

APPENDIX F
Hydrology and Water Quality Reports

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

**CTCIP GARDENA BLVD.
333 WEST GARDENA BLVD.
CARSON, CA**

PREPARED FOR

CT Realty Investors - N.B.
4343 VON KARMAN SUITE 200
NEWPORT BEACH, CA 92660
P. (949) 431-6400
F. (949) 330-5771

AUGUST 14, 2019
REVISED OCTOBER 9, 2019
REVISED FEBRUARY 21, 2020

JOB NO. 3795

PREPARED BY

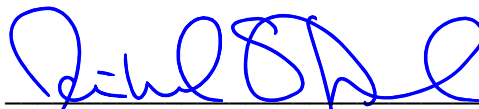
THIENES ENGINEERING
14349 FIRESTONE BLVD.
LA MIRADA, CALIFORNIA 90638
P. (714) 521-4811
FAX (714) 521-4173

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

**CTCIP GARDENA BLVD.
333 WEST GARDENA BLVD.**

PREPARED UNDER
THE SUPERVISION OF



REINHARD STENZEL

02/21/20
DATE:

R.C.E. 56155

EXP. 12/31/2020

INTRODUCTION

A: PROJECT LOCATION

The project site is located at 333 W. Gardena Boulevard in the City of Carson, California. Please see following page for vicinity map.

B: STUDY PURPOSE

The purpose of this study is to determine the proposed condition 50-year peak flow rate from the site that ultimately drains to an existing storm drain system in S. Figueroa Street via a proposed storm drain in 164th Street.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel, PE
Matthew Cruz

DISCUSSION

The project site encompasses approximately 6.55 acres. Proposed improvements to the site consist of the construction of one warehouse type building of approximately 145,840 square feet. A truck dock is located at the easterly side of the proposed building with vehicle parking on the northerly and westerly side of the site. There will be landscaping adjacent to the streets.

Existing Condition

The project site has two warehouse type buildings and a residential building. The site consists of scattered open brush with some paving. There is no clear drainage path but in general runoff will surface drain southerly and westerly toward Gardena Boulevard and 164th Street. There is a private alleyway where runoff is ponding up along the west side of the site.

Based on hydrology calculations from the County the project site is tabled to storm drain Line "A" in Figueroa Street (Project No. 1207, Line A) which is west of the project site. Based on the calculations and correspondence from the County, the allowable peak flow rate for the site is 1.05 cfs/acre.

See Appendix "A" for reference hydrology calculations and existing storm drain plans.

Proposed Condition

Runoff from the majority of the building roof, the northerly vehicle parking, the truckyard, and the southeasterly vehicle parking will drain to multiple catch basins in the truck yard (Subarea 1A, 4.90 ac.). Runoff will be conveyed around the northerly portion of the building and will discharge to a proposed public storm drain system within 164th Street. The 50-year peak flow rate from this area is approximately 13.5 cfs.

Runoff from the westerly vehicle parking and westerly portion of the building roof will drain to two catch basins in the aforementioned vehicle parking lot (Subarea 2A, 3A, 1.40 ac.). Flows will be conveyed to the proposed public storm drain within 164th Street. The 50-year peak flow rate is approximately 4.5 cfs.

Runoff from proposed landscaping fronting Gardena Boulevard will sheet flow to the street (Subarea 4B, 0.25 ac.).

See Appendix "B" for the hydrology calculations and Appendix "D" for the proposed condition hydrology map.

Detention

Runoff from the site draining via the proposed storm drain will be limited to the allowable peak flow rate provided by the County, which is approximately 6.6 cfs (6.30 acres x 1.05 cfs/acre). In order to limit the runoff discharge from the site, flows tributary to the truck yard (Subarea 1A) will be temporarily stored above ground. The total undetained Q50 is approximately 4.5 cfs (Subareas 2A and 3A), therefore only up to 2.1 cfs (6.6 cfs allowable – 4.5 cfs undetained = 2.1 cfs from truck yard) is allowed to discharge from the truck yard.

Hydrograph volumes were determined from the Hydro-Calc excel spreadsheet. Cumulative volumes are shown up to the allowable peak flow rate before and after the peak occur. The difference in the volume before and after the peak along with the allowable peak flow rate (2.1 cfs allowed from the truck yard) is the volume to be temporarily detained. The estimated volume to be detained is approximately 9,571 cubic feet to a depth of up to 0.7 feet in the truck yard.

See Appendix "C" for the detention calculations.

Methodology

Hydrology calculations were computed using Los Angeles County's HydroCalc Spreadsheet. WSPG was used for the hydraulic calculations. The soil type is "13" and 50-year isohyetal is 6.0" per the Los Angeles County Hydrology Manual.

APPENDIX

DESCRIPTION

A

REFERENCE MATERIALS

B

HYDROLOGY CALCULATIONS

C

DETENTION CALCULATIONS

D

HYDROLOGY MAP

APPENDIX A

REFERENCE MATERIALS

34° 00' 00"

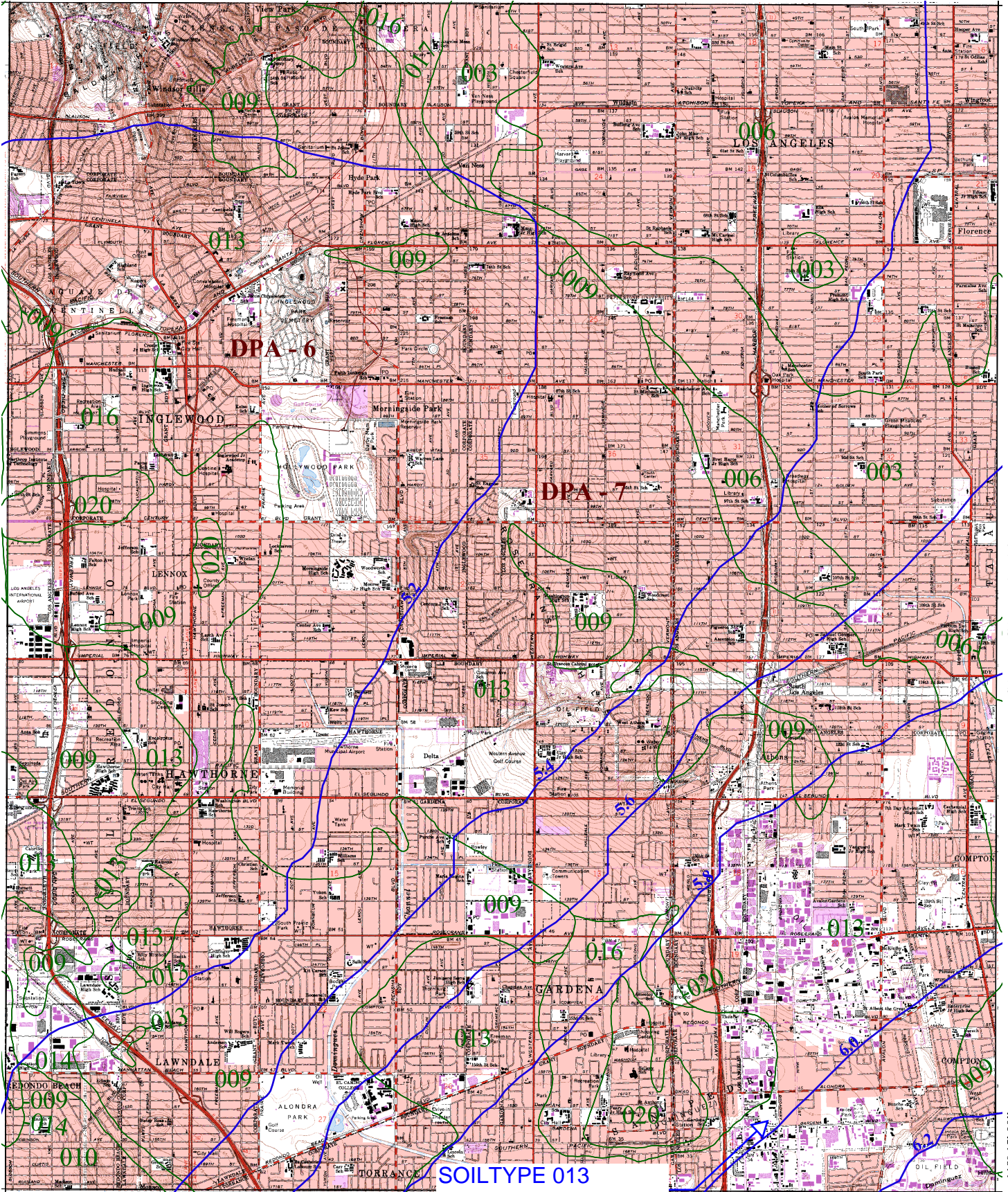
HOLLYWOOD 1-H1.18

-118° 22' 30"

VENICE 1-H1.7

SOUTH GATE 1-H1.9

-118° 15' 00"



SOILTYPE 013
6.0 INCH RAINFALL

33° 52' 30"



- 016 SOIL CLASSIFICATION AREA
- 7.2 INCHES OF RAINFALL
- DPA - 6 DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

INGLEWOOD 50-YEAR 24-HOUR ISOHYET

1-H1.8





| | |
|--|-----------------|
| Office Use Only | |
| <input type="checkbox"/> Sent | Initials: _____ |
| <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email <input type="checkbox"/> Other: | _____ |
| Date: _____ | Time: _____ |

**LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION – HYDRAULIC ANALYSIS UNIT**

INFORMATION REQUEST SUMMARY

INFORMATION REQUESTED BY

*Requester's Name: Angie Maldonado
 Company: Thienes Engineering, Inc
 *Phone Number: (714) 521-4811 Fax Number: (714) 521-4173
 *Email: Angie@ThienesEng.com

Method of Contact: Walk-in Phone Fax Email Prelim. Mtg. Date: 7/12/2019

Intended Use: Research

Proposed Project Type: Industrial Acreage Involved: _____

*Will information be used in any litigation? YES NO
 Case Info. Name: _____ No: _____ Location: _____

INFORMATION REQUESTED (Attach Assessor Map)

LACFCD Facility: Name: Project No. 1207
 Unit: _____ Line: A Station: _____
 City: Carson
 *Street/Cross-street: NW Gardena Blvd & Broadway St
 *Thomas Guide: Page: 734 Grid: C6 Site Map/Plans Submitted
 Info. Requested:
 • Hydrology Map
 • Allowable Q
 • Calcs

*Required Information. See Page 2 of 2 for Instructions.

BELOW SECTION TO BE COMPLETED BY THE HYDRAULIC ANALYSIS UNIT

INFORMATION PROVIDED:

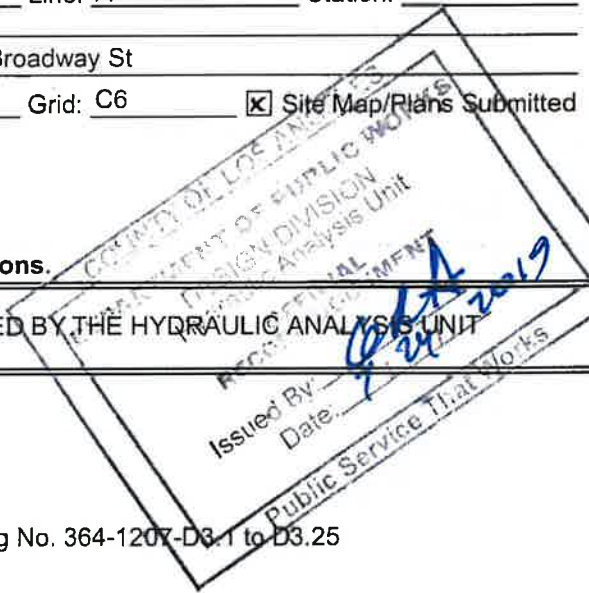
Hydrology Data, Hydrology Map

REFERENCES SEARCHED:

Project No. 1207 Micro Fish Files, and As Built Drawing No. 364-1207-D3.1 to D3.25

COMMENTS, ETC:

Subarea No. 19 Allowable Discharge Flow $Q = (43.40/37.70) \times (774.00/851.00) = 1.05\text{cfs/acre}$



INFORMATION PROVIDED BY: George K Aintablian

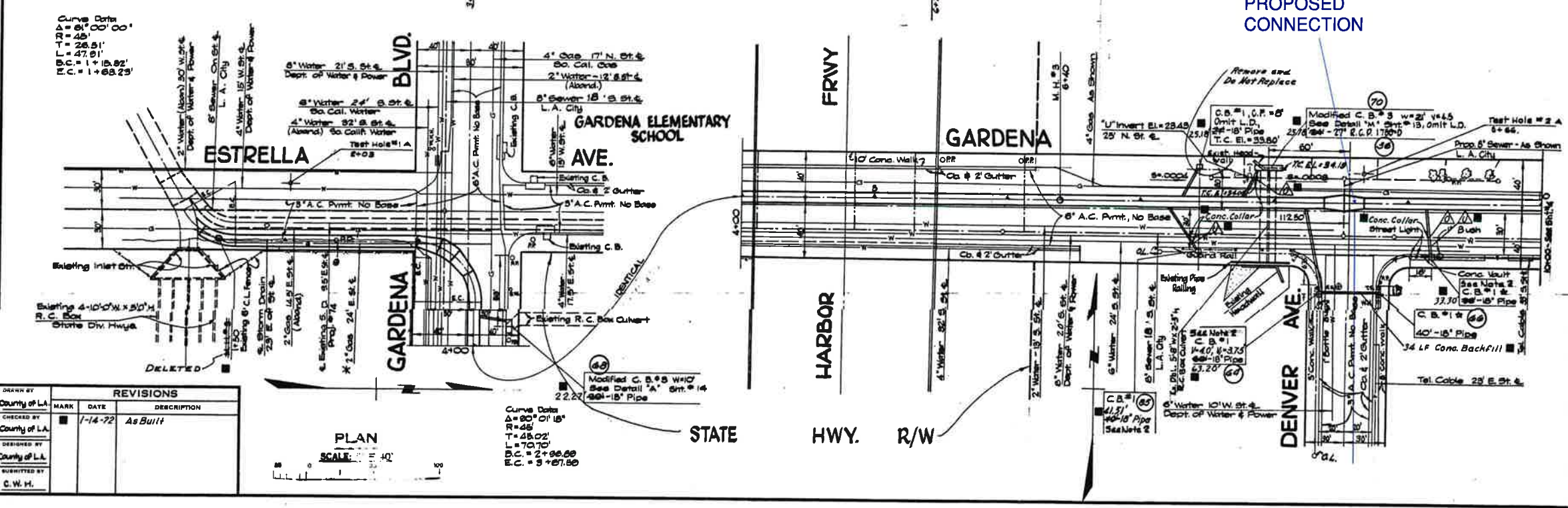
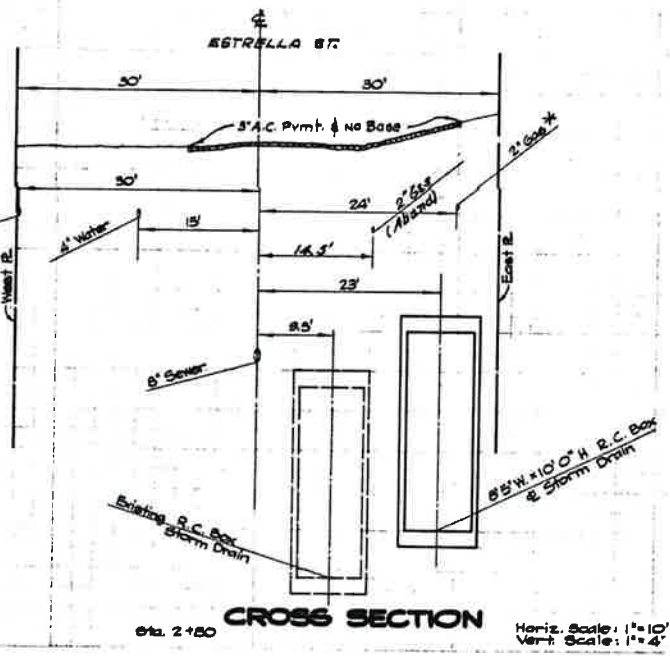
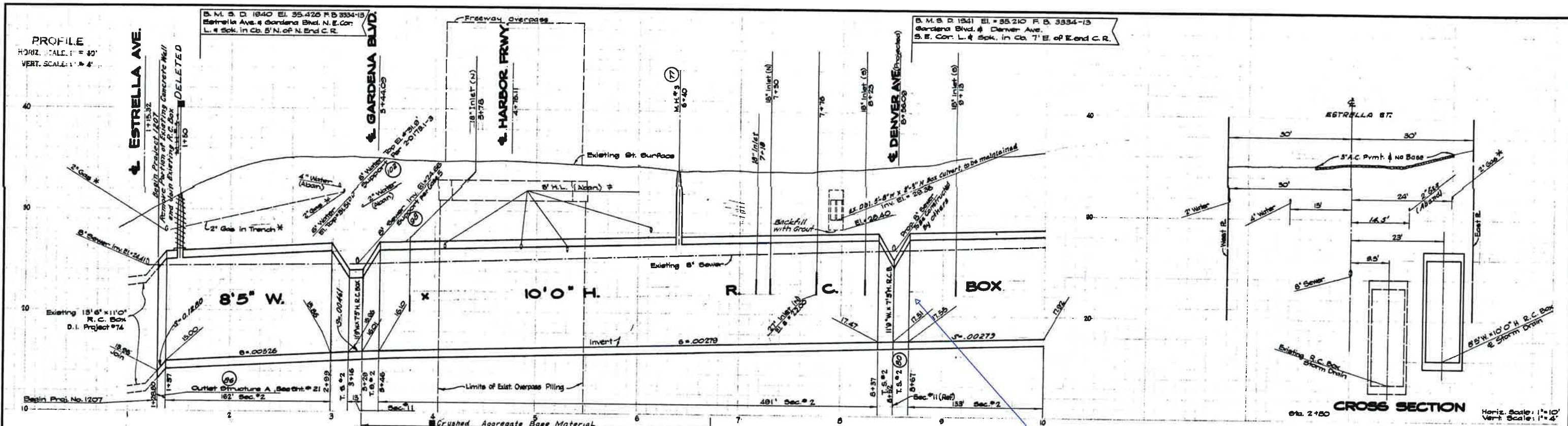
Date: 07/24/2019

INFORMATION REVIEWED BY:

Date:

Print

Save a Copy



NOTES:

- In the City of Los Angeles 6" A.C. pvm't shall be replaced with 6" A.C. pvm't.
- At each catch basin location remove 18" of 1-inch street lighting conduit. Furnish and install new conduit. Remove existing cable and furnish and install new cable between adjacent street lights.

| REVISIONS | | |
|-----------|---------|-------------|
| MARK | DATE | DESCRIPTION |
| 1 | 1-14-72 | As Built |

1964 STORM DRAIN BOND ISSUE

LOS ANGELES COUNTY
FLOOD CONTROL DISTRICT

COUNTY
PROJECT NO. 1207
LINE A
STA. 1+28.00 TO STA. 10+00
PLAN AND PROFILE

| | |
|--|---|
| PREPARED BY JOHN A. LAMBIE COUNTY ENGINEER | RECOMMENDED BY <i>[Signature]</i> DIVISION ENGINEER - DESIGN DIVISION |
| DRAWN BY <i>[Signature]</i> DESIGNED BY <i>[Signature]</i> CHECKED BY <i>[Signature]</i> DATE 1-1-68 | APPROVED BY <i>[Signature]</i> 12/1/68 CHIEF ENGINEER |

SCALE AS SHOWN DATE DEC '68 DWG. NO. 364-1207-D-3 SHEET 3 OF 25

APPENDIX B

HYDROLOGY CALCULATIONS

Peak Flow Hydrologic Analysis

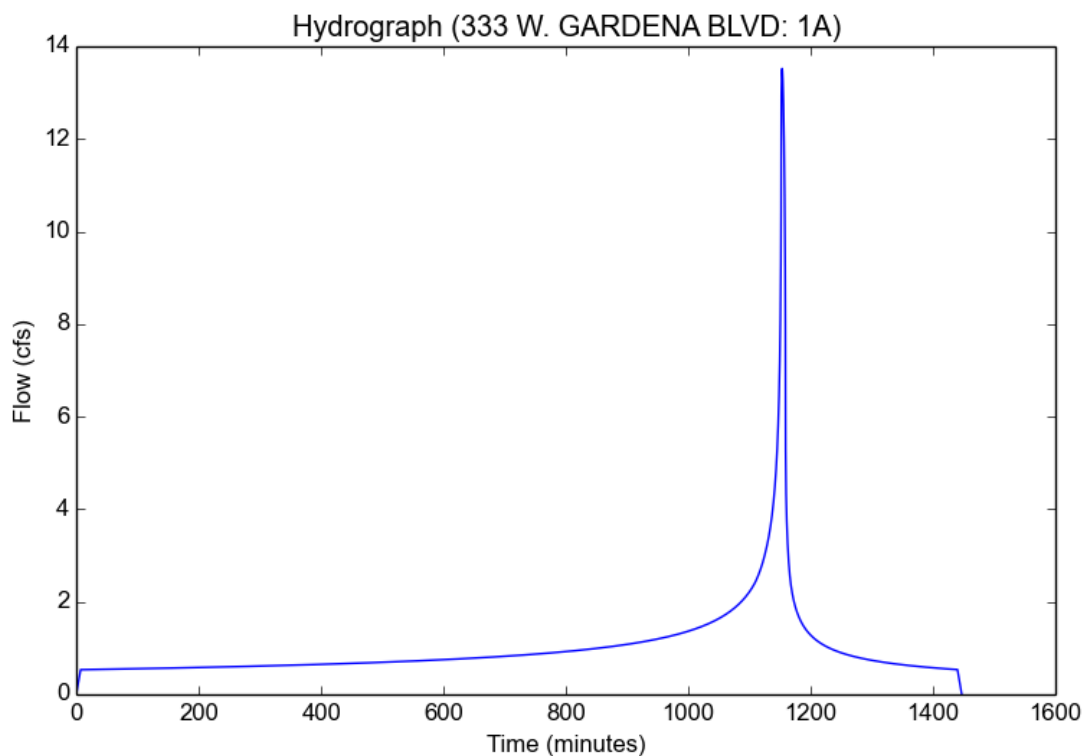
File location: O:/3700-3799/3795/HYDROLOGY/333 W. GARDENA BLVD Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

| | |
|---------------------------|---------------------|
| Project Name | 333 W. GARDENA BLVD |
| Subarea ID | 1A |
| Area (ac) | 4.9 |
| Flow Path Length (ft) | 480.0 |
| Flow Path Slope (vft/hft) | 0.00575 |
| 50-yr Rainfall Depth (in) | 6.0 |
| Percent Impervious | 0.9 |
| Soil Type | 13 |
| Design Storm Frequency | 50-yr |
| Fire Factor | 0 |
| LID | False |

Output Results

| | |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.0 |
| Peak Intensity (in/hr) | 3.0561 |
| Undeveloped Runoff Coefficient (Cu) | 0.9292 |
| Developed Runoff Coefficient (Cd) | 0.9 |
| Time of Concentration (min) | 7.0 |
| Clear Peak Flow Rate (cfs) | 13.4776 |
| Burned Peak Flow Rate (cfs) | 13.4776 |
| 24-Hr Clear Runoff Volume (ac-ft) | 2.0131 |
| 24-Hr Clear Runoff Volume (cu-ft) | 87690.7424 |



Peak Flow Hydrologic Analysis

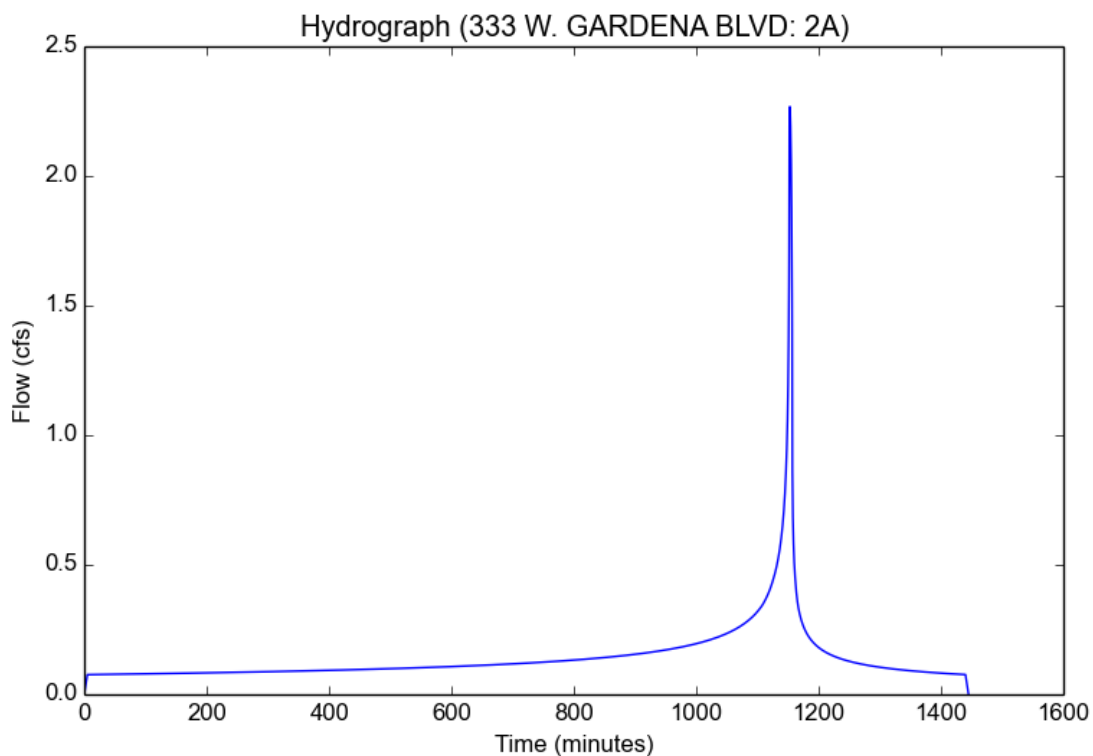
File location: O:/3700-3799/3795/HYDROLOGY/333 W. GARDENA BLVD Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

| | |
|---------------------------|---------------------|
| Project Name | 333 W. GARDENA BLVD |
| Subarea ID | 2A |
| Area (ac) | 0.7 |
| Flow Path Length (ft) | 202.0 |
| Flow Path Slope (vft/hft) | 0.00708 |
| 50-yr Rainfall Depth (in) | 6.0 |
| Percent Impervious | 0.9 |
| Soil Type | 13 |
| Design Storm Frequency | 50-yr |
| Fire Factor | 0 |
| LID | False |

Output Results

| | |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.0 |
| Peak Intensity (in/hr) | 3.5798 |
| Undeveloped Runoff Coefficient (Cu) | 0.9493 |
| Developed Runoff Coefficient (Cd) | 0.9 |
| Time of Concentration (min) | 5.0 |
| Clear Peak Flow Rate (cfs) | 2.2553 |
| Burned Peak Flow Rate (cfs) | 2.2553 |
| 24-Hr Clear Runoff Volume (ac-ft) | 0.2876 |
| 24-Hr Clear Runoff Volume (cu-ft) | 12526.7383 |



Peak Flow Hydrologic Analysis

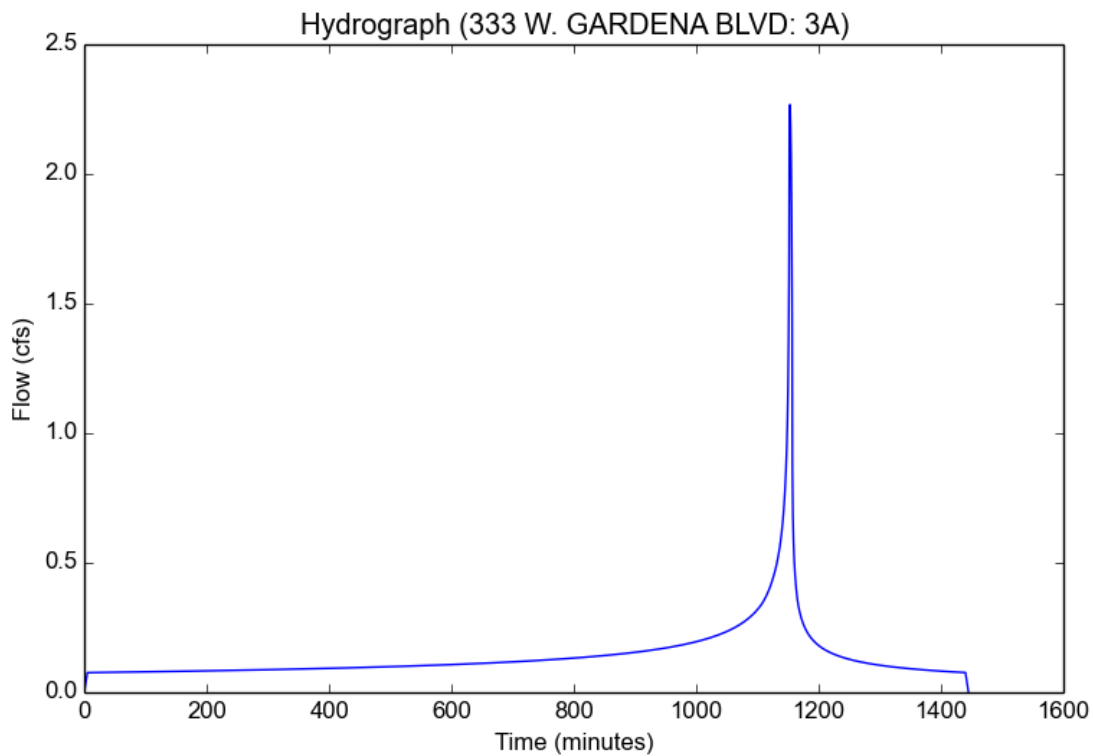
File location: O:/3700-3799/3795/HYDROLOGY/333 W. GARDENA BLVD Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

| | |
|---------------------------|---------------------|
| Project Name | 333 W. GARDENA BLVD |
| Subarea ID | 3A |
| Area (ac) | 0.7 |
| Flow Path Length (ft) | 164.0 |
| Flow Path Slope (vft/hft) | 0.00939 |
| 50-yr Rainfall Depth (in) | 6.0 |
| Percent Impervious | 0.9 |
| Soil Type | 13 |
| Design Storm Frequency | 50-yr |
| Fire Factor | 0 |
| LID | False |

Output Results

| | |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.0 |
| Peak Intensity (in/hr) | 3.5798 |
| Undeveloped Runoff Coefficient (Cu) | 0.9493 |
| Developed Runoff Coefficient (Cd) | 0.9 |
| Time of Concentration (min) | 5.0 |
| Clear Peak Flow Rate (cfs) | 2.2553 |
| Burned Peak Flow Rate (cfs) | 2.2553 |
| 24-Hr Clear Runoff Volume (ac-ft) | 0.2876 |
| 24-Hr Clear Runoff Volume (cu-ft) | 12526.7383 |



APPENDIX C

DETENTION CALCULATIONS

TEI JOB NO 3795 W. GARDENA BLVD.
Volume at Truck Yard

| Elevation | Depth (feet) | Area (sq. ft.) | Volume (c.f.) | Σ Volume (c.f.) | Σ Volume (ac-ft) |
|-----------|-----------------|-------------------|------------------|---------------------------|----------------------------|
| 41.19 | 0.00 | 0 | 501 | 501 | 0.01151 |
| 41.40 | 0.21 | 4776 | 2208 | 2709 | 0.06219 |
| 41.60 | 0.41 | 17300 | 4671 | 7380 | 0.16943 |
| 41.80 | 0.61 | 29413 | 6294 | 13675 | 0.31393 |
| 42.00 | 0.81 | 33529 | 7168 | 20842 | 0.47847 |
| 42.20 | 1.01 | 38148 | | | |

Peak Flow Hydrologic Analysis

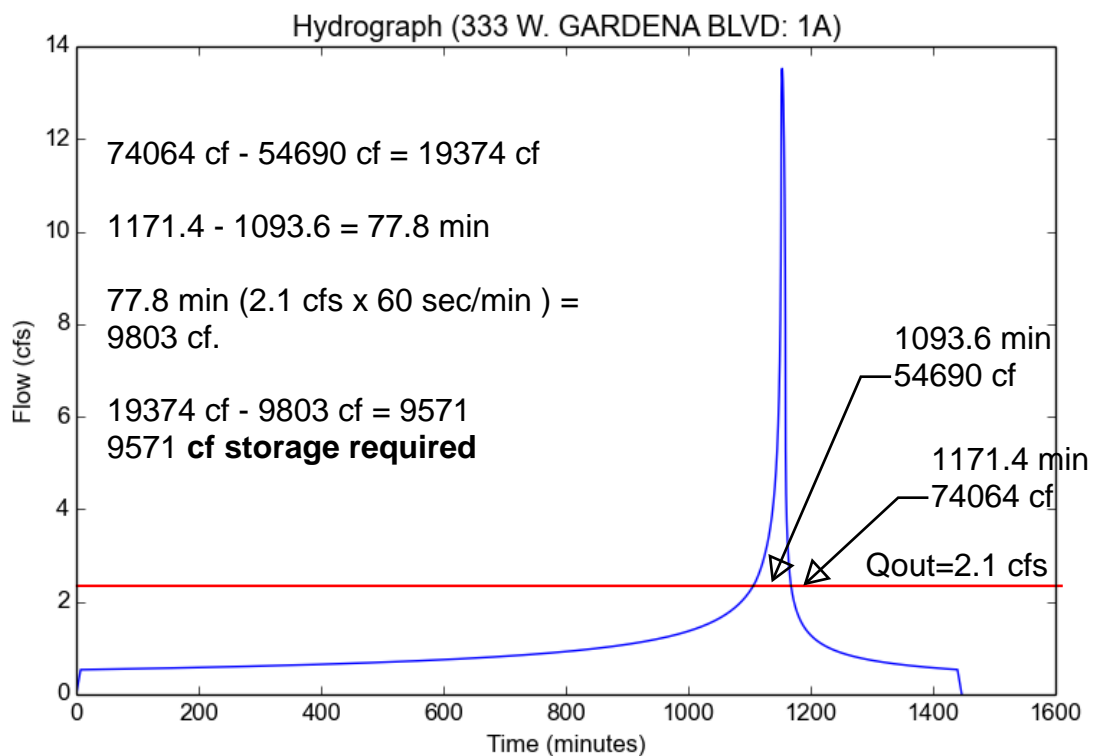
File location: O:/3700-3799/3795/HYDROLOGY/333 W. GARDENA BLVD Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

| | |
|---------------------------|---------------------|
| Project Name | 333 W. GARDENA BLVD |
| Subarea ID | 1A |
| Area (ac) | 4.9 |
| Flow Path Length (ft) | 480.0 |
| Flow Path Slope (vft/hft) | 0.00575 |
| 50-yr Rainfall Depth (in) | 6.0 |
| Percent Impervious | 0.9 |
| Soil Type | 13 |
| Design Storm Frequency | 50-yr |
| Fire Factor | 0 |
| LID | False |

Output Results

| | |
|-------------------------------------|------------|
| Modeled (50-yr) Rainfall Depth (in) | 6.0 |
| Peak Intensity (in/hr) | 3.0561 |
| Undeveloped Runoff Coefficient (Cu) | 0.9292 |
| Developed Runoff Coefficient (Cd) | 0.9 |
| Time of Concentration (min) | 7.0 |
| Clear Peak Flow Rate (cfs) | 13.4776 |
| Burned Peak Flow Rate (cfs) | 13.4776 |
| 24-Hr Clear Runoff Volume (ac-ft) | 2.0131 |
| 24-Hr Clear Runoff Volume (cu-ft) | 87690.7424 |



Inputs: 333 W. GARDENA BLVD

| Subarea ID | Area (ac) | Flow Path | Leng | Flow Path | 50-yr Rainfall | Dept | Percent Imperviou | Soil Type | Design Storm | F Fire Factor |
|------------|-----------|-----------|---------|-----------|----------------|------|-------------------|-----------|--------------|---------------|
| 1A | 4.9 | 480 | 0.00575 | 6 | 0.9 | 13 | 50-yr | 0 | | |

Outputs: 333 W. GARDENA BLVD

| Area (ac) | Modeled (50- | Time of Concer | Clear Peak | 24-Hr Clear | Runoff Burned | Peak Flow | Peak Intensity | Undeveloped F | Developed Ru |
|-----------|--------------|----------------|------------|-------------|---------------|------------|----------------|---------------|--------------|
| 1A | 6 | 7 | 13.521 | 2.013102443 | 13.47761017 | 3.05614743 | 0.929172028 | | 0.9 |

Hydrograph: 333 W. GARDENA BLVD - 1A

| Time (min) | Incremental R | Incremental De | Intensity (i | Undeveloped Runc | Developed Runoff | Clear Peak Fl | Incremental Vt | Cumulative Vc |
|------------|---------------|----------------|--------------|------------------|------------------|---------------|----------------|---------------|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0.2 | 7.36E-05 | 0.000441685 | 0 | 0 | 0 | 0.01523279 | 0.091396713 | 0.09139671 |
| 0.4 | 0.00014723 | 0.000883405 | 0 | 0 | 0 | 0.03046557 | 0.274190139 | 0.36558685 |
| 0.6 | 0.00022086 | 0.001325162 | 0 | 0 | 0 | 0.04569836 | 0.456983565 | 0.82257042 |
| 0.8 | 0.00029449 | 0.001766955 | 0 | 0 | 0 | 0.06093114 | 0.63977699 | 1.46234741 |
| 1 | 0.00036813 | 0.002208784 | 0 | 0 | 0 | 0.07616393 | 0.822570416 | 2.28491782 |
| 1.2 | 0.00044177 | 0.002650649 | 0 | 0 | 0 | 0.09139671 | 1.005363842 | 3.29028166 |
| 1.4 | 0.00051543 | 0.00309255 | 0 | 0 | 0 | 0.1066295 | 1.188157268 | 4.47843893 |
| 1.6 | 0.00058908 | 0.003534487 | 0 | 0 | 0 | 0.12186228 | 1.370950694 | 5.84938963 |
| 1.8 | 0.00066274 | 0.003976461 | 0 | 0 | 0 | 0.13709507 | 1.553744119 | 7.40313375 |
| 2 | 0.00073641 | 0.00441847 | 0 | 0 | 0 | 0.15232785 | 1.736537545 | 9.13967129 |
| 2.2 | 0.00081009 | 0.004860516 | 0 | 0 | 0 | 0.16756064 | 1.919330971 | 11.0590023 |
| 2.4 | 0.00088377 | 0.005302597 | 0 | 0 | 0 | 0.18279343 | 2.102124397 | 13.1611267 |
| 2.6 | 0.00095745 | 0.005744715 | 0 | 0 | 0 | 0.19802621 | 2.284917823 | 15.4460445 |
| 2.8 | 0.00103114 | 0.006186869 | 0 | 0 | 0 | 0.213259 | 2.467711248 | 17.9137557 |
| 3 | 0.00110484 | 0.00662906 | 0 | 0 | 0 | 0.22849178 | 2.650504674 | 20.5642604 |
| 3.2 | 0.00117855 | 0.007071286 | 0 | 0 | 0 | 0.24372457 | 2.8332981 | 23.3975585 |
| 3.4 | 0.00125226 | 0.007513548 | 0 | 0 | 0 | 0.25895735 | 3.016091526 | 26.41365 |
| 3.6 | 0.00132597 | 0.007955847 | 0 | 0 | 0 | 0.27419014 | 3.198884952 | 29.612535 |
| 3.8 | 0.0013997 | 0.008398182 | 0 | 0 | 0 | 0.28942292 | 3.381678377 | 32.9942134 |
| 4 | 0.00147343 | 0.008840553 | 0 | 0 | 0 | 0.30465571 | 3.564471803 | 36.5586852 |
| 4.2 | 0.00154716 | 0.009282961 | 0 | 0 | 0 | 0.3198885 | 3.747265229 | 40.3059504 |
| 4.4 | 0.0016209 | 0.009725404 | 0 | 0 | 0 | 0.33512128 | 3.930058655 | 44.236009 |
| 4.6 | 0.00169465 | 0.010167884 | 0 | 0 | 0 | 0.35035407 | 4.112852081 | 48.3488611 |
| 4.8 | 0.0017684 | 0.0106104 | 0 | 0 | 0 | 0.36558685 | 4.295645506 | 52.6445066 |
| 5 | 0.00184216 | 0.011052953 | 0 | 0 | 0 | 0.38081964 | 4.478438932 | 57.1229456 |
| 5.2 | 0.00191592 | 0.011495541 | 0 | 0 | 0 | 0.39605242 | 4.661232358 | 61.7841779 |
| 5.4 | 0.00198969 | 0.011938166 | 0 | 0 | 0 | 0.41128521 | 4.844025784 | 66.6282037 |
| 5.6 | 0.00206347 | 0.012380828 | 0 | 0 | 0 | 0.42651799 | 5.02681921 | 71.6550229 |
| 5.8 | 0.00213725 | 0.012823525 | 0 | 0 | 0 | 0.44175078 | 5.209612635 | 76.8646356 |
| 6 | 0.00221104 | 0.013266259 | 0 | 0 | 0 | 0.45698356 | 5.392406061 | 82.2570416 |
| 6.2 | 0.00228484 | 0.013709029 | 0 | 0 | 0 | 0.47221635 | 5.575199487 | 87.8322411 |
| 6.4 | 0.00235864 | 0.014151836 | 0 | 0 | 0 | 0.48744914 | 5.757992913 | 93.590234 |
| 6.6 | 0.00243245 | 0.014594678 | 0 | 0 | 0 | 0.50268192 | 5.940786339 | 99.5310204 |
| 6.8 | 0.00250626 | 0.015037558 | 0 | 0 | 0 | 0.51791471 | 6.123579764 | 105.6546 |
| 7 | 0.00258008 | 0.015480473 | 0.13269 | 0.1 | 0.82 | 0.53314749 | 6.30637319 | 111.960973 |
| 7.2 | 0.0026539 | 0.015923425 | 0.132701 | 0.1 | 0.82 | 0.53319113 | 6.398031753 | 118.359005 |
| 7.4 | 0.00272774 | 0.016366413 | 0.132711 | 0.1 | 0.82 | 0.53323479 | 6.398555521 | 124.757561 |
| 7.6 | 0.00280157 | 0.016809438 | 0.132722 | 0.1 | 0.82 | 0.53327845 | 6.399079423 | 131.15664 |
| 7.8 | 0.00287542 | 0.017252499 | 0.132733 | 0.1 | 0.82 | 0.53332213 | 6.399603459 | 137.556243 |
| 8 | 0.00294927 | 0.017695596 | 0.132744 | 0.1 | 0.82 | 0.53336581 | 6.400127629 | 143.956371 |
| 8.2 | 0.00302312 | 0.01813873 | 0.132755 | 0.1 | 0.82 | 0.53340951 | 6.400651933 | 150.357023 |
| 8.4 | 0.00309698 | 0.0185819 | 0.132766 | 0.1 | 0.82 | 0.53345322 | 6.401176372 | 156.758199 |
| 8.6 | 0.00317085 | 0.019025107 | 0.132777 | 0.1 | 0.82 | 0.53349694 | 6.401700945 | 163.1599 |

Hydrograph: 333 W. GARDENA BLVD - 1A

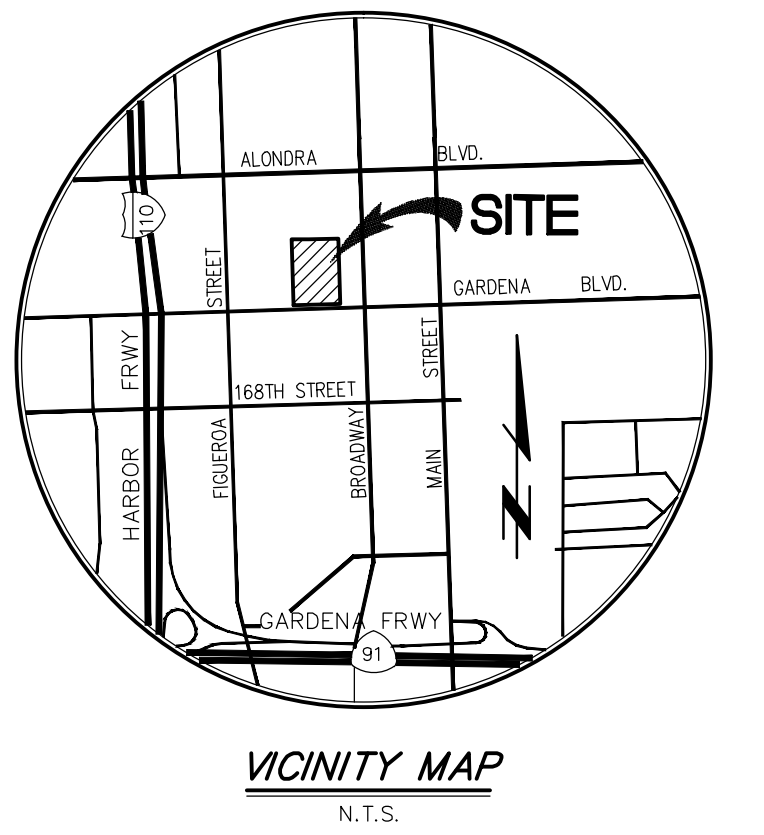
| Time (min) | Incremental R | Incremental D | Intensity (i | Undeveloped Runc | Developed Runoff | Clear Peak Fl | Incremental V | Cumulative Vc |
|------------|---------------|---------------|--------------|------------------|------------------|---------------|---------------|---------------|
| 1088.8 | 0.62824862 | 3.769491745 | 0.505705 | 0.1 | 0.82 | 2.03192266 | 24.36590517 | 54094.7864 |
| 1089 | 0.6285369 | 3.771221417 | 0.50642 | 0.1 | 0.82 | 2.03479646 | 24.40031477 | 54119.1867 |
| 1089.2 | 0.62882561 | 3.772953671 | 0.507139 | 0.1 | 0.82 | 2.03768303 | 24.43487694 | 54143.6216 |
| 1089.4 | 0.62911475 | 3.77468852 | 0.50786 | 0.1 | 0.82 | 2.04058245 | 24.46959285 | 54168.0912 |
| 1089.6 | 0.62940433 | 3.776425976 | 0.508585 | 0.1 | 0.82 | 2.04349482 | 24.50446363 | 54192.5957 |
| 1089.8 | 0.62969434 | 3.778166051 | 0.509313 | 0.1 | 0.82 | 2.04642025 | 24.53949045 | 54217.1352 |
| 1090 | 0.62998479 | 3.779908758 | 0.510045 | 0.1 | 0.82 | 2.04935883 | 24.5746745 | 54241.7098 |
| 1090.2 | 0.63027568 | 3.781654109 | 0.510779 | 0.1 | 0.82 | 2.05231066 | 24.61001696 | 54266.3199 |
| 1090.4 | 0.63056702 | 3.783402117 | 0.511517 | 0.1 | 0.82 | 2.05527584 | 24.64551903 | 54290.9654 |
| 1090.6 | 0.6308588 | 3.785152795 | 0.512258 | 0.1 | 0.82 | 2.05825448 | 24.68118194 | 54315.6466 |
| 1090.8 | 0.63115103 | 3.786906154 | 0.513003 | 0.1 | 0.82 | 2.06124667 | 24.71700691 | 54340.3636 |
| 1091 | 0.6314437 | 3.788662209 | 0.513751 | 0.1 | 0.82 | 2.06425252 | 24.75299517 | 54365.1166 |
| 1091.2 | 0.63173683 | 3.790420972 | 0.514503 | 0.1 | 0.82 | 2.06727214 | 24.789148 | 54389.9057 |
| 1091.4 | 0.63203041 | 3.792182456 | 0.515258 | 0.1 | 0.82 | 2.07030563 | 24.82546666 | 54414.7312 |
| 1091.6 | 0.63232445 | 3.793946675 | 0.516016 | 0.1 | 0.82 | 2.0733531 | 24.86195243 | 54439.5931 |
| 1091.8 | 0.63261894 | 3.795713641 | 0.516778 | 0.1 | 0.82 | 2.07641466 | 24.89860661 | 54464.4917 |
| 1092 | 0.63291389 | 3.797483369 | 0.517544 | 0.1 | 0.82 | 2.07949042 | 24.93543051 | 54489.4272 |
| 1092.2 | 0.63320931 | 3.799255871 | 0.518313 | 0.1 | 0.82 | 2.08258049 | 24.97242545 | 54514.3996 |
| 1092.4 | 0.63350519 | 3.801031162 | 0.519085 | 0.1 | 0.82 | 2.08568498 | 25.00959279 | 54539.4092 |
| 1092.6 | 0.63380154 | 3.802809255 | 0.519862 | 0.1 | 0.82 | 2.088804 | 25.04693386 | 54564.4561 |
| 1092.8 | 0.63409836 | 3.804590164 | 0.520642 | 0.1 | 0.82 | 2.09193767 | 25.08445005 | 54589.5406 |
| 1093 | 0.63439565 | 3.806373903 | 0.521425 | 0.1 | 0.82 | 2.09508612 | 25.12214274 | 54614.6627 |
| 1093.2 | 0.63469341 | 3.808160486 | 0.522212 | 0.1 | 0.82 | 2.09824944 | 25.16001333 | 54639.8227 |
| 1093.4 | 0.63499165 | 3.809949927 | 0.523003 | 0.1 | 0.82 | 2.10142777 | 25.19806324 | 54665.0208 |
| 1093.6 | 0.63529037 | 3.811742242 | 0.523798 | 0.1 | 0.82 | 2.10462122 | 25.2362939 | 54690.2571 |
| 1093.8 | 0.63558957 | 3.813537443 | 0.524597 | 0.1 | 0.82 | 2.10782991 | 25.27470675 | 54715.5318 |
| 1094 | 0.63588926 | 3.815335547 | 0.525399 | 0.1 | 0.82 | 2.11105397 | 25.31330327 | 54740.8451 |
| 1094.2 | 0.63618943 | 3.817136567 | 0.526205 | 0.1 | 0.82 | 2.11429352 | 25.35208494 | 54766.1972 |
| 1094.4 | 0.63649009 | 3.818940518 | 0.527016 | 0.1 | 0.82 | 2.11754869 | 25.39105325 | 54791.5882 |
| 1094.6 | 0.63679124 | 3.820747416 | 0.52783 | 0.1 | 0.82 | 2.1208196 | 25.43020972 | 54817.0184 |
| 1094.8 | 0.63709288 | 3.822557275 | 0.528648 | 0.1 | 0.82 | 2.12410638 | 25.46955589 | 54842.488 |
| 1095 | 0.63739502 | 3.82437011 | 0.52947 | 0.1 | 0.82 | 2.12740917 | 25.5090933 | 54867.9971 |
| 1095.2 | 0.63769766 | 3.826185938 | 0.530296 | 0.1 | 0.82 | 2.13072809 | 25.54882352 | 54893.5459 |
| 1095.4 | 0.6380008 | 3.828004774 | 0.531126 | 0.1 | 0.82 | 2.13406327 | 25.58874815 | 54919.1347 |
| 1095.6 | 0.63830444 | 3.829826632 | 0.53196 | 0.1 | 0.82 | 2.13741486 | 25.62886879 | 54944.7635 |
| 1095.8 | 0.63860859 | 3.83165153 | 0.532798 | 0.1 | 0.82 | 2.14078298 | 25.66918705 | 54970.4327 |
| 1096 | 0.63891325 | 3.833479482 | 0.533641 | 0.1 | 0.82 | 2.14416778 | 25.70970459 | 54996.1424 |
| 1096.2 | 0.63921842 | 3.835310506 | 0.534487 | 0.1 | 0.82 | 2.1475694 | 25.75042306 | 55021.8928 |
| 1096.4 | 0.6395241 | 3.837144616 | 0.535338 | 0.1 | 0.82 | 2.15098796 | 25.79134416 | 55047.6842 |
| 1096.6 | 0.63983031 | 3.83898183 | 0.536193 | 0.1 | 0.82 | 2.15442363 | 25.83246957 | 55073.5167 |
| 1096.8 | 0.64013703 | 3.840822164 | 0.537052 | 0.1 | 0.82 | 2.15787654 | 25.87380103 | 55099.3905 |
| 1097 | 0.64044427 | 3.842665635 | 0.537916 | 0.1 | 0.82 | 2.16134684 | 25.91534027 | 55125.3058 |
| 1097.2 | 0.64075204 | 3.844512259 | 0.538784 | 0.1 | 0.82 | 2.16483467 | 25.95708906 | 55151.2629 |
| 1097.4 | 0.64106034 | 3.846362053 | 0.539657 | 0.1 | 0.82 | 2.16834019 | 25.99904918 | 55177.2619 |
| 1097.6 | 0.64136917 | 3.848215035 | 0.540533 | 0.1 | 0.82 | 2.17186355 | 26.04122244 | 55203.3032 |
| 1097.8 | 0.64167854 | 3.850071221 | 0.541415 | 0.1 | 0.82 | 2.1754049 | 26.08361067 | 55229.3868 |
| 1098 | 0.64198844 | 3.851930629 | 0.542301 | 0.1 | 0.82 | 2.17896439 | 26.12621571 | 55255.513 |
| 1098.2 | 0.64229888 | 3.853793277 | 0.543191 | 0.1 | 0.82 | 2.18254218 | 26.16903944 | 55281.682 |
| 1098.4 | 0.64260986 | 3.855659182 | 0.544086 | 0.1 | 0.82 | 2.18613844 | 26.21208376 | 55307.8941 |
| 1098.6 | 0.64292139 | 3.857528362 | 0.544986 | 0.1 | 0.82 | 2.18975332 | 26.25535058 | 55334.1495 |
| 1098.8 | 0.64323347 | 3.859400836 | 0.54589 | 0.1 | 0.82 | 2.19338699 | 26.29884184 | 55360.4483 |
| 1099 | 0.6435461 | 3.861276621 | 0.546799 | 0.1 | 0.82 | 2.1970396 | 26.34255951 | 55386.7909 |
| 1099.2 | 0.64385929 | 3.863155735 | 0.547713 | 0.1 | 0.82 | 2.20071133 | 26.38650557 | 55413.1774 |
| 1099.4 | 0.64417303 | 3.865038198 | 0.548632 | 0.1 | 0.82 | 2.20440235 | 26.43068206 | 55439.6081 |

Hydrograph: 333 W. GARDENA BLVD - 1A

| Time (min) | Incremental Runoff | Incremental Depth | Intensity (in/hr) | Undeveloped Runoff | Developed Runoff | Clear Peak Flow | Incremental Volume | Cumulative Volume |
|------------|--------------------|-------------------|-------------------|--------------------|------------------|-----------------|--------------------|-------------------|
| 1164.4 | 0.83776291 | 5.026577469 | 0.692049 | 0.233484186 | 0.833348419 | 2.82591822 | 34.13338235 | 73060.3713 |
| 1164.6 | 0.83808451 | 5.028507057 | 0.68426 | 0.222189346 | 0.832218935 | 2.79032642 | 33.69746782 | 73094.0688 |
| 1164.8 | 0.83840372 | 5.030422302 | 0.676754 | 0.211303629 | 0.831130363 | 2.75610542 | 33.27859101 | 73127.3474 |
| 1165 | 0.83872059 | 5.032323533 | 0.669512 | 0.200801568 | 0.830080157 | 2.7231664 | 32.87563087 | 73160.223 |
| 1165.2 | 0.83903518 | 5.034211066 | 0.662518 | 0.190659957 | 0.829065996 | 2.69142864 | 32.48757023 | 73192.7106 |
| 1165.4 | 0.83934753 | 5.036085205 | 0.655758 | 0.18085759 | 0.828085759 | 2.6608186 | 32.11348346 | 73224.824 |
| 1165.6 | 0.83965771 | 5.037946241 | 0.649219 | 0.171375037 | 0.827137504 | 2.63126904 | 31.75252582 | 73256.5766 |
| 1165.8 | 0.83996574 | 5.039794459 | 0.642889 | 0.162194452 | 0.826219445 | 2.60271836 | 31.4039244 | 73287.9805 |
| 1166 | 0.84027169 | 5.041630129 | 0.636755 | 0.153299405 | 0.82532994 | 2.57511001 | 31.06697025 | 73319.0475 |
| 1166.2 | 0.84057559 | 5.043453515 | 0.630807 | 0.144674736 | 0.824467474 | 2.54839191 | 30.74101155 | 73349.7885 |
| 1166.4 | 0.84087748 | 5.045264871 | 0.625036 | 0.136306429 | 0.823630643 | 2.52251604 | 30.42544774 | 73380.2139 |
| 1166.6 | 0.84117741 | 5.04706444 | 0.619434 | 0.128181499 | 0.82281815 | 2.49743801 | 30.11972429 | 73410.3336 |
| 1166.8 | 0.84147541 | 5.048852459 | 0.61399 | 0.120287895 | 0.822028789 | 2.47311669 | 29.82332817 | 73440.157 |
| 1167 | 0.84177153 | 5.050629158 | 0.608699 | 0.11261441 | 0.821261441 | 2.44951396 | 29.53578389 | 73469.6928 |
| 1167.2 | 0.84206579 | 5.052394757 | 0.603552 | 0.105150608 | 0.820515061 | 2.42659436 | 29.25664993 | 73498.9494 |
| 1167.4 | 0.84235825 | 5.054149471 | 0.598543 | 0.1 | 0.82 | 2.4049447 | 28.98923435 | 73527.9386 |
| 1167.6 | 0.84264892 | 5.055893506 | 0.593665 | 0.1 | 0.82 | 2.38534708 | 28.74175064 | 73556.6804 |
| 1167.8 | 0.84293784 | 5.057627064 | 0.588914 | 0.1 | 0.82 | 2.36625469 | 28.50961061 | 73585.19 |
| 1168 | 0.84322506 | 5.059350338 | 0.584282 | 0.1 | 0.82 | 2.34764544 | 28.28340078 | 73613.4734 |
| 1168.2 | 0.84351059 | 5.061063517 | 0.579766 | 0.1 | 0.82 | 2.3294986 | 28.06286427 | 73641.5363 |
| 1168.4 | 0.84379446 | 5.062766785 | 0.57536 | 0.1 | 0.82 | 2.31179471 | 27.84775991 | 73669.384 |
| 1168.6 | 0.84407672 | 5.064460317 | 0.571059 | 0.1 | 0.82 | 2.29451546 | 27.63786103 | 73697.0219 |
| 1168.8 | 0.84435738 | 5.066144286 | 0.56686 | 0.1 | 0.82 | 2.2776436 | 27.43295434 | 73724.4548 |
| 1169 | 0.84463648 | 5.067818859 | 0.562758 | 0.1 | 0.82 | 2.26116288 | 27.23283888 | 73751.6877 |
| 1169.2 | 0.84491403 | 5.069484198 | 0.55875 | 0.1 | 0.82 | 2.24505797 | 27.03732511 | 73778.725 |
| 1169.4 | 0.84519008 | 5.07114046 | 0.554832 | 0.1 | 0.82 | 2.22931438 | 26.8462341 | 73805.5712 |
| 1169.6 | 0.84546463 | 5.072787799 | 0.551 | 0.1 | 0.82 | 2.21391841 | 26.65939671 | 73832.2306 |
| 1169.8 | 0.84573773 | 5.074426362 | 0.547252 | 0.1 | 0.82 | 2.19885708 | 26.47665294 | 73858.7073 |
| 1170 | 0.84600938 | 5.076056295 | 0.543583 | 0.1 | 0.82 | 2.18411813 | 26.29785128 | 73885.0051 |
| 1170.2 | 0.84627962 | 5.077677738 | 0.539993 | 0.1 | 0.82 | 2.16968989 | 26.12284813 | 73911.128 |
| 1170.4 | 0.84654847 | 5.079290828 | 0.536476 | 0.1 | 0.82 | 2.15556132 | 25.95150725 | 73937.0795 |
| 1170.6 | 0.84681595 | 5.080895698 | 0.533032 | 0.1 | 0.82 | 2.1417219 | 25.7836993 | 73962.8632 |
| 1170.8 | 0.84708208 | 5.082492478 | 0.529657 | 0.1 | 0.82 | 2.12816166 | 25.61930138 | 73988.4825 |
| 1171 | 0.84734688 | 5.084081293 | 0.526349 | 0.1 | 0.82 | 2.1148711 | 25.4581966 | 74013.9407 |
| 1171.2 | 0.84761038 | 5.085662267 | 0.523106 | 0.1 | 0.82 | 2.10184118 | 25.30027373 | 74039.241 |
| 1171.4 | 0.84787259 | 5.08723552 | 0.519926 | 0.1 | 0.82 | 2.08906328 | 25.14542681 | 74064.3864 |
| 1171.6 | 0.84813353 | 5.088801168 | 0.516807 | 0.1 | 0.82 | 2.07652919 | 24.99355486 | 74089.3799 |
| 1171.8 | 0.84839322 | 5.090359325 | 0.513746 | 0.1 | 0.82 | 2.06423107 | 24.84456158 | 74114.2245 |
| 1172 | 0.84865168 | 5.091910102 | 0.510742 | 0.1 | 0.82 | 2.05216144 | 24.69835504 | 74138.9229 |
| 1172.2 | 0.84890893 | 5.093453608 | 0.507793 | 0.1 | 0.82 | 2.04031314 | 24.55484743 | 74163.4777 |
| 1172.4 | 0.84916499 | 5.094989947 | 0.504898 | 0.1 | 0.82 | 2.02867934 | 24.41395486 | 74187.8917 |
| 1172.6 | 0.84941987 | 5.096519224 | 0.502054 | 0.1 | 0.82 | 2.01725351 | 24.2755971 | 74212.1673 |
| 1172.8 | 0.84967359 | 5.098041537 | 0.499261 | 0.1 | 0.82 | 2.00602939 | 24.13969737 | 74236.307 |
| 1173 | 0.84992616 | 5.099556987 | 0.496516 | 0.1 | 0.82 | 1.99500098 | 24.00618218 | 74260.3131 |
| 1173.2 | 0.85017761 | 5.101065668 | 0.493818 | 0.1 | 0.82 | 1.98416254 | 23.8749811 | 74284.1881 |
| 1173.4 | 0.85042795 | 5.102567675 | 0.491167 | 0.1 | 0.82 | 1.97350857 | 23.74602666 | 74307.9341 |
| 1173.6 | 0.85067718 | 5.104063098 | 0.48856 | 0.1 | 0.82 | 1.96303379 | 23.61925414 | 74331.5534 |
| 1173.8 | 0.85092534 | 5.105552027 | 0.485996 | 0.1 | 0.82 | 1.95273312 | 23.49460143 | 74355.048 |
| 1174 | 0.85117242 | 5.10703455 | 0.483475 | 0.1 | 0.82 | 1.9426017 | 23.37200892 | 74378.42 |
| 1174.2 | 0.85141846 | 5.108510752 | 0.480994 | 0.1 | 0.82 | 1.93263486 | 23.25141935 | 74401.6714 |
| 1174.4 | 0.85166345 | 5.109980716 | 0.478554 | 0.1 | 0.82 | 1.92282809 | 23.1327777 | 74424.8042 |
| 1174.6 | 0.85190742 | 5.111444525 | 0.476152 | 0.1 | 0.82 | 1.91317708 | 23.01603106 | 74447.8202 |
| 1174.8 | 0.85215038 | 5.112902257 | 0.473787 | 0.1 | 0.82 | 1.90367768 | 22.90112856 | 74470.7214 |
| 1175 | 0.85239233 | 5.114353993 | 0.47146 | 0.1 | 0.82 | 1.89432586 | 22.78802123 | 74493.5094 |

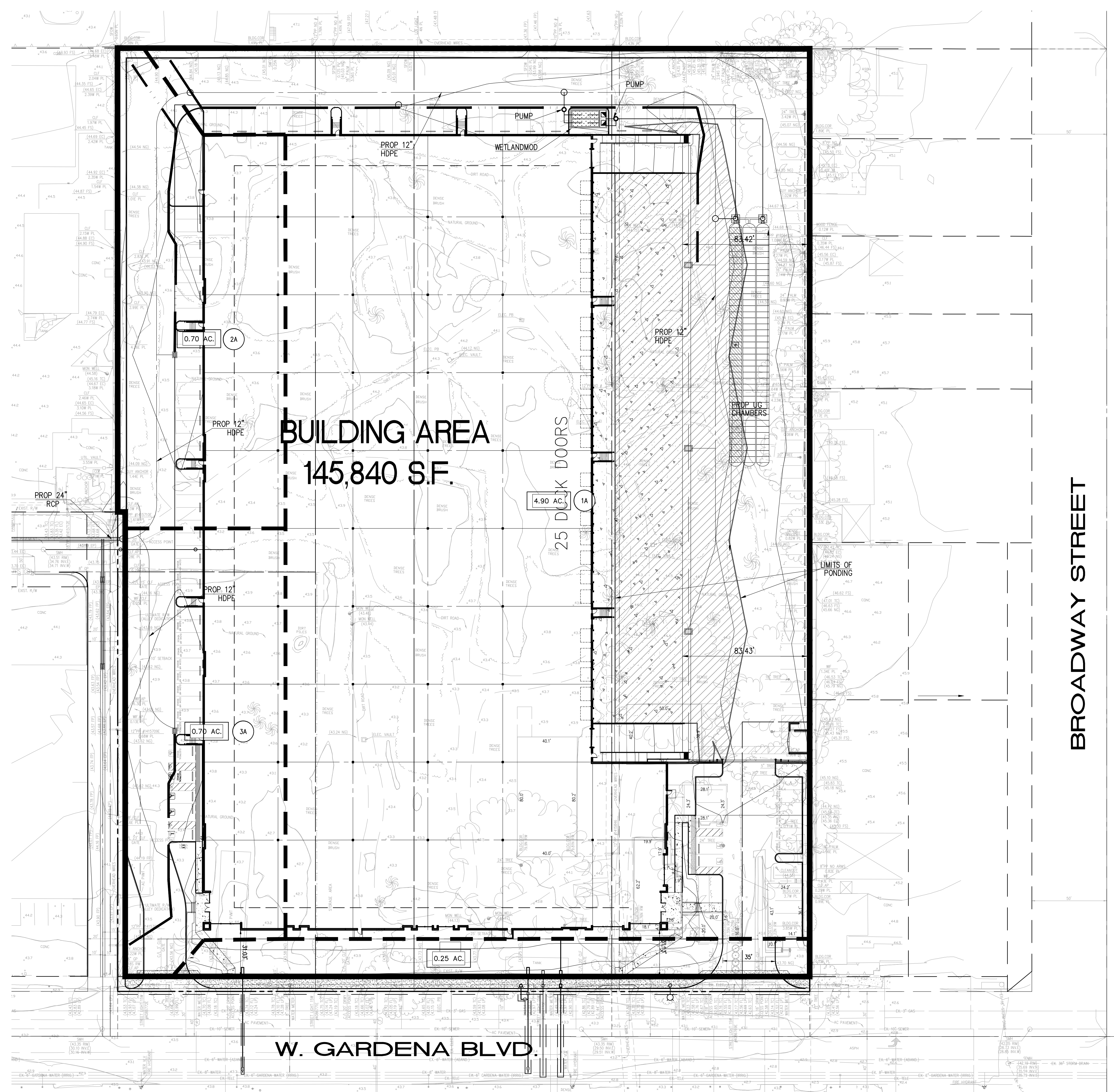
APPENDIX D

HYDROLOGY MAP



SUBAREA DATA SUMMARY

| SUBAREA | AREA (ACRES) | LENGTH (FEET) | SLOPE | RAINFALL DEPTH (INCH) | SOIL TYPE | BURN FACTOR | PERCENT IMPERVIOUSNESS | Tc (MINUTES) | Q50 DESIGN (CFS) | Q50 RESTRICTED (CFS) | Q50 OUTF (CFS) |
|---------|--------------|---------------|---------|-----------------------|-----------|-------------|------------------------|--------------|------------------|----------------------|----------------|
| (1A) | 4.90 | 480 | 0.00575 | 6.0 | 13 | 0 | 0.9 | 7 | 13.5 | 2.1 | 2.1 |
| (2A) | 4.7 | 160 | 0.012 | 6.0 | 13 | 0 | 0.9 | 5 | 2.3 | 2.3 | 2.3 |
| (3A) | 0.65 | 272 | 0.0072 | 6.0 | 13 | 0 | 0.9 | 13 | 2.2 | 2.2 | 2.2 |
| TOTAL | | | | | | | | | | 6.6 | |



BROADWAY STREET

LEGEND

- PROJECT BOUNDARY
- SUBAREA BOUNDARY
- FLOW PATH
- SUBAREA AREA
- NODE NUMBER
- FLOW DIRECTION
- PONDING LIMITS

SCALE: 1" = 30'



PREPARED UNDER THE DIRECTION OF:
REINHARD STENZEL
R.C.E. NO. 56155

PREPARED FOR:
CT REALTY INVESTORS - N.B.
4343 VON KARMAN, SUITE 200
NEWPORT BEACH, CALIFORNIA 92660
PHONE: (949) 431-6400
FAX: (949) 330-5771

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Thienes Engineering, Inc.
CIVIL ENGINEERING - LAND SURVEYING
14348 FIRESTONE BOULEVARD
LA HABRA, CALIFORNIA 90639
PH: (714) 521-4811 FAX: (714) 521-4173

PROPOSED CONDITION HYDROLOGY MAP
FOR
333 W. GARDENA BLVD.
CARBON CALIFORNIA

SHEET
1
OF
1
T.E. JOB NO. 3795

Last Update: 2/21/20
D:\3700-3795\3795\3795HYD.dwg