	18.8%
MeC	Milpitas-Positas fine sandy loams, 2 to 9 percent slopes	12.5	60.4%
MeD2	Milpitas-Positas fine sandy loam, 9 to 15 percent slopes, eroded	2.4	11.8%
Totals for Area of Interest		20.7	100.0%

Santa Barbara County, California, South Coastal Part

Cb—Camarillo, variant, fine sandy loam

Map Unit Setting

National map unit symbol: hc4f
Elevation: 10 to 50 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 60 to 62 degrees F
Frost-free period: 310 to 330 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Camarillo Variant

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from calcareous sedimentary rock

Typical profile

H1 - 0 to 7 inches: fine sandy loam
H2 - 7 to 35 inches: stratified loamy sand to clay loam
H3 - 35 to 72 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat):
Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (2.0 to
4.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D

Minor Components

Unnamed, (Is surface layer)

Percent of map unit: 8 percent

Unnamed, (soil >40" deep over clay)

Percent of map unit: 7 percent

Data Source Information

Soil Survey Area: Santa Barbara County, California, South Coastal Part
Survey Area Data: Version 7, Sep 19, 2014

Santa Barbara County, California, South Coastal Part

CgC2—Concepcion fine sandy loam, 2 to 9 percent slopes, eroded

Map Unit Setting

National map unit symbol: hc4m

Elevation: 40 to 200 feet

Mean annual precipitation: 16 to 20 inches

Mean annual air temperature: 59 to 62 degrees F

Farmland classification: Not prime farmland

Map Unit Composition

Concepcion and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Concepcion

Setting

Landform: Terraces

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Mixed alluvium

Typical profile

H1 - 0 to 18 inches: fine sandy loam

H2 - 18 to 32 inches: clay

H3 - 32 to 60 inches: clay loam

Properties and qualities

Slope: 2 to 9 percent

Depth to restrictive feature: 16 to 23 inches to abrupt textural change

Natural drainage class: Moderately well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: D

Ecological site: Claypan (R015XD115CA)

Minor Components

Diablo

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Positas

Percent of map unit: 3 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Baywood

Percent of map unit: 3 percent
Landform: Dunes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Unnamed

Percent of map unit: 3 percent

Milpitas

Percent of map unit: 3 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Data Source Information

Soil Survey Area: Santa Barbara County, California, South Coastal Part
Survey Area Data: Version 7, Sep 19, 2014

Santa Barbara County, California, South Coastal Part

CgE2—Concepcion fine sandy loam, 15 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: hc4p

Elevation: 40 to 200 feet

Mean annual precipitation: 16 to 20 inches

Mean annual air temperature: 59 to 62 degrees F

Farmland classification: Not prime farmland

Map Unit Composition

Concepcion and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Concepcion

Setting

Landform: Escarpments

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Riser

Down-slope shape: Concave

Across-slope shape: Convex

Parent material: Mixed alluvium

Typical profile

H1 - 0 to 18 inches: fine sandy loam

H2 - 18 to 32 inches: clay

H3 - 32 to 60 inches: clay loam

Properties and qualities

Slope: 15 to 30 percent

Depth to restrictive feature: 10 to 20 inches to abrupt textural change

Natural drainage class: Moderately well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: D

Ecological site: Claypan (R015XD115CA)

Minor Components

Milpitas

Percent of map unit: 4 percent

Landform: Terraces

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Santa lucia

Percent of map unit: 4 percent

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Positas

Percent of map unit: 4 percent

Landform: Terraces

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Unnamed

Percent of map unit: 3 percent

Data Source Information

Soil Survey Area: Santa Barbara County, California, South Coastal Part

Survey Area Data: Version 7, Sep 19, 2014

Table 2-2a Runoff curve numbers for urban areas ^{1/}

Cover description	Average percent impervious area ^{2/}	Curve numbers for hydrologic soil group			
		A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) ^{3/} :					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ^{4/}		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation) ^{5/}		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

^{1/} Average runoff condition, and $I_p = 0.2S$.^{2/} The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.^{3/} CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.^{4/} Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.^{5/} Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands ^{1/}

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment ^{2/}	Hydrologic condition ^{3/}	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
Good		61	70	77	80	
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

^{1/} Average runoff condition, and $I_p=0.2S$

^{2/} Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

^{3/} Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good $\geq 20\%$), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands ^{1/}

Cover type	Cover description	Hydrologic condition	Curve numbers for hydrologic soil group			
			A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. ^{2/}		Poor	68	79	86	89
		Fair	49	69	79	84
		Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.		—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. ^{3/}		Poor	48	67	77	83
		Fair	35	56	70	77
		Good	30 ^{4/}	48	65	73
Woods—grass combination (orchard or tree farm). ^{5/}		Poor	57	73	82	86
		Fair	43	65	76	82
		Good	32	58	72	79
Woods. ^{6/}		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	30 ^{4/}	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.		—	59	74	82	86

^{1/} Average runoff condition, and $I_p = 0.2S$.

^{2/} *Poor*: <50% ground cover or heavily grazed with no mulch.

Fair: 50 to 75% ground cover and not heavily grazed.

Good: > 75% ground cover and lightly or only occasionally grazed.

^{3/} *Poor*: <50% ground cover.

Fair: 50 to 75% ground cover.

Good: >75% ground cover.

^{4/} Actual curve number is less than 30; use $CN = 30$ for runoff computations.

^{5/} CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

^{6/} *Poor*: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.

Fair: Woods are grazed but not burned, and some forest litter covers the soil.

Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands¹

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition ²	A ³	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		76	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	68	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

¹ Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.² Poor: <30% ground cover (litter, grass, and brush overstory).

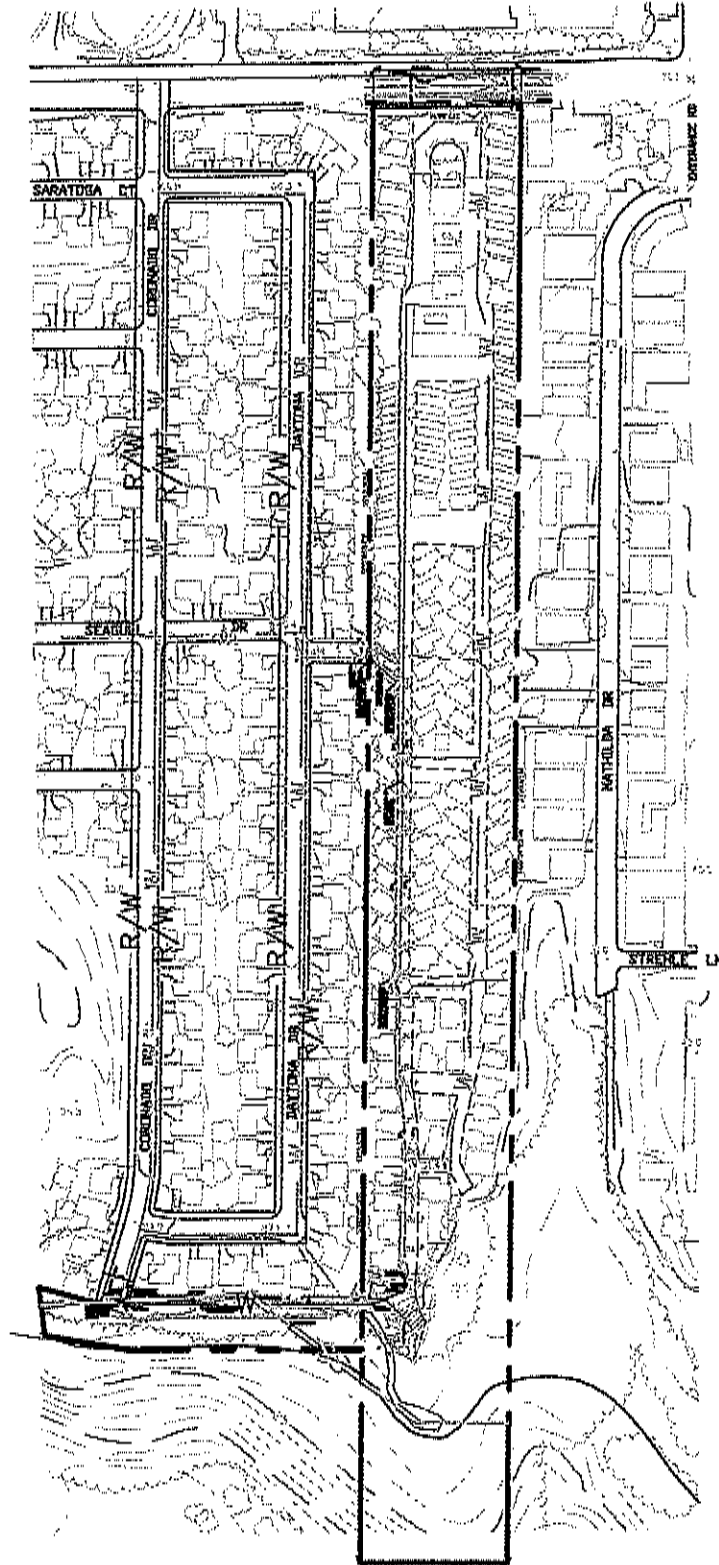
Fair: 30 to 70% ground cover.

Good: > 70% ground cover.

³ Curve numbers for group A have been developed only for desert shrub.

RANCHO GOLETA MOBILE HOME PARK FIRE IMPROVEMENTS PRE-DEVELOPMENT MAP

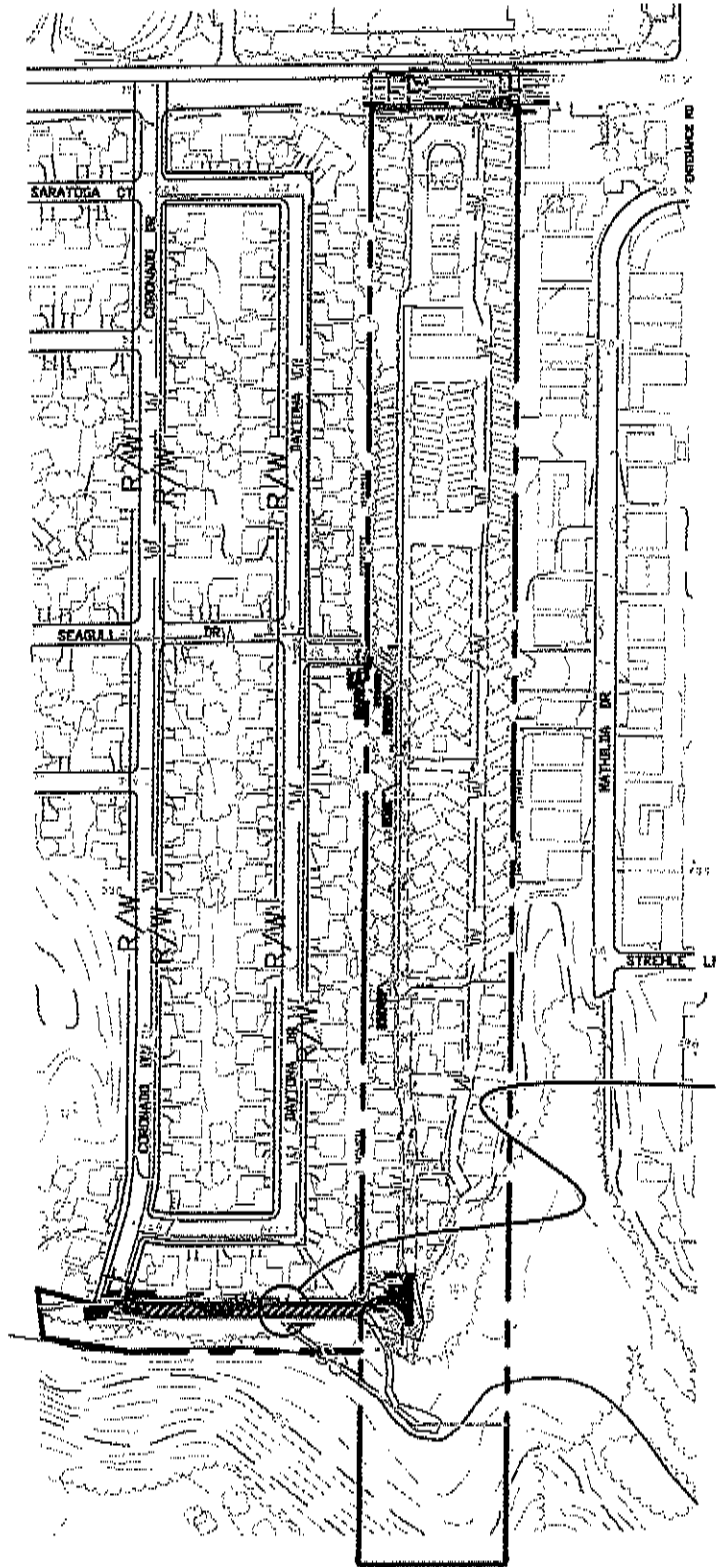
NOT TO SCALE



14 JAN 2015

RANCHO GOLETA MOBILE HOME PARK FIRE IMPROVEMENTS POST-DEVELOPMENT MAP

NOT TO SCALE



CONSTRUCTION
AREA

14 JAN 2015

RANCHO GOLETA MOBILE HOME PARK FIRE IMPROVEMENTS
HYDRAFLOW HYDROGRAPHS

14 JAN 2015

Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Wednesday, Jan 14 2015, 5:1 PM

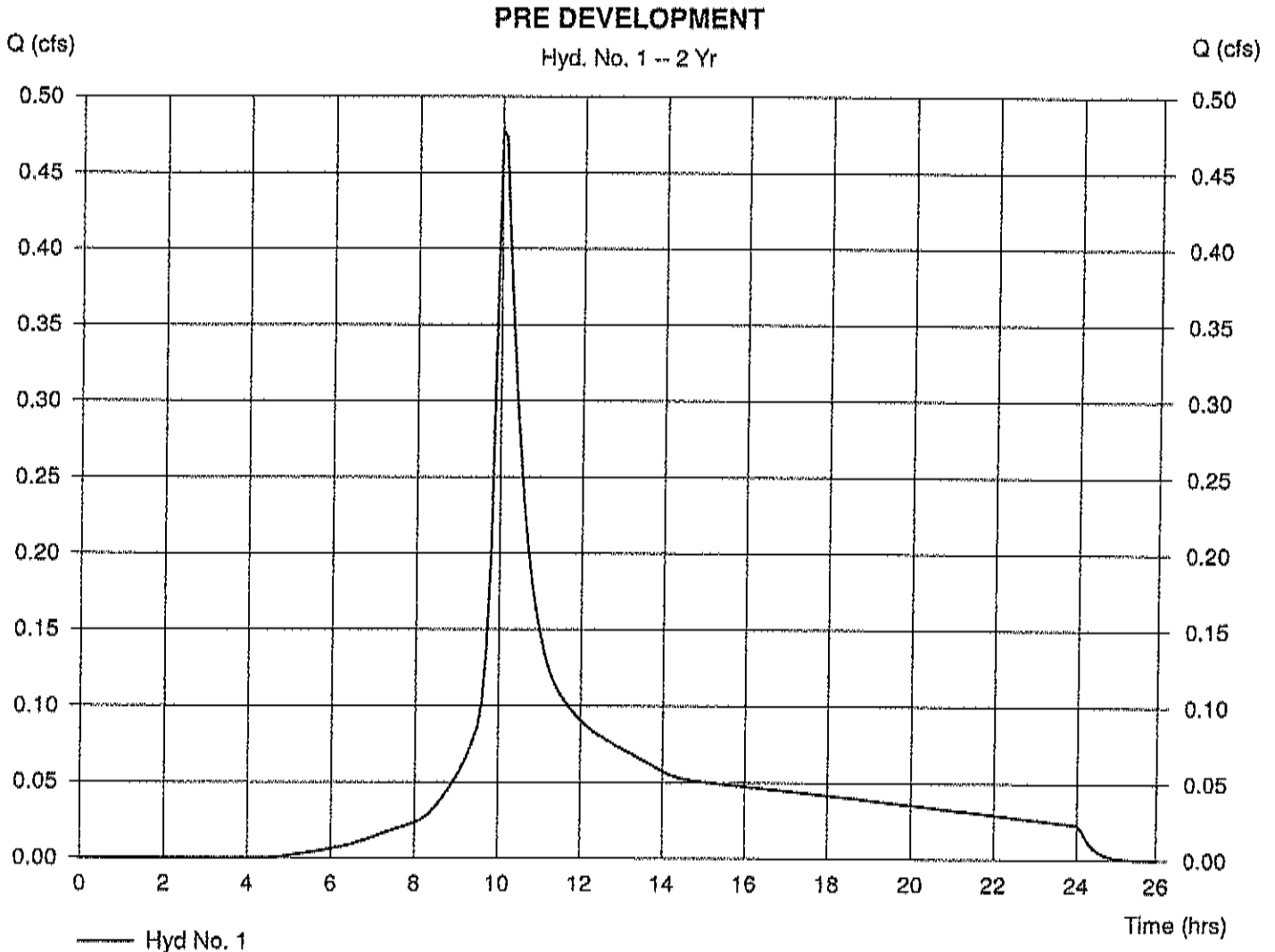
Hyd. No. 1

PRE DEVELOPMENT

Hydrograph type = SBUH Runoff
Storm frequency = 2 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 3.20 in
Storm duration = 24 hrs

Peak discharge = 0.48 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 490 ft
Time of conc. (Tc) = 19.30 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 4,132 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 14 2015, 5:2 PM

Hyd. No. 1

PRE DEVELOPMENT

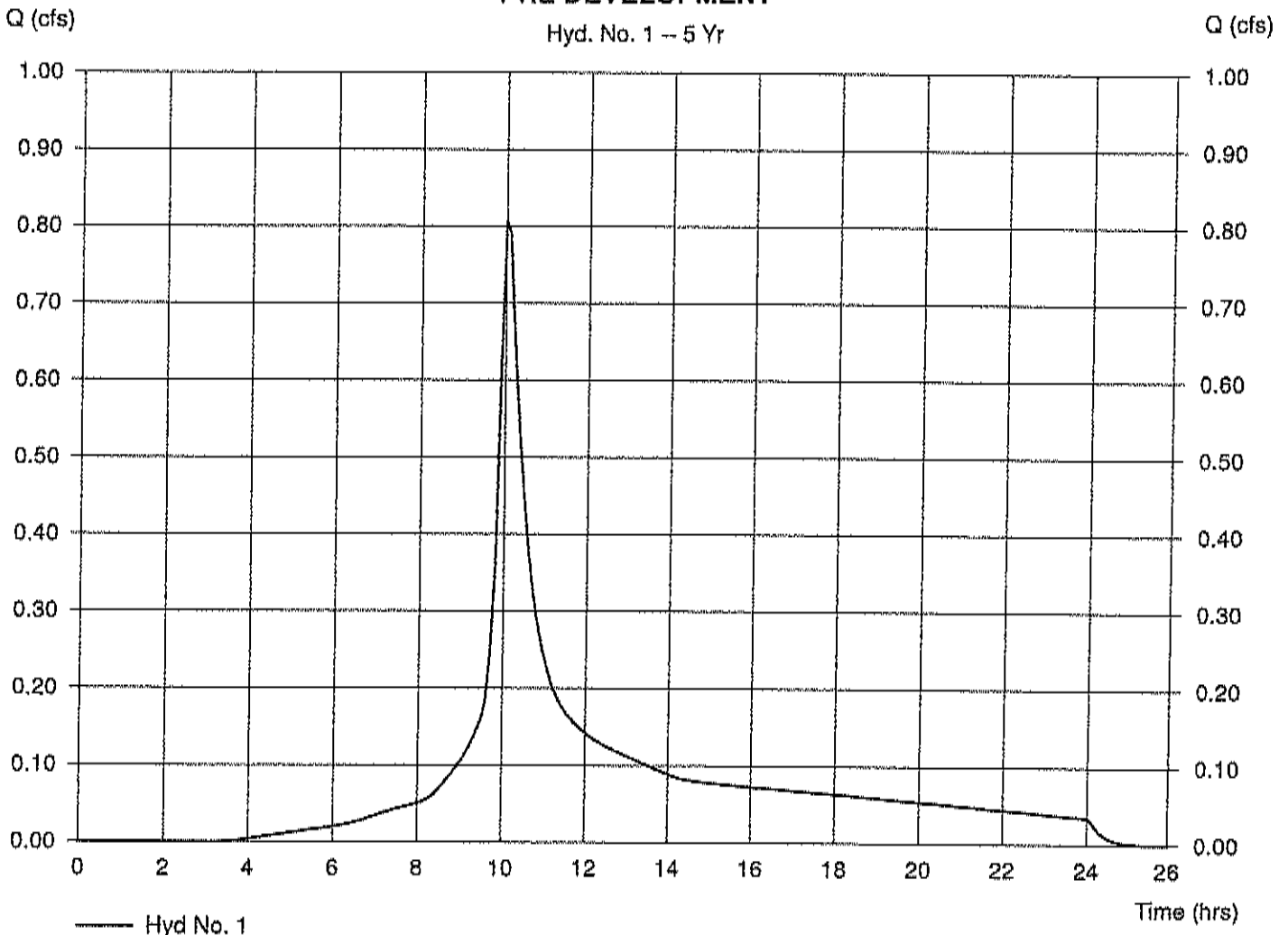
Hydrograph type = SBUH Runoff
Storm frequency = 5 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 4.61 in
Storm duration = 24 hrs

Peak discharge = 0.81 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 490 ft
Time of conc. (Tc) = 19.30 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 6,828 cuft

PRE DEVELOPMENT

Hyd. No. 1 -- 5 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 14 2015, 5:2 PM

Hyd. No. 1

PRE DEVELOPMENT

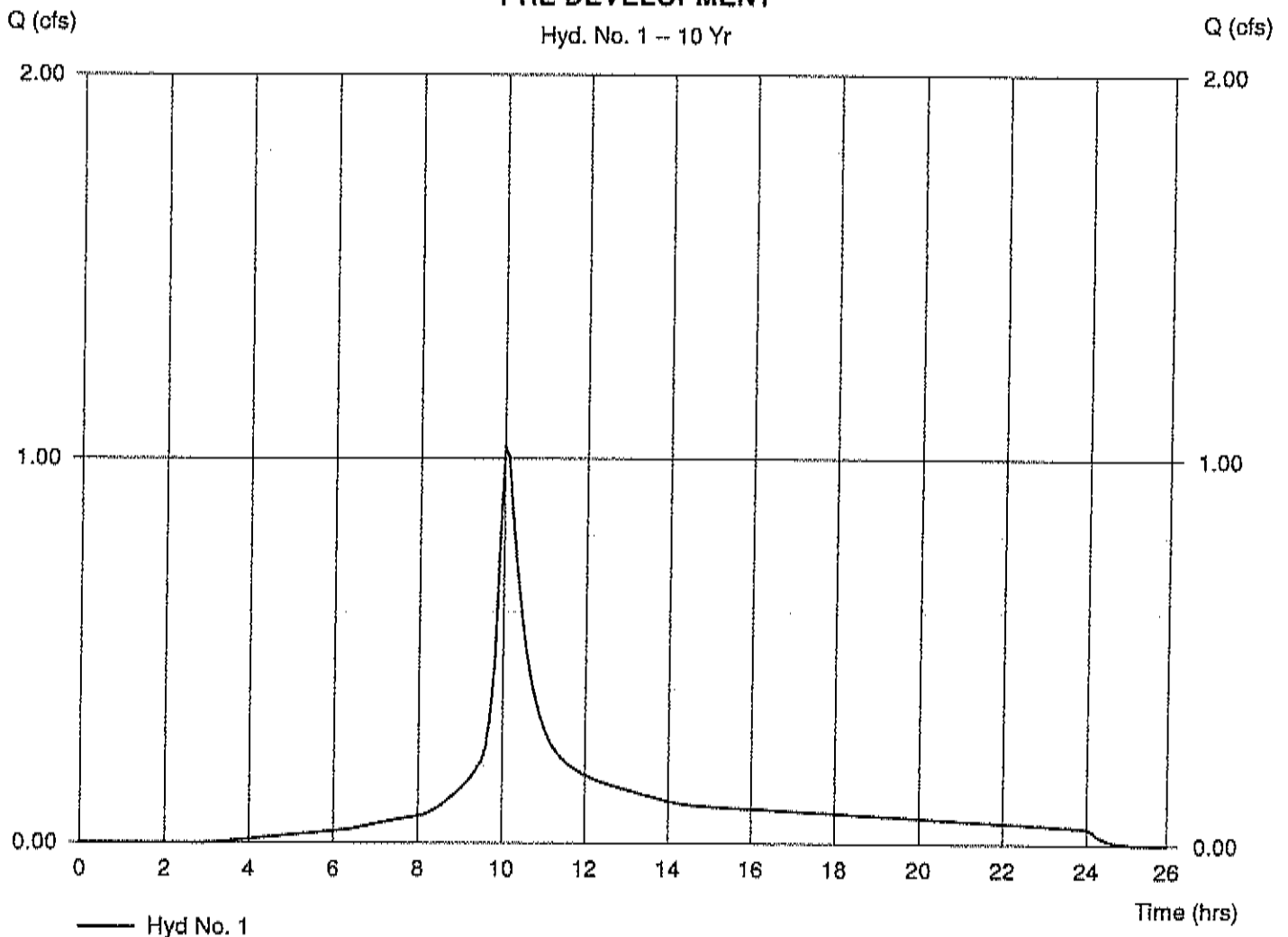
Hydrograph type = SBUH Runoff
Storm frequency = 10 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 5.55 in
Storm duration = 24 hrs

Peak discharge = 1.03 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 490 ft
Time of conc. (Tc) = 19.30 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 8,677 cuft

PRE DEVELOPMENT

Hyd. No. 1 -- 10 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 14 2015, 5:2 PM

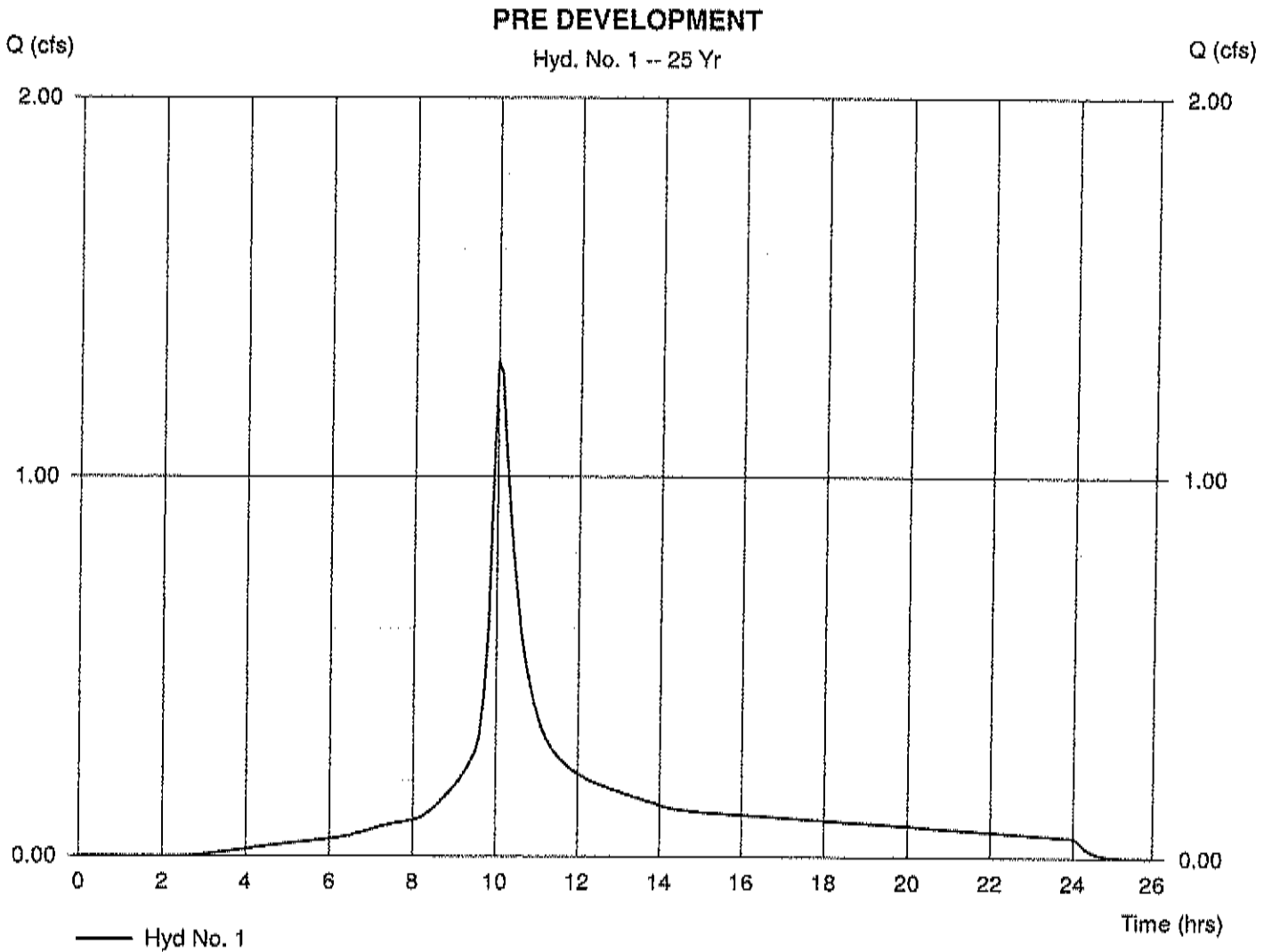
Hyd. No. 1

PRE DEVELOPMENT

Hydrograph type = SBUH Runoff
Storm frequency = 25 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 6.71 in
Storm duration = 24 hrs

Peak discharge = 1.30 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 490 ft
Time of conc. (Tc) = 19.30 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 10,991 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 14 2015, 5:2 PM

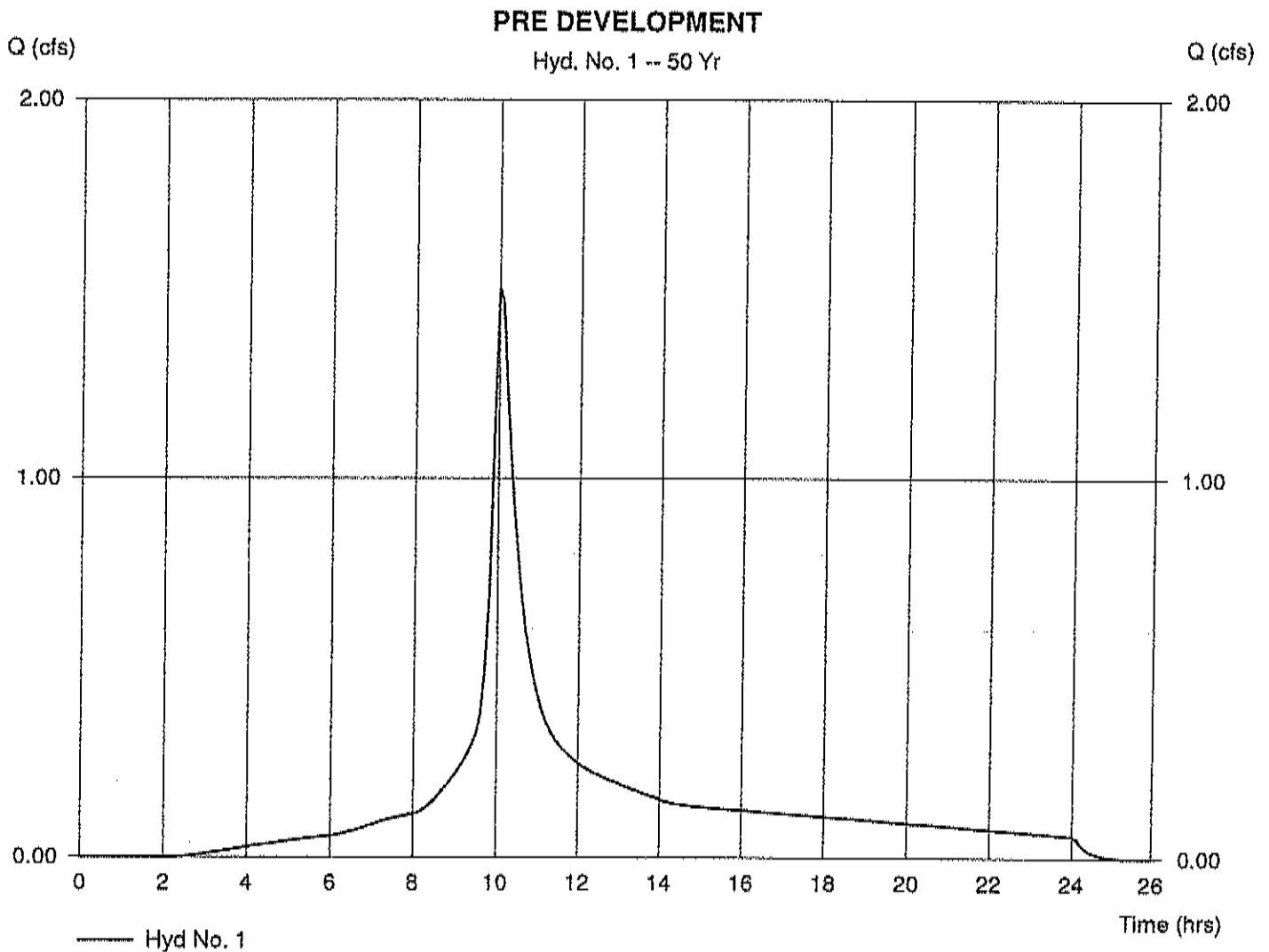
Hyd. No. 1

PRE DEVELOPMENT

Hydrograph type = SBUH Runoff
Storm frequency = 50 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 7.56 in
Storm duration = 24 hrs

Peak discharge = 1.50 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 490 ft
Time of conc. (Tc) = 19.30 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 12,701 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intellsolve

Wednesday, Jan 14 2015, 5:2 PM

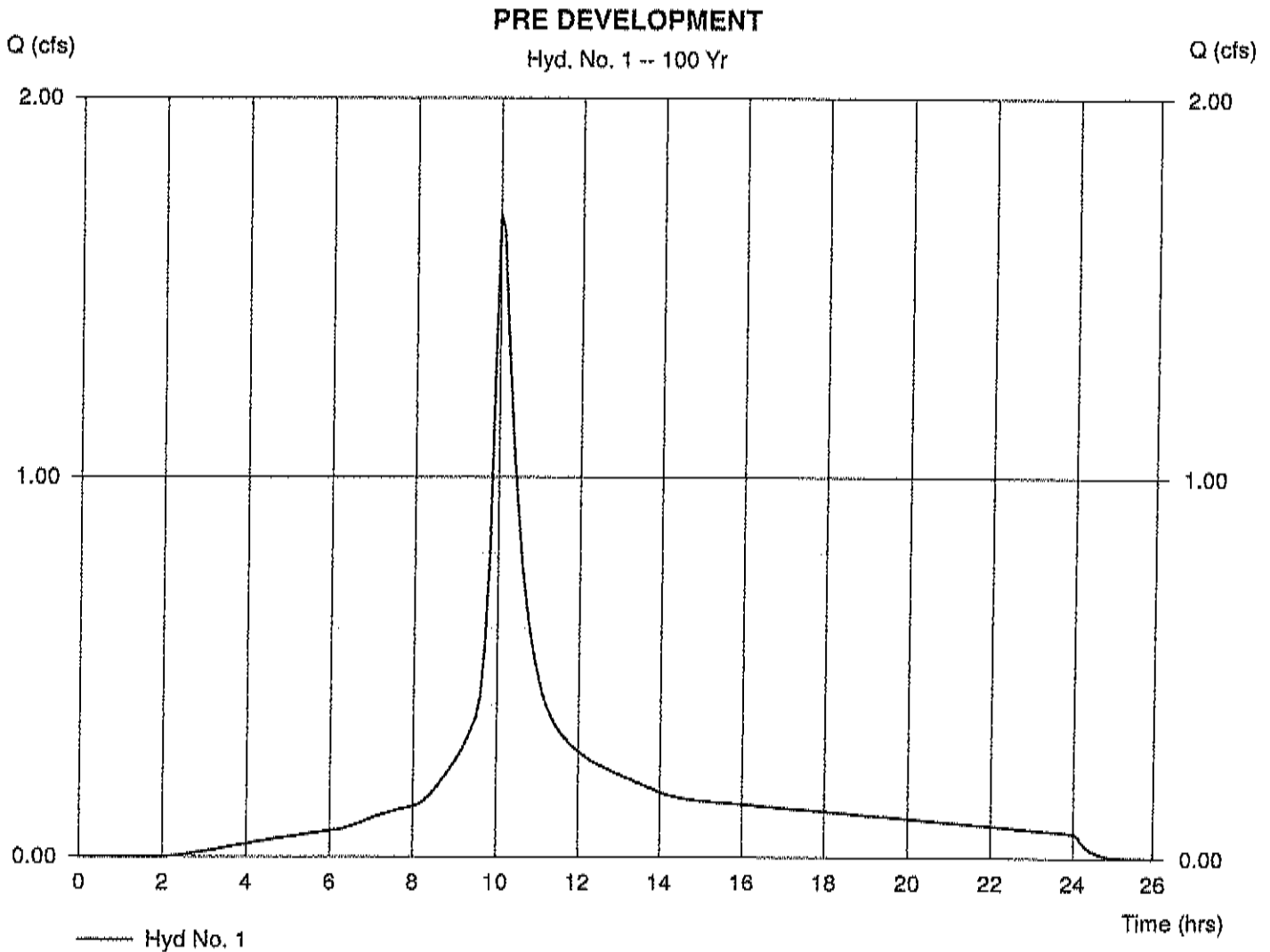
Hyd. No. 1

PRE DEVELOPMENT

Hydrograph type = SBUH Runoff
Storm frequency = 100 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 8.38 in
Storm duration = 24 hrs

Peak discharge = 1.70 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 490 ft
Time of conc. (Tc) = 19.30 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 14,360 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 14 2015, 5:3 PM

Hyd. No. 2

POST DEVELOPMENT

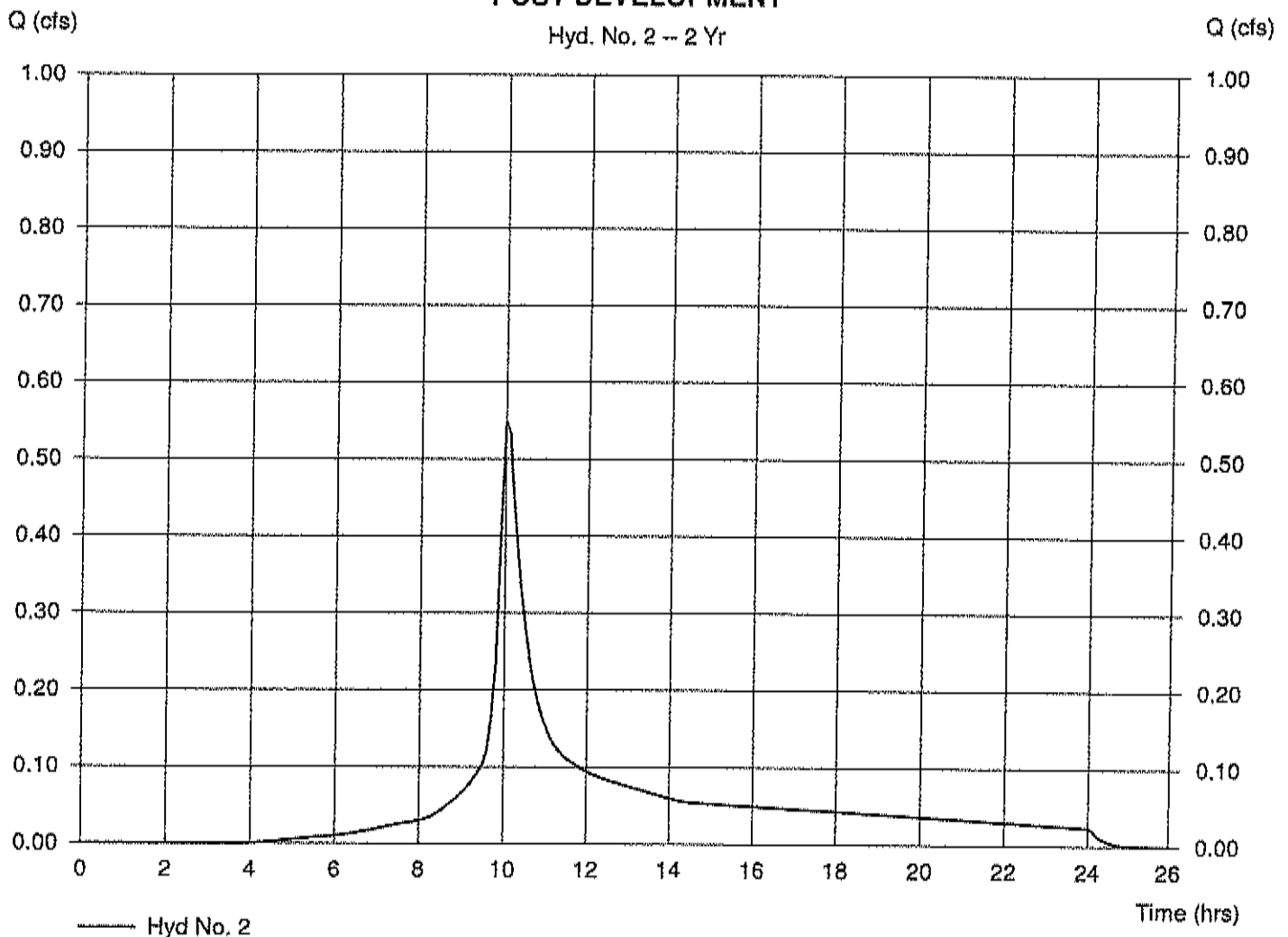
Hydrograph type = SBUH Runoff
Storm frequency = 2 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 3.20 in
Storm duration = 24 hrs

Peak discharge = 0.55 cfs
Time interval = 6 min
Curve number = 90
Hydraulic length = 490 ft
Time of conc. (Tc) = 17.80 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 4,487 cuft

POST DEVELOPMENT

Hyd. No. 2 -- 2 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 14 2015, 5:3 PM

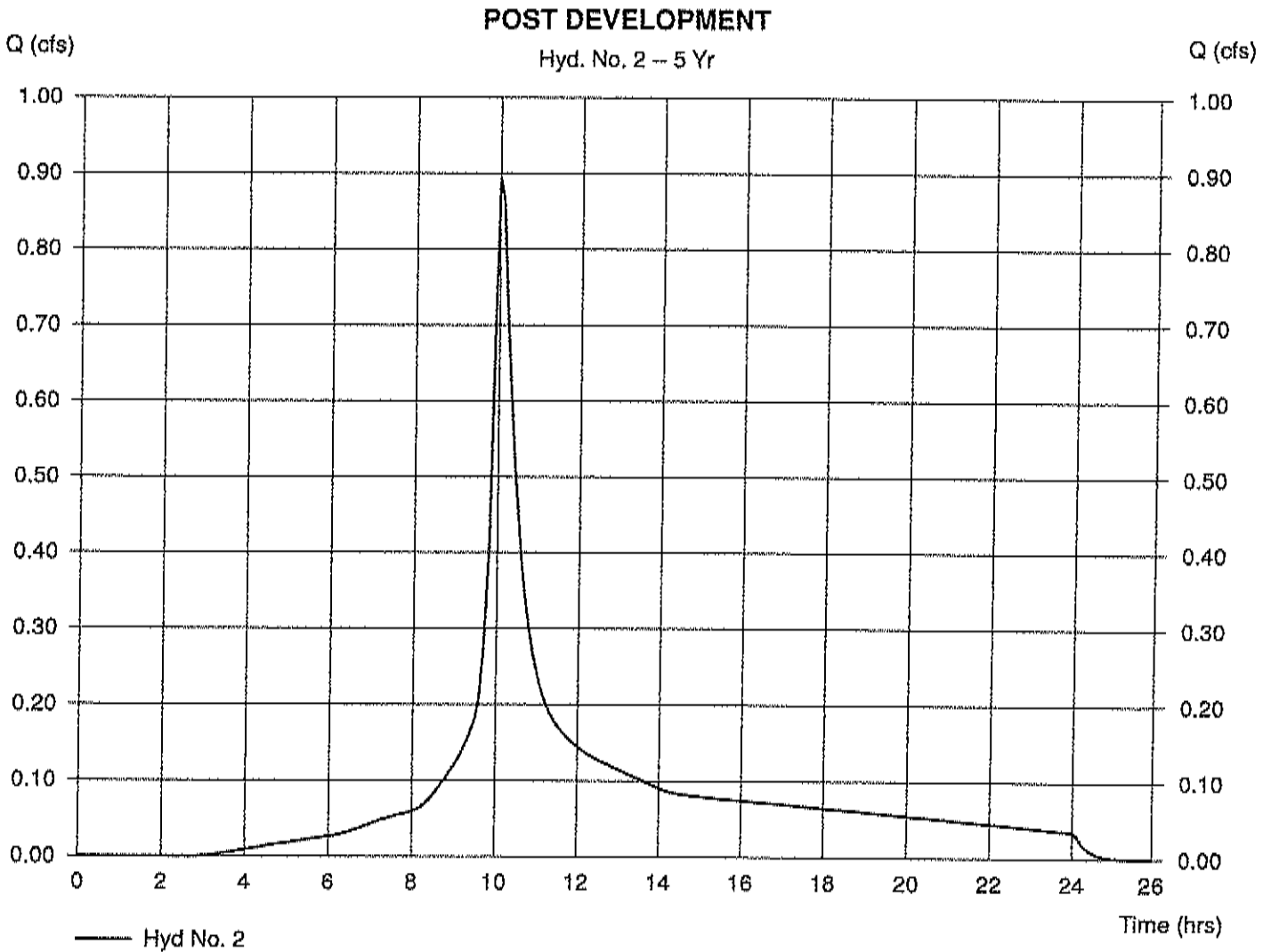
Hyd. No. 2

POST DEVELOPMENT

Hydrograph type = SBUH Runoff
Storm frequency = 5 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 4.61 in
Storm duration = 24 hrs

Peak discharge = 0.89 cfs
Time interval = 6 min
Curve number = 90
Hydraulic length = 490 ft
Time of conc. (Tc) = 17.80 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 7,244 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 14 2015, 5:3 PM

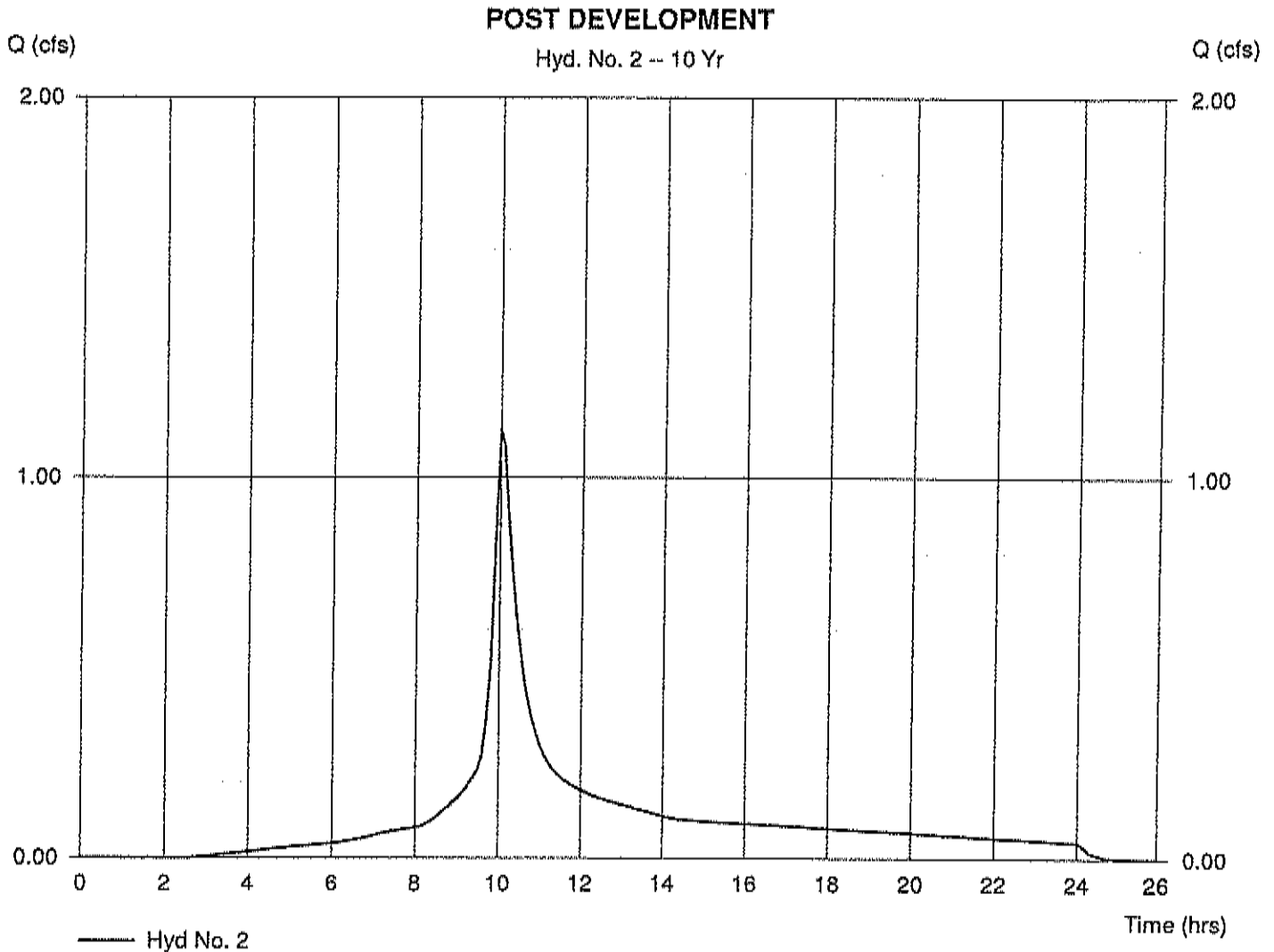
Hyd. No. 2

POST DEVELOPMENT

Hydrograph type = SBUH Runoff
Storm frequency = 10 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 5.55 in
Storm duration = 24 hrs

Peak discharge = 1.13 cfs
Time interval = 6 min
Curve number = 90
Hydraulic length = 490 ft
Time of conc. (Tc) = 17.80 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 9,121 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 14 2015, 5:4 PM

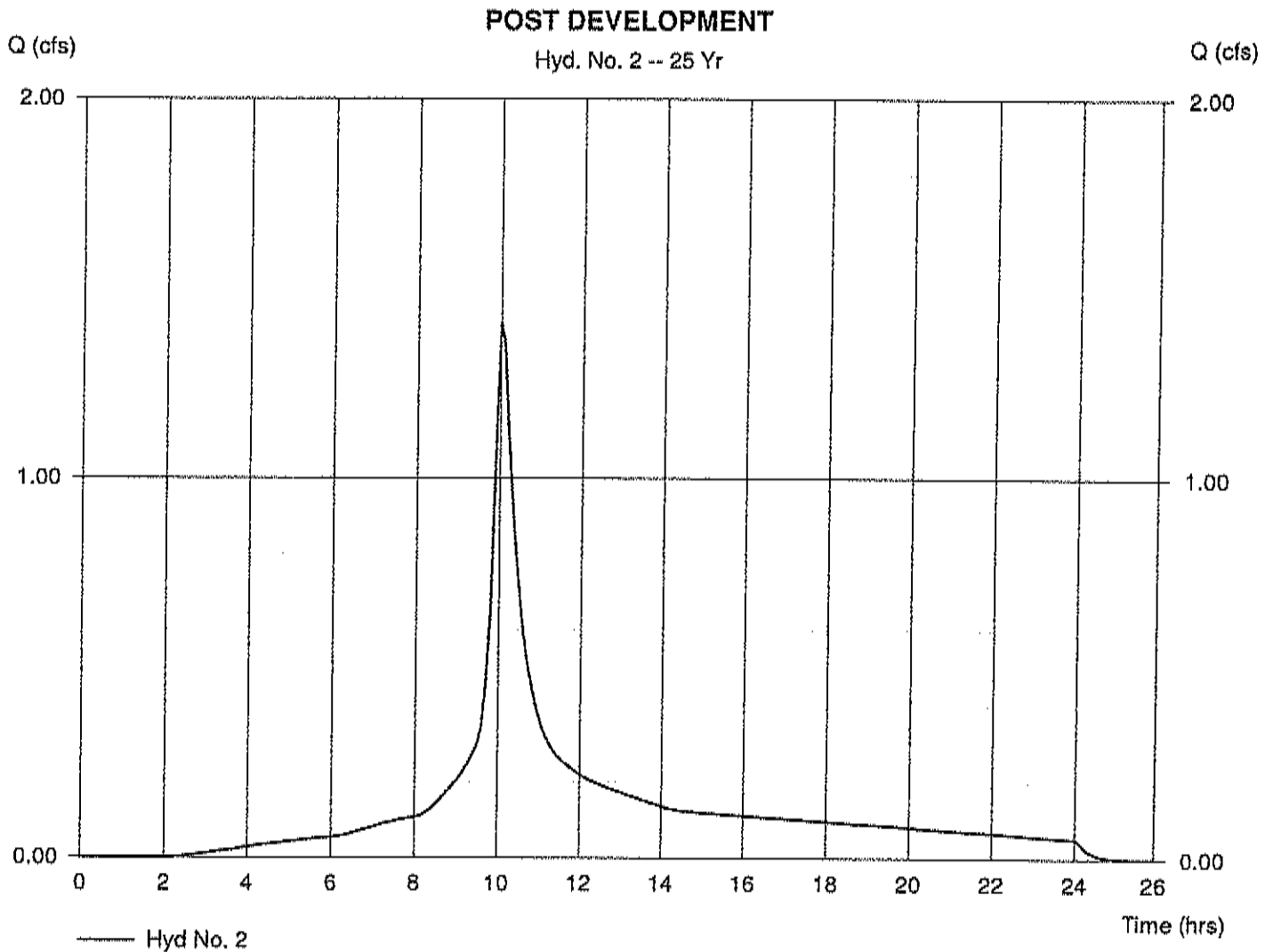
Hyd. No. 2

POST DEVELOPMENT

Hydrograph type = SBUH Runoff
Storm frequency = 25 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 6.71 in
Storm duration = 24 hrs

Peak discharge = 1.41 cfs
Time interval = 6 min
Curve number = 90
Hydraulic length = 490 ft
Time of conc. (Tc) = 17.80 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 11,461 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 14 2015, 5:4 PM

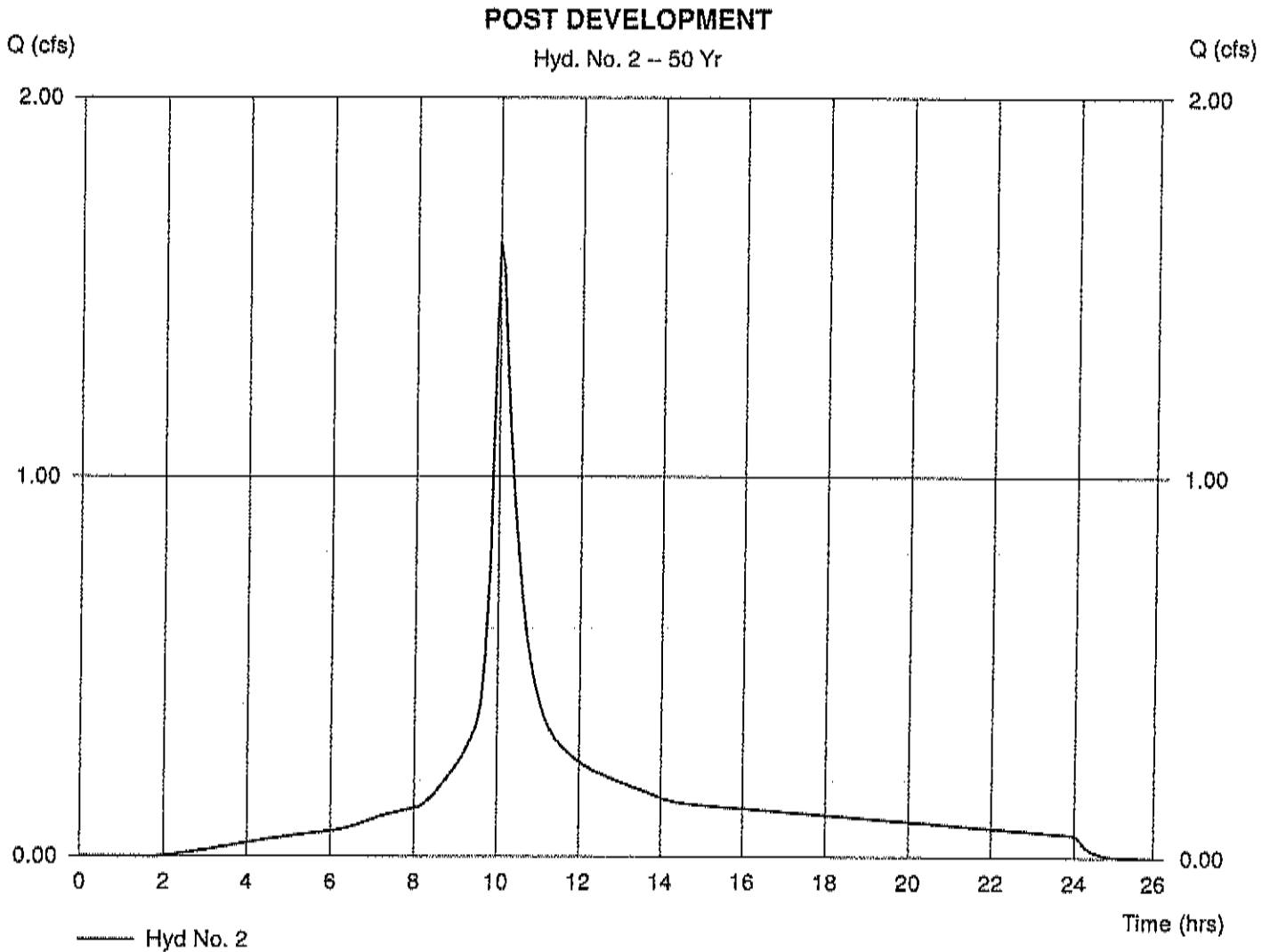
Hyd. No. 2

POST DEVELOPMENT

Hydrograph type = SBUH Runoff
Storm frequency = 50 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 7.56 in
Storm duration = 24 hrs

Peak discharge = 1.62 cfs
Time interval = 6 min
Curve number = 90
Hydraulic length = 490 ft
Time of conc. (Tc) = 17.80 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 13,186 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 14 2015, 5:4 PM

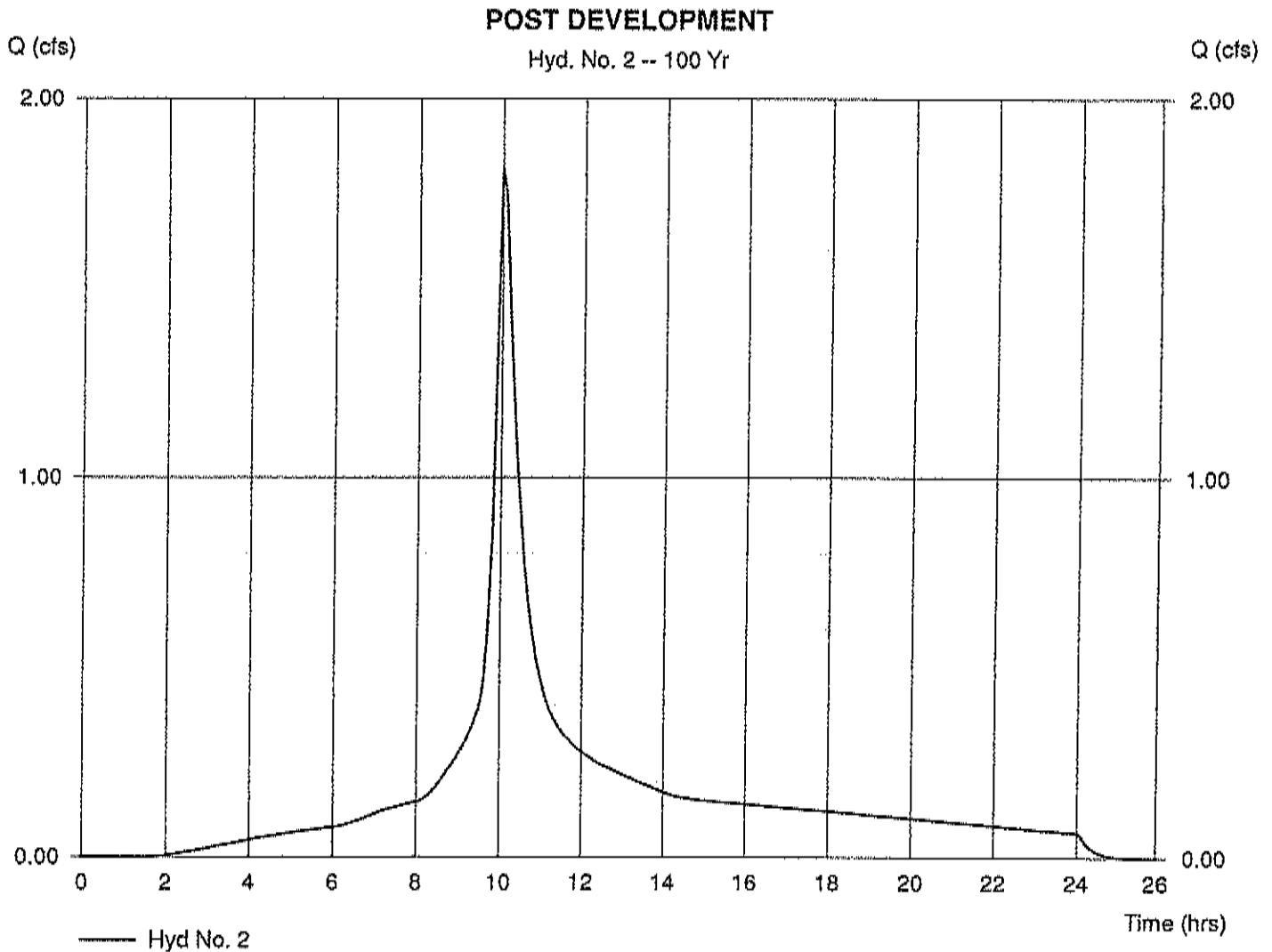
Hyd. No. 2

POST DEVELOPMENT

Hydrograph type = SBUH Runoff
Storm frequency = 100 yrs
Drainage area = 0.570 ac
Basin Slope = 0.5 %
Tc method = LAG
Total precip. = 8.38 in
Storm duration = 24 hrs

Peak discharge = 1.82 cfs
Time interval = 6 min
Curve number = 90
Hydraulic length = 490 ft
Time of conc. (Tc) = 17.80 min
Distribution = Type I
Shape factor = N/A

Hydrograph Volume = 14,856 cuft



Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SBUH Runoff	-----	-----	0.48	-----	0.81	1.03	1.30	1.50	1.70	PRE DEVELOPMENT
2	SBUH Runoff	-----	-----	0.55	-----	0.89	1.13	1.41	1.62	1.82	POST DEVELOPMENT

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