APPENDIX G1

Drainage Study

DRAINAGE STUDY

Ginkgo Stonehouse Property

Project Location:
935 & 965 E Grandview Ave.
Sierra Madre, CA 91024

City of Sierra Madre
232 W. Sierra Madre Blvd.
Sierra Madre, CA 91024

Prepared for:
Ginkgo Stonehouse, LLC
805 W. Duarte Rd. No. 101
Arcadia, CA 91007

Prepared by:
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March 21, 2019

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INTRODUCTION

Project Description

The proposed project is a subdivision of about 9 acres into 9 single family home lots ranging in size from 20,000 square feet to about 3 acres ("Project"). The Project is located in the northeasterly portion of the city of Sierra Madre ("City"), County of Los Angeles ("County"). The Project is bordered on the south by Grandview Avenue. Existing single family lots are adjacent to the west, north and east Project boundary. A portion of the easterly Project boundary is adjacent to the undeveloped Ginko Stonehouse II project ("GS2"). (see Figure 1 Area Map, Figure 2 Vicinity Map, and Appendix E4 Aerial Map for illustrations of the Project location).

Project Objectives

The objectives of this study are listed below.

1. Prepare a preliminary hydrologic analysis of the existing and proposed conditions of the Project watershed based on land uses, drainage patterns, ground slopes and soil types to generate estimated 10-year, 50-year, and 100-year 24-hour storm event peak flow rates. The hydrology computations were made using HydroCalc 1.0.2 which is based on the Los Angeles County Department of Public Works (LADPW) Hydrology Manual.

2. Estimate the storm flow capacity of the proposed streets to identify locations where storm flow may need to be captured with catch basins and conveyed through a storm drain system.

3. Estimate the storm v-ditch size needed to convey anticipated off-site storm flows.

4. Prepare Preliminary Drainage Study based on objectives above.

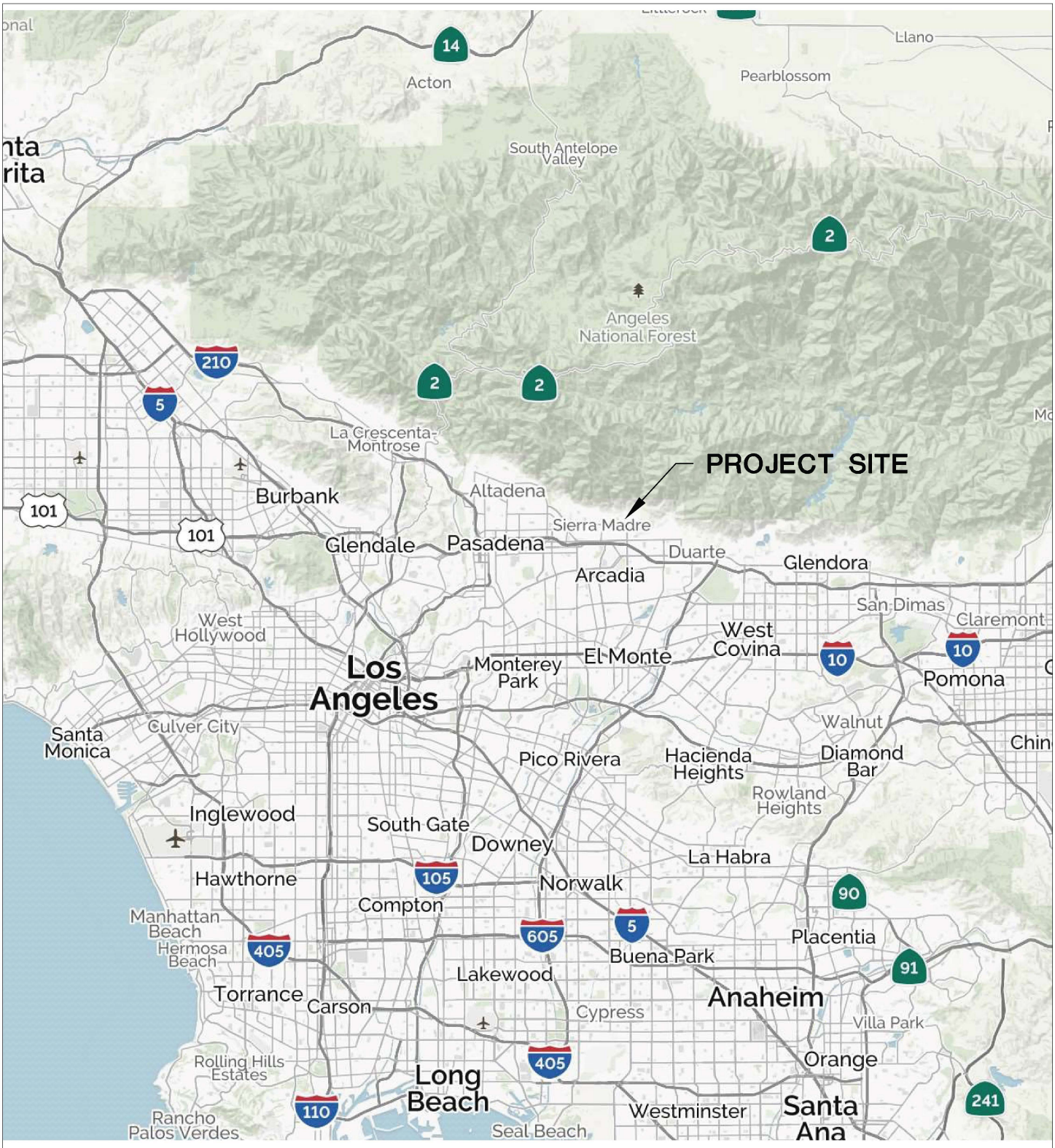


FIGURE 1: AREA MAP

ADVANCED
CIVIL GROUP

FIGURE 2: VICINITY MAP

ADVANCED
CIVIL GROUP

Existing Facilities

The existing topography shows that the watersheds tributary to the Project consists of mostly undeveloped drainage areas located north of the Project site. Three existing homes are located completely within the Project watershed boundary, while two other existing homes are located partially within the Project watershed boundary. The three existing homes located completely within the Project boundary are proposed to be demolished. The Project watershed boundary is divided into two sub-basins: 1A and 1B. The runoff from these two sub-basins, in the existing condition, flows onto adjacent properties to the west and onto Grand View Avenue to the south as overland flow.

An existing 39" – 48" reinforced concrete pipe (RCP) storm drain line routes storm water from the catch basins in Grand View Avenue, west, into the Sierra Madre Wash.

Flood Hazard Zones

The entire Project site is located within a community that participates in the National Flood Insurance Program (NFIP), which is administered by the Federal Emergency Management Agency (FEMA). Communities in the NFIP must adopt and enforce minimum floodplain management standards, including identification of flood hazards and flood risks on Flood Insurance Rate Maps (FIRM). The Project is outside of any special flood hazard zones and is in "Zone X" of "Other Areas" as identified on the community FIRM, which is defined as "Areas determined to be outside the 0.2% annual chance floodplain" (see Figure 3 FEMA FIRM Map for illustration of the Project on the community FIRM).

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in **areas where Base Flood Elevations** (BFEs) and/or **floodways** have been determined, **users are** encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later and from National Geospatial Intelligence Agency imagery produced at a scale of 1:4,000 from photography dated 2003 or later.

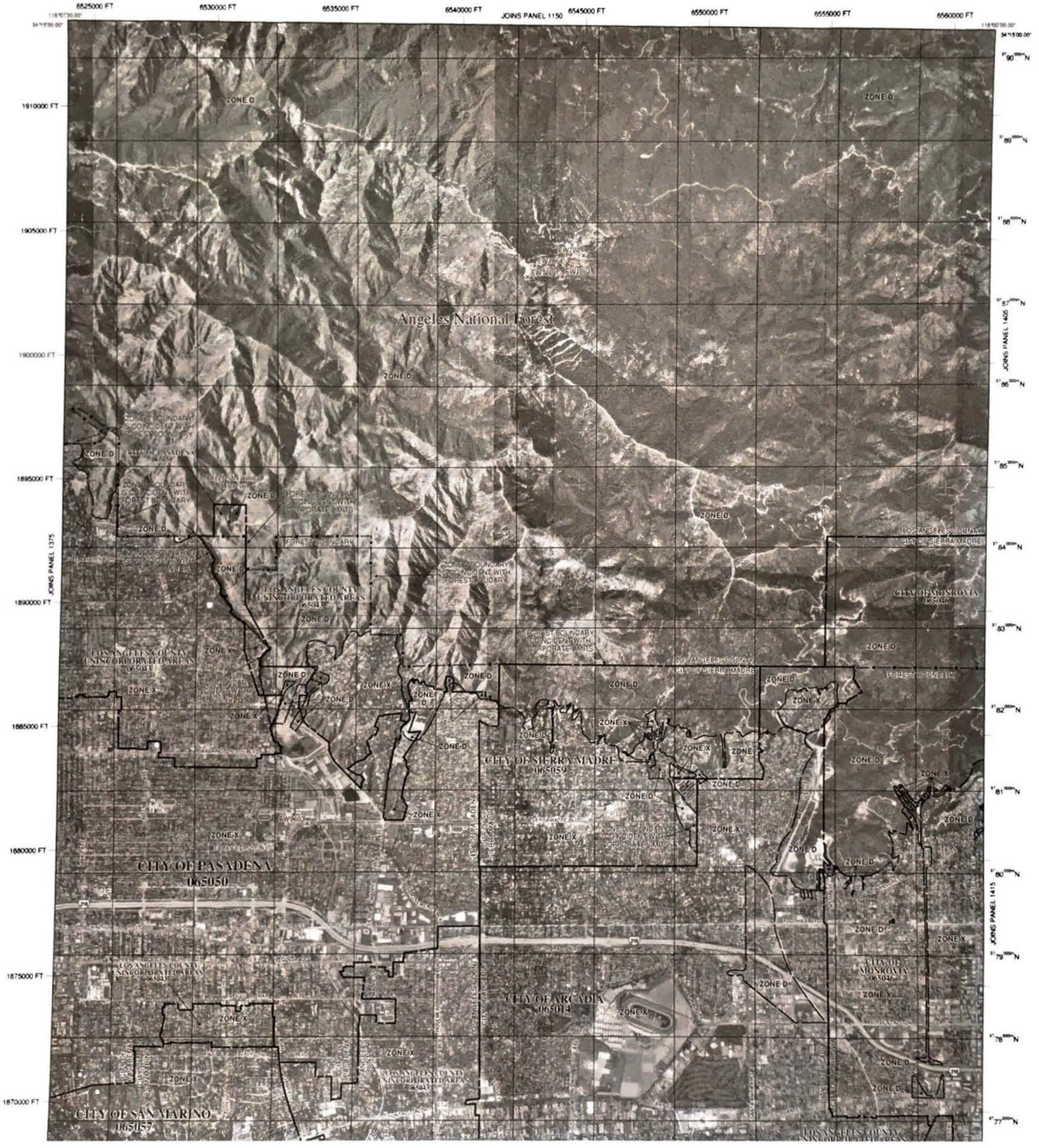
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its **website** at http://www.msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

- **ZONE A** — No Base Flood Elevations determined.
- **ZONE AE** — Base Flood Elevations determined.
- **ZONE AH** — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** — Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 87°57'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000 N — 1000-meter Universal Transverse Mercator grid values, zone 11
- 6000000 FT — 5000-foot grid ticks: California State Plane coordinate system, V zone (FIPSZONE 0405), Lambert Conformal Conic
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 26, 2008
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'
1000 0 2000 4000 FEET
300 0 600 1200 METERS

NFIP

PANEL 1400F

FIRM
FLOOD INSURANCE RATE MAP
LOS ANGELES COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1400 OF 2350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	1400	F
ARCADIA, CITY OF	065014	1400	F
MONROVIA, CITY OF	065064	1400	F
PASADENA, CITY OF	065050	1400	F
SAN MARINO, CITY OF	065057	1400	F
SIERRA MADRE, CITY OF	065069	1400	F

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

MAP NUMBER

HYDROLOGY

Methodology

The tributary drainage area boundaries were delineated utilizing topography from aerial photogrammetry over the Project site and surrounding areas. The proposed Project grading illustrated on the Tentative Tract Map (TTM) was used to determine the drainage patterns and boundaries for the onsite post-development condition.

General Assumptions and Guidelines

The assumptions and guidelines listed below were applied in the use of the Rational Method in preparing the hydrologic analysis.

- Hydrology methodology outlined by the LADPW Hydrology Manual dated January 2006, and incorporated into HydroCalc 1.0.2. The Rational Method is commonly used for determining peak discharge from drainage areas less than 40 acres.

- The soil type for the Project was determined using the Mt. Wilson (30) soil map index page of Appendix B in the LADPW Hydrology Manual. Sub-basin 1A is located almost completely within soil type 88 boundary, with less than 2.1% lying within a soil type 6 boundary. Accordingly, soil type 88 was used for the existing and proposed sub-basin 1A rational method calculations. About one third of the sub-basin 1B area for both proposed and existing conditions lies within a soil type 88 boundary. The other two thirds of the sub-basin 1B boundaries lies within a soil type 6 boundary. Accordingly, soil type 6 was used for the existing and proposed sub-basin 1B rational method calculations. Using soil type 6 instead of soil type 88 in the rational method results in a higher flow rate, and so using soil type 6 for sub-basin 1B is more conservative.

- The land use calculations for the existing and proposed conditions were determined based on visual inspection of the areas during site visits, aerial photos of the project area, and the proposed development conditions.

- The Mt. Wilson (30) soil map index page of Appendix B in the LADPW Hydrology Manual provided through the LADPW website was used to identify the 50-yr 24-hr rainfall depth for the Project (see Proposed Condition Hydrology Map and Hydrology Boundaries Exhibit). The Project is located between the 9.4", 9.6", 9.8", and 10.0" isohyets, and therefore the area weighted method, shown in section 5.4 of the LADPW Hydrology Manual, was used to find the 50-yr 24-hr rainfall depth for each subarea.

- Peak flow rates were calculated for each watershed subarea using the HydoCalc 1.0.2 software provided on the LADPW website. A hydrograph was also calculated for each subarea using HydoCalc 1.0.2. Although HydroCalc 1.0.2 calculates a hydrograph for the watershed in question, the rational method was used, and peak flow rates were added to the associated downstream watersheds. This method neglects attenuation, making the rational method more conservative than the modified rational method.

Rational Method

The Rational Method, an empirical computational procedure for developing peak runoff and discharge for storms of a specified recurrence interval in small watersheds, was used to compute peak flow rates for the watersheds tributary to the Project. The Rational Method formula is:

$$Q = CIA$$

Where:

Q = Peak discharge, in cubic feet per second (cfs)
C = Runoff coefficient representing the ratio of runoff depth to rainfall depth
I = The time-averaged rainfall intensity for a storm duration equal to the time of concentration, in inches/hour (in/hr)
A = Drainage area, in acres (ac)

Rational Method Assumptions and Guidelines

The assumptions and guidelines listed below were applied in the use of the Rational Method.

- The basic assumption for the Rational Method is that the precipitation rate is constant and uniform over the entire watershed for the time duration such that runoff could travel from the most remote point in the watershed to the concentration point; after which time the rate of runoff does not increase. This is the time defined as the "time of concentration" (Tc). The method assumes that the peak flow rate is directly proportional to drainage area, rainfall intensity, and a runoff coefficient "C," which is related to land use and soil type.

- The runoff coefficient is calculated by using an iterative procedure which starts with an assumed time of concentration. The assumed time of concentration is then used to find a rainfall intensity, which is then used to find an undeveloped runoff coefficient. The percent of project impervious area is then used to calculate the developed runoff coefficient with

equation 6.3.2 in the LADPW Hydrology Manual. The time of concentration is then calculated using equation 7.3.5 in the LADPW Hydrology Manual. If the calculated time of concentration is within 0.5 minutes of the assumed time of concentration, then the calculated time of concentration is rounded to the nearest minute and used to calculate the final intensity and developed runoff coefficient.

- Initial subareas were drawn to be less than 40 acres in size per the LADPW Hydrology Manual guidelines for this procedure.

Rational Method Calculation

The hydrologic calculations for watersheds tributary to the Project were performed using HydroCalc 1.0.2. The parameters used for the HydroCalc input are summarized in Table 1 - Hydrology Summary in the Hydrology Summary section. A breakdown of the impervious areas for each watershed is shown in the Appendix B2 Impervious Area Worksheet.

Watershed Characteristics

The Watershed associated with the Project site includes approximately 14 acres of mostly undeveloped hills north of and within the Project site. The Project boundary is encompassed by sub-basins 1A and 1B, in which storm water drains from north to south. The westernmost sub-basin is labeled 1A and the easternmost sub-basin is labeled 1B (See Existing and Proposed Hydrology Maps). Storm water in these two existing condition sub-basins flows as natural valley concentrated flow and overland sheet flow and discharges onto Grandview Avenue. From thence the storm water flows into catch basins along Grand View Avenue, through Grand View Avenue Storm Drain and into the Sierra Madre Wash (see Appendix A1 Existing Condition Hydrology Map).

Following development, the Project will consist of nine 20,000 square foot (minimum) single family lots with a new street and driveway. The new street will start at the north side of Grandview Avenue and will end in a cul-de-sac approximately 406 linear feet directly north. The proposed driveway is approximately 344 linear feet long and leads to lot number 4 (see Appendix A2 Proposed Condition Hydrology Map). Storm water runoff will still be mitigated by designing the grading, hardscape and landscape of each single-family home to allow for storm water storage and percolation.

The proposed condition sub-basin 1A eastern boundary is created by the grading of the westernmost Project lots. Therefore, no storm water from the proposed development will drain onto Watershed 1A. Once the concentrated flow of Watershed 1A reaches the northwest corner of

lot 3 the concentrated storm water flow will be routed south onto Grandview Avenue via a concrete v-ditch.

All the proposed residential development including the new street and driveway will be encompassed by sub-basin 1B. Storm water in sub-basin 1B will flow from the northernmost sub-basin border until the concentrated flow reaches the lot number 5 pad. From thence the storm water will flow south adjacent to the lot number 5 pad until the storm water reaches the proposed driveway. From thence the storm water will flow south along the proposed driveway and onto the cul-de-sac. From thence the storm water will flow south along proposed Street 'A' and onto Grandview Avenue.

The storm water from the Project which discharges onto Grandview Avenue will flow into catch basins along Grandview Avenue and into the storm drain. The storm water will flow west in the storm drain and discharge into the Sierra Madre Wash.

Debris Potential Area

A portion of the undeveloped parcel of land to the east is classified as a debris potential area (DPA-1) as defined in the Los Angeles County Department of Public Works Sedimentation Manual (see Mt. Wilson 50-year 24-hour Isohyet Map Exhibit). To ensure that the DPA-1 will not drain onto the Project site, a review of the hydrologic boundary and watershed associated with GS2 was completed. The results of the review show that there is a ridgeline between the Project and GS2, creating a natural hydrologic boundary and preventing any GS2 runoff from draining onto the Project. All the GS2 runoff drains into Stonehouse Road (see Appendix A2 Proposed Condition Hydrology Map and Appendix C1 Hydrology Boundaries Exhibit).

Hydrology Summary

Below is a summary of the results of the hydrology analysis. The table shows the estimated existing and proposed condition peak runoff values for the 10-year, 50-year, and 100-year storm events.

Table 1 – Hydrology Summary

	Sub-basin 1A (Existing Condition)	Sub-basin 1A (Proposed Condition)	Sub-basin 1B (Existing Condition)	Sub-basin 1B (Proposed Condition)
Area (acres)	7.29	6.4	6.65	7.54
Flow Path Length (ft)	1424	1660.7	1353.4	1293.5
Flow Path Slope	0.1784	0.1614	0.1626	0.1639
24-hr, 50-yr Rainfall Depth (in.)	9.685	9.685	9.545	9.545
Impervious Fraction	0.0204	0.0293	0.0326	0.1534
Soil Type	88	88	6	6
Fire Factor	0.71	0.71	0.71	0.71
Q-10 (cfs)	15.2	12.4	19.8	22.6
Q-50 (cfs)	31.6	25.3	31.3	35.5
Q-100 (cfs)	36.6	32.2	38.2	43.3

The sum of the storm water runoff from the 10-year and 50-year 24-hour storm events is equal to or greater in the existing condition than in the proposed condition despite the increased impervious fraction. However, storm water runoff from the 100-year 24-hour storm event is 0.7 cfs greater in the proposed condition than in the existing condition. The change in the flow path length, flow path slope, watershed area and percent impervious area parameters are responsible for the peak flow differences in each sub-basin.

Conclusion

The existing storm drain system in Grand View Avenue will be sufficient to route the Project storm water runoff into Sierra Madre Wash without any capacity issues. This conclusion is based on the fact that storm water runoff from the 10-year and 50-year 24-hour storm events will decrease in the

proposed condition. Storm water runoff from the 100-year 24-hour storm event will only increase by 0.7 cfs, which is less than 1.0%.

HYDRAULICS

Street Capacity

Hydraulic calculations were made to ensure that the street design did not require extra catch basins. The hydraulic calculations made sure that the 50-year 24-hour storm event peak flow rate (Q_{50}) does not flow above the curb. Manning's equation was used to determine if the street flow carrying capacity was sufficient to carry Q_{50}.

$$Q = (1.49/n)AR^{2/3}S^{1/2}$$

Where:

Q = Peak discharge, in cubic feet per second (cfs)
n = Manning's roughness coefficient representing the concrete channel's physical characteristics
A = Cross sectional area of the flow (ft^2)
R = Hydraulic Radius (ft)
S = Channel slope (ft/ft)

The hydraulic carrying capacity ($Q_{street\text{-}max}$) was determined for the street design cross section shown on the TTM No. 65348 in the Appendix. The highest flow will occur where Street 'A' and Grand View Avenue meet as this is the most downstream location of the Project watershed and has the flattest slope (6.0%).

- The Manning's n was assumed to be 0.016 for asphalt with a channel slope of 6.0%.
- To solve for $Q_{street\text{-}max}$ the street was assumed to be filled to the top of curb giving an area and a hydraulic radius, which were calculated as 5.68 ft^2 and 0.177 ft respectively (see street design shown on Vesting TTM No. 65348).
- Once $Q_{street\text{-}max}$ was calculated $Q_{street\text{-}max}$ was compared to Q_{50} (see Table 1 – Hydrology Summary) to make sure that $Q_{street\text{-}max}$ was greater than Q_{50}.

$Q_{street\text{-}max}$ was calculated by using Manning's equation with the parameter values previously mentioned in this hydraulics section (n = 0.016, A = 5.68 ft^2, R = 0.177 ft, and S = 6.0%).

Table 2 — Street Capacity Summary

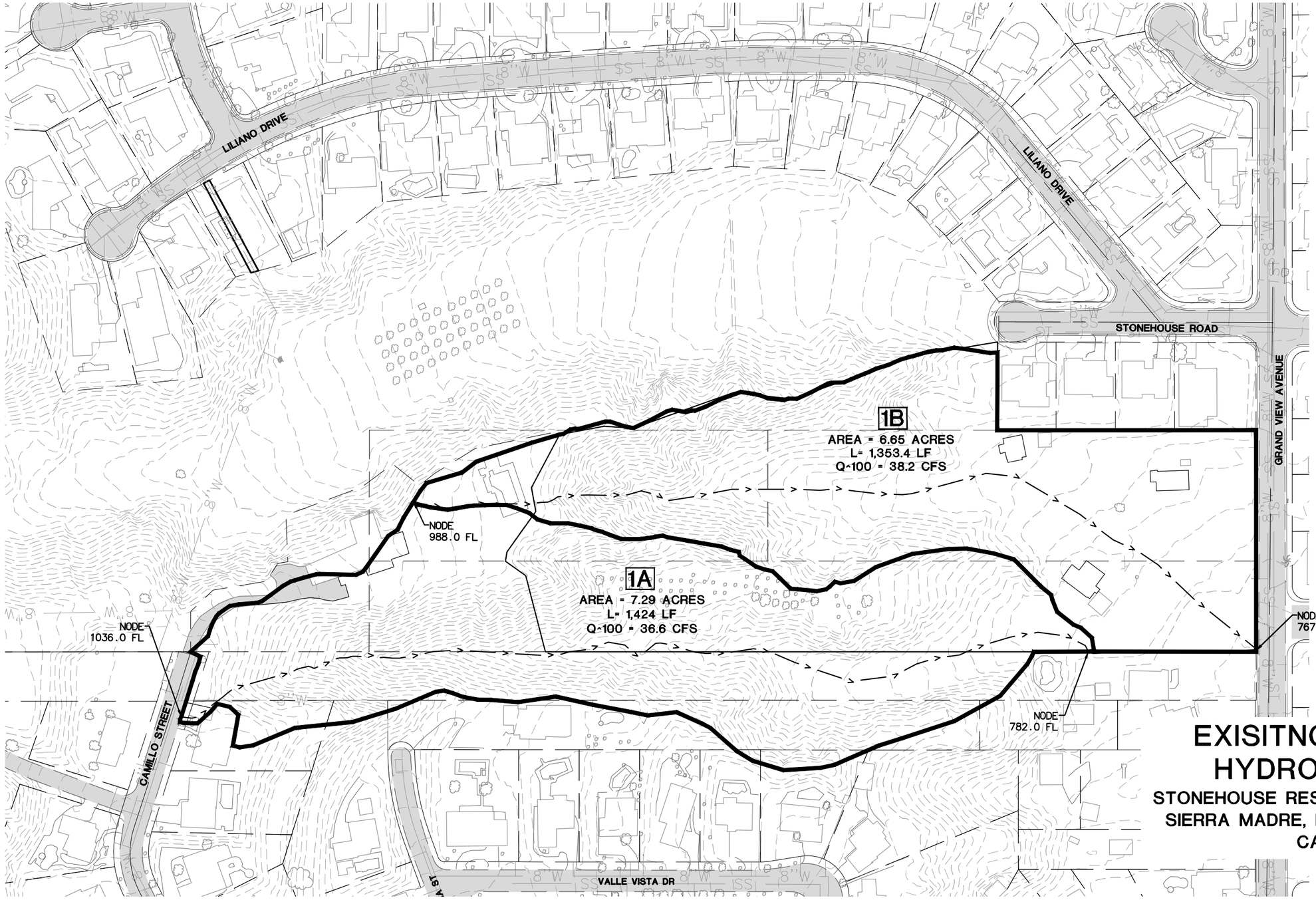
$Q_{street\text{-}max}$ (cfs)	Q_{50} (cfs)	$Q_{street\text{-}max} > Q_{50actual}$
40.90	35.46	Yes

Street Capacity Conclusion

On 11/27/17 Advanced Civil Group personnel spoke with Peter Imaa who said that street hydraulic carrying capacity is defined as retaining runoff within property lines from a 25-year 24-hour storm event. This hydraulics analysis shows that the proposed Project street hydraulic capacity is greater than the 50-year 24-hour storm peak flow rate. Therefore, the proposed Project street hydraulic capacity meets LACDPW Flood Control standards, and does not require catch basins and new storm drain.

V-Ditch Analysis

An analysis of the hydraulic capacity of the proposed Project v-ditch in Watershed 1A was also performed, and it was determined that the proposed v-ditch design (see TTM No. 65348) is sufficient to route the peak flow from the 50-year 24-hour storm without overflowing. This determination was made using an online Manning's equation calculator solving for depth given a flow rate (see Appendix D2 Manning's Calculator – V-Ditch Check Calculation). A minimum slope of 1% was used for the channel slope with a roughness coefficient of 0.015 for concrete. The sub-basin 1A Q_{50} (25.3 cfs) was used to determine the resulting depth which was calculated as 1.85 feet. Since the depth of the v-ditch is 2 ft (see Appendix D1 Vesting TTM No. 65348) the v-ditch will successfully route flow from the 50-year 24-hour storm without overflowing.



LEGEND

- PROJECT BOUNDARY
- WATERSHED BOUNDARY
- EXISTING WATERSHED FLOW PATH
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING PROPERTY LINE
- EXISTING ROAD EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING HOUSE
- EXISTING HARDSCAPE
- EXISTING TREE
- 1A DRAINAGE AREA

EXISITNG CONDITION HYDROLOGY MAP

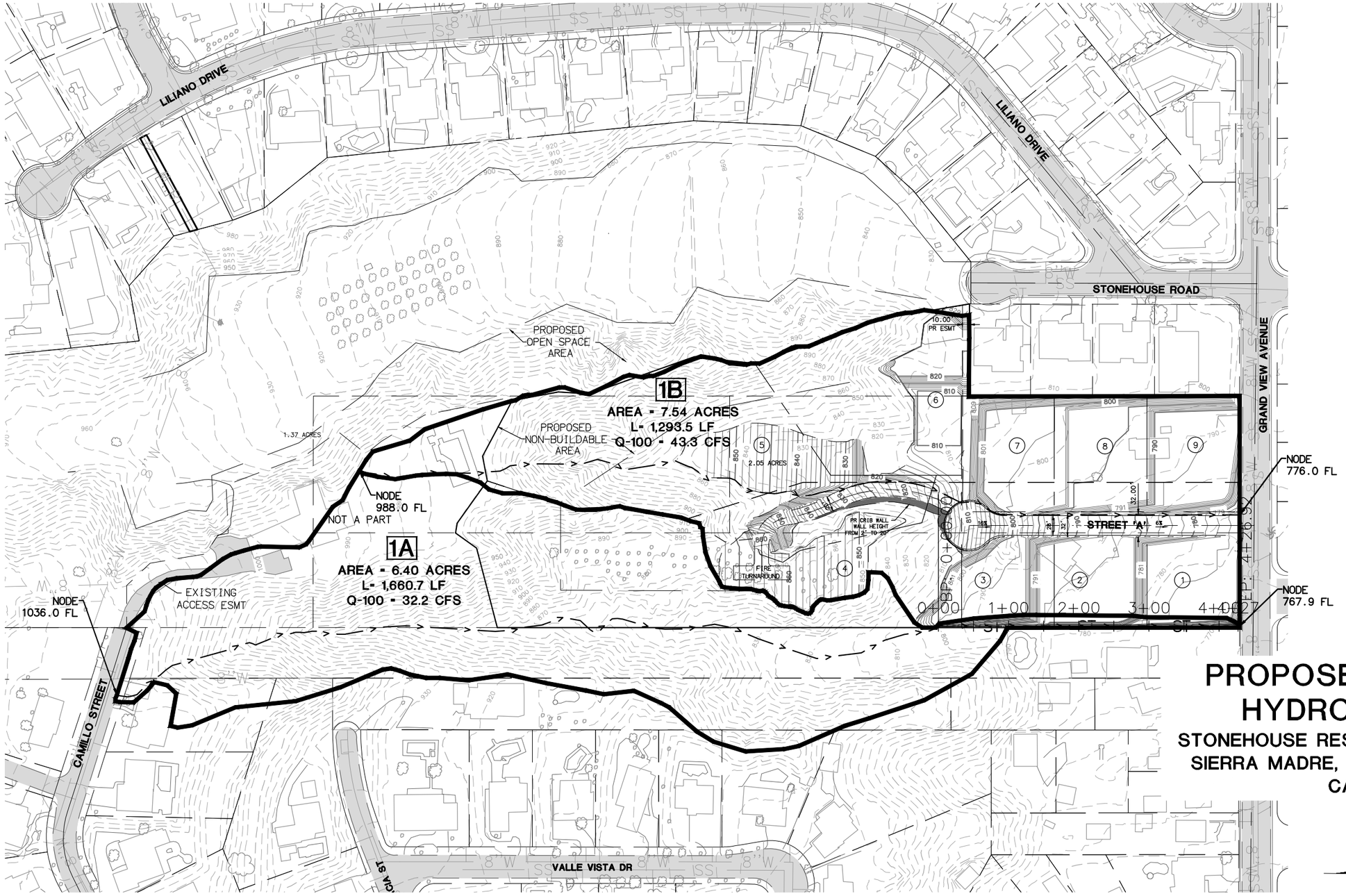
STONEHOUSE RESIDENTIAL DEVELOPMENT, SIERRA MADRE, LOS ANGELES COUNTY, CALIFORNIA

0 75 150 300 Feet

1":150'

LEGEND

- PROJECT BOUNDARY
- WATERSHED BOUNDARY
- PROPOSED WATERSHED FLOW PATH
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING PROPERTY LINE
- PROPOSED RETAINING WALL
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED PROPERTY LINE
- EXISTING ROAD EDGE OF PAVEMENT
- EXISTING HOUSE
- EXISTING HARDSCAPE
- EXISTING TREE
- 1A DRAINAGE AREA

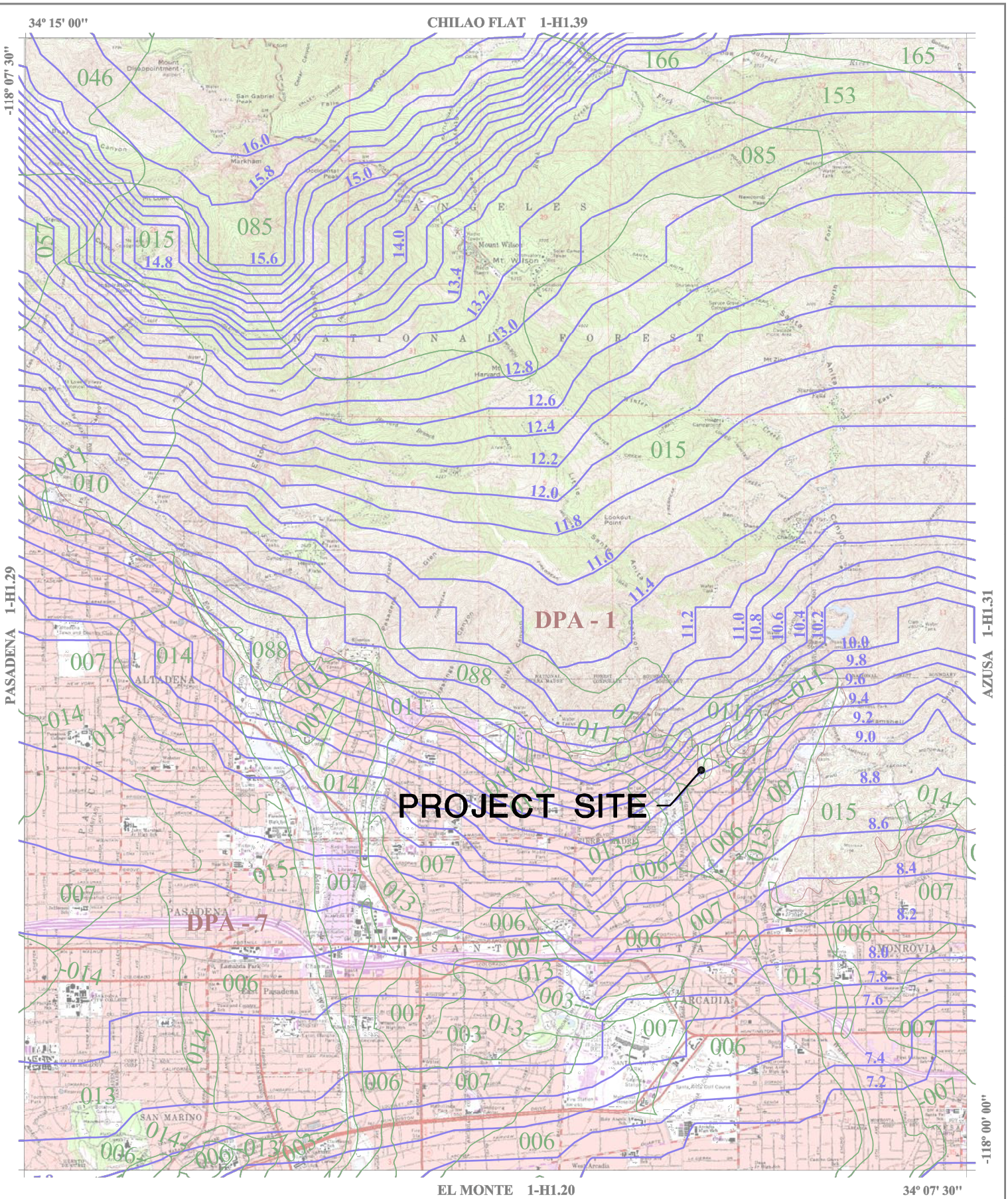


PROPOSED CONDITION HYDROLOGY MAP

STONEHOUSE RESIDENTIAL DEVELOPMENT, SIERRA MADRE, LOS ANGELES COUNTY, CALIFORNIA

0 75 150 300 Feet

1:1800



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N W E S

1 0 1 2 Miles

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

MOUNT WILSON
50-YEAR 24-HOUR ISOHYET

1-H1.30

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

Impervious Area Worksheet

Watershed 1A - Exisiting	
Feature	Area (sf)
Watershed 1A	317768
712 Camillo Rd. Driveway	986
838 Camillo Rd. House	2036
838 Camillo Rd. Driveway	3448
Existing Impervious Fraction	0.020

Watershed 1B - Exisiting Condition	
Feature	Area (sf)
Watershed 1B Area (sf)	289482
Three Houses	5825
838 Camillo Rd. Pool	3611
Existing Impervious Fraction	0.033

Watershed 1A - Proposed	
Feature	Area (sf)
Watershed 1A Area (sf)	278913
V-Ditch	1708
Proposed Impervious Fraction	0.029

Watershed 1B - Proposed	
Feature	Area (sf)
Watershed 1B Area (sf)	328337
9 Houses (2,500 sf/house)	22500
Street 'A' Asphalt	13840
Street 'A' Curb and Gutter	1834
Street 'A' Driveway	8581
Proposed Impervious Fraction	0.153

Peak Flow Hydrologic Analysis

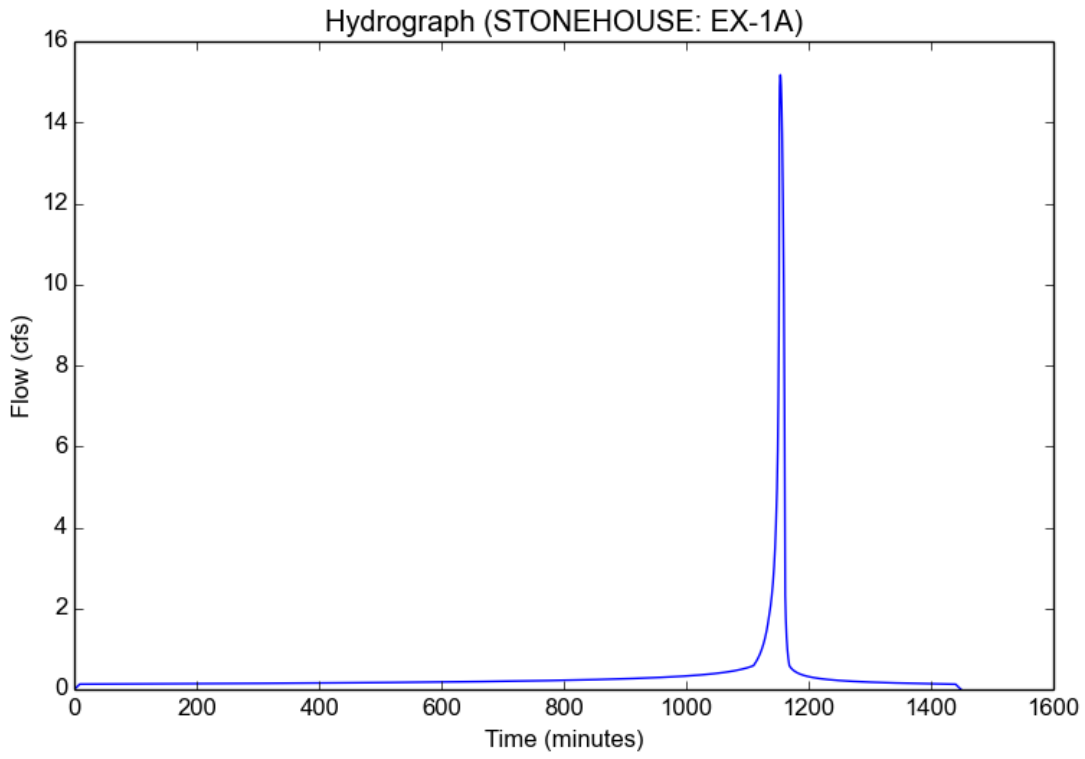
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - EX-1A.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	STONEHOUSE
Subarea ID	EX-1A
Area (ac)	7.29
Flow Path Length (ft)	1424.0
Flow Path Slope (vft/hft)	0.1784
50-yr Rainfall Depth (in)	9.685
Percent Impervious	0.0204
Soil Type	88
Design Storm Frequency	10-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	6.9151
Peak Intensity (in/hr)	3.1298
Undeveloped Runoff Coefficient (Cu)	0.6601
Developed Runoff Coefficient (Cd)	0.665
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	15.1738
Burned Peak Flow Rate (cfs)	17.3301
24-Hr Clear Runoff Volume (ac-ft)	0.6907
24-Hr Clear Runoff Volume (cu-ft)	30087.4419



Peak Flow Hydrologic Analysis

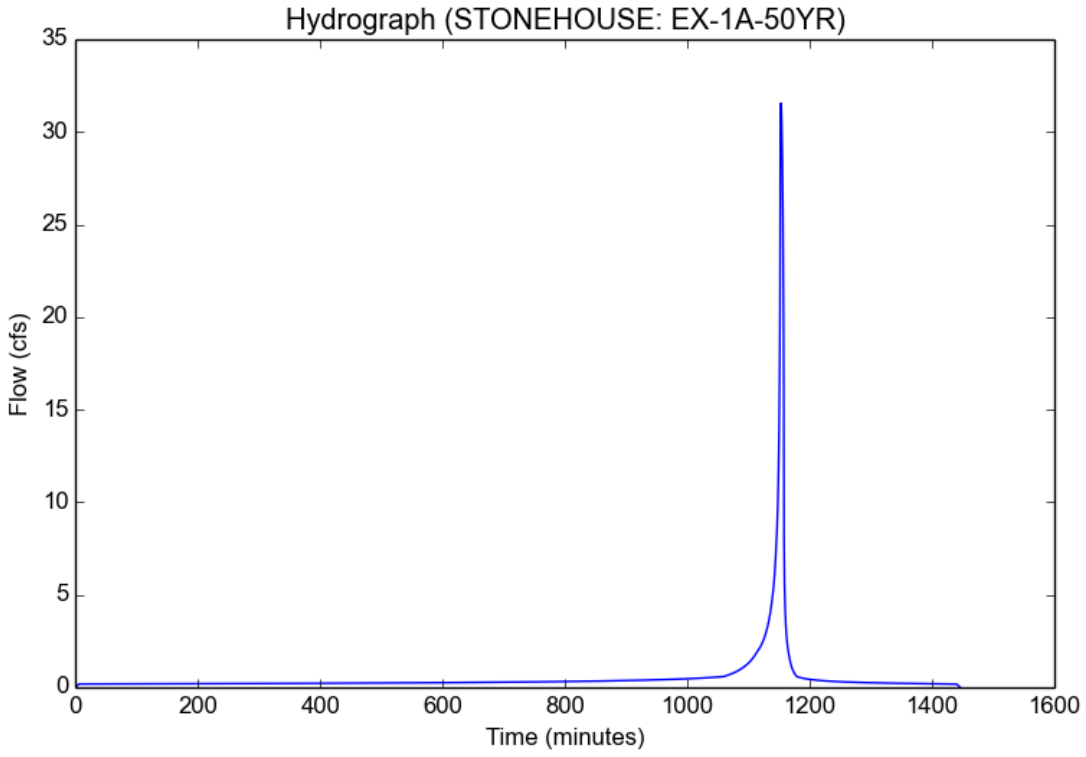
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - EX-1A-50YR.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	STONEHOUSE
Subarea ID	EX-1A-50YR
Area (ac)	7.29
Flow Path Length (ft)	1424.0
Flow Path Slope (vft/hft)	0.1784
50-yr Rainfall Depth (in)	9.685
Percent Impervious	0.0204
Soil Type	88
Design Storm Frequency	50-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	9.685
Peak Intensity (in/hr)	5.3038
Undeveloped Runoff Coefficient (Cu)	0.8143
Developed Runoff Coefficient (Cd)	0.816
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	31.5504
Burned Peak Flow Rate (cfs)	33.7171
24-Hr Clear Runoff Volume (ac-ft)	1.1225
24-Hr Clear Runoff Volume (cu-ft)	48897.381



Peak Flow Hydrologic Analysis

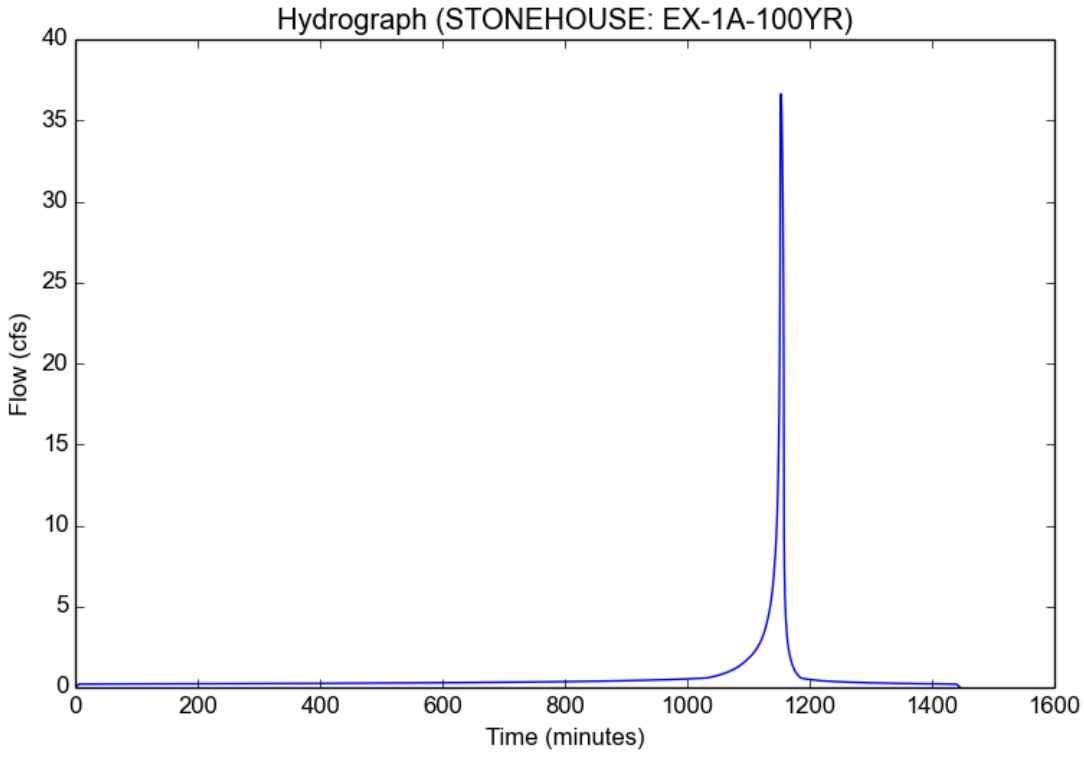
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - EX-1A-100YR.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	STONEHOUSE
Subarea ID	EX-1A-100YR
Area (ac)	7.29
Flow Path Length (ft)	1424.0
Flow Path Slope (vft/hft)	0.1784
50-yr Rainfall Depth (in)	9.685
Percent Impervious	0.0204
Soil Type	88
Design Storm Frequency	100-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	10.8666
Peak Intensity (in/hr)	5.9509
Undeveloped Runoff Coefficient (Cu)	0.8434
Developed Runoff Coefficient (Cd)	0.8445
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	36.6365
Burned Peak Flow Rate (cfs)	38.7227
24-Hr Clear Runoff Volume (ac-ft)	1.3308
24-Hr Clear Runoff Volume (cu-ft)	57969.4666



Peak Flow Hydrologic Analysis

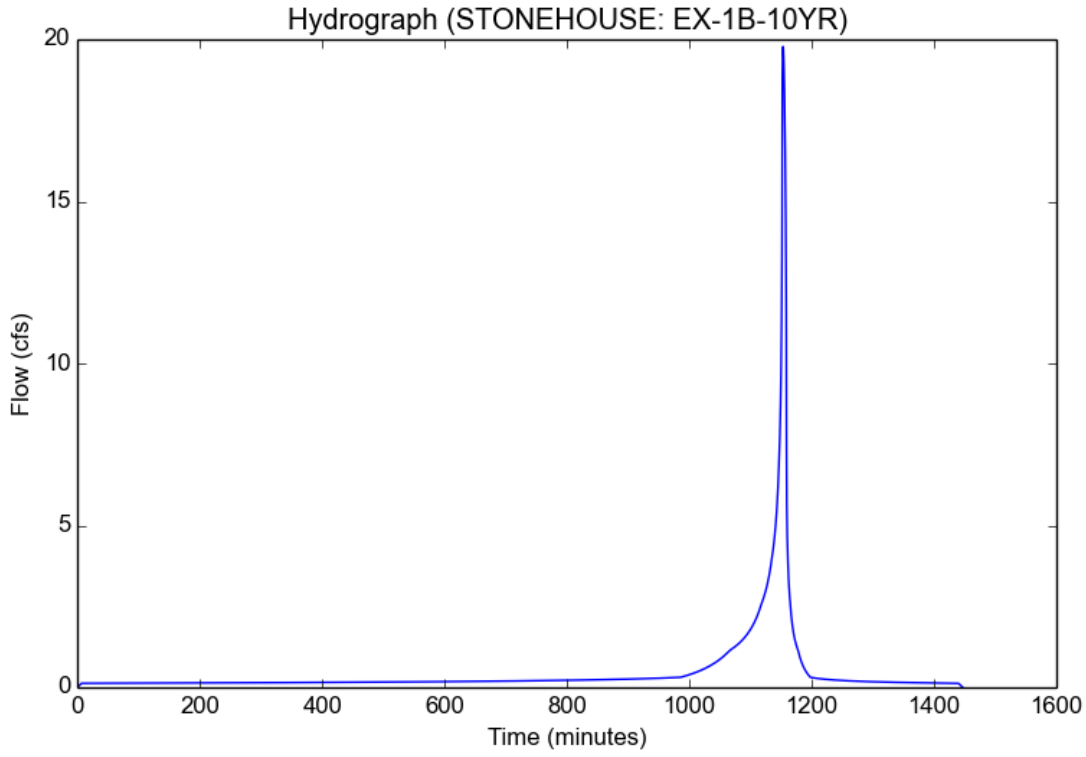
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - EX-1B-10YR.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	STONEHOUSE
Subarea ID	EX-1B-10YR
Area (ac)	6.65
Flow Path Length (ft)	1353.4
Flow Path Slope (vft/hft)	0.16263
50-yr Rainfall Depth (in)	9.545
Percent Impervious	0.0326
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	6.8151
Peak Intensity (in/hr)	3.4713
Undeveloped Runoff Coefficient (Cu)	0.8554
Developed Runoff Coefficient (Cd)	0.8568
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	19.7794
Burned Peak Flow Rate (cfs)	20.7267
24-Hr Clear Runoff Volume (ac-ft)	0.9597
24-Hr Clear Runoff Volume (cu-ft)	41804.365



Peak Flow Hydrologic Analysis

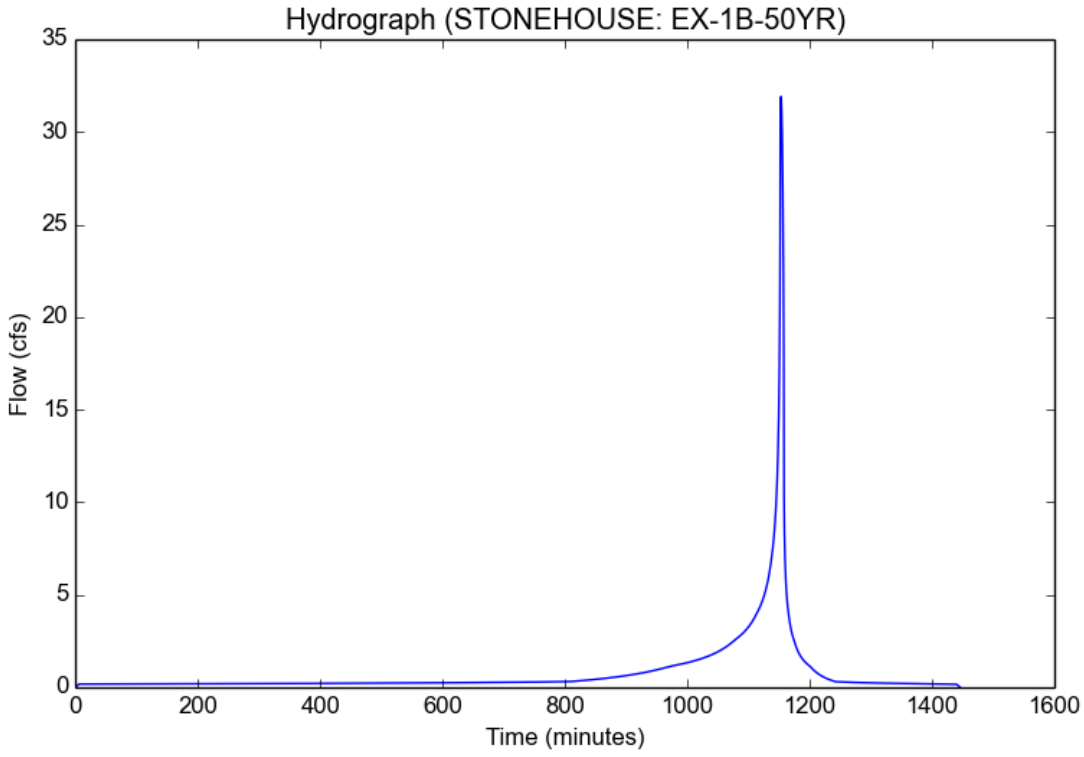
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - EX-1B-50YR.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	STONEHOUSE
Subarea ID	EX-1B-50YR
Area (ac)	6.65
Flow Path Length (ft)	1353.4
Flow Path Slope (vft/hft)	0.16263
50-yr Rainfall Depth (in)	9.545
Percent Impervious	0.0326
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	9.545
Peak Intensity (in/hr)	5.2271
Undeveloped Runoff Coefficient (Cu)	0.9186
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	31.2844
Burned Peak Flow Rate (cfs)	32.341
24-Hr Clear Runoff Volume (ac-ft)	1.6659
24-Hr Clear Runoff Volume (cu-ft)	72564.7565



Peak Flow Hydrologic Analysis

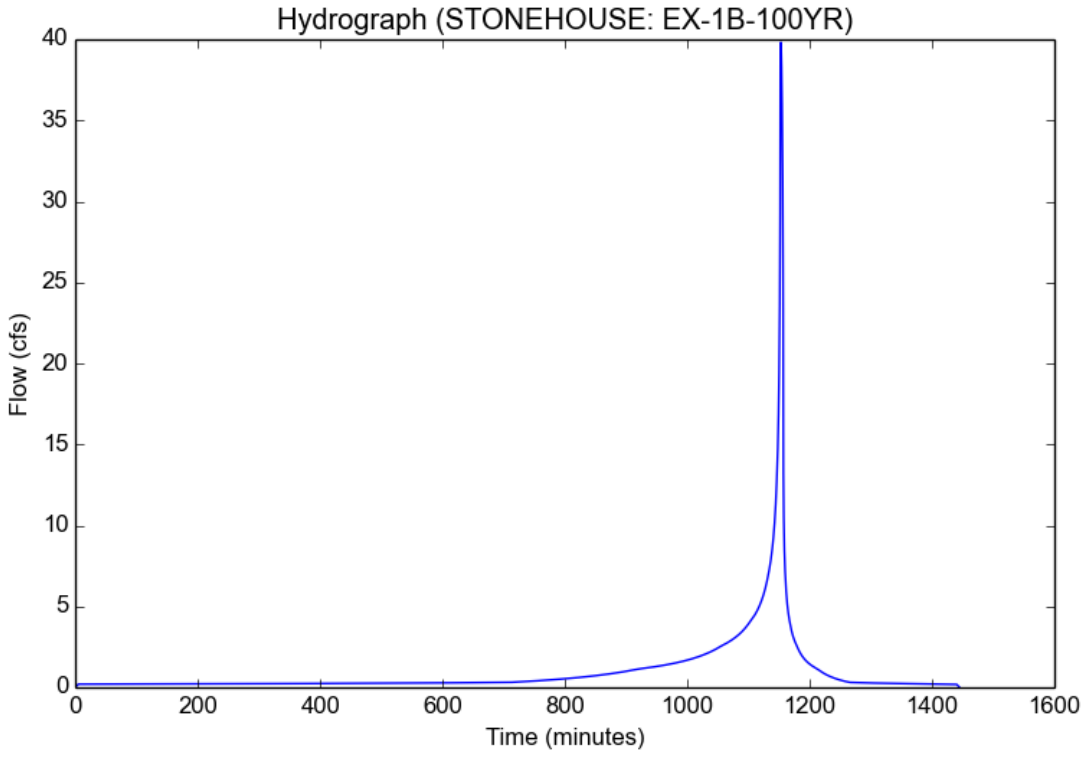
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - EX-1B-100YR.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	STONEHOUSE
Subarea ID	EX-1B-100YR
Area (ac)	6.65
Flow Path Length (ft)	1353.4
Flow Path Slope (vft/hft)	0.16263
50-yr Rainfall Depth (in)	9.545
Percent Impervious	0.0326
Soil Type	6
Design Storm Frequency	100-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	10.7095
Peak Intensity (in/hr)	6.3896
Undeveloped Runoff Coefficient (Cu)	0.9385
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	38.2416
Burned Peak Flow Rate (cfs)	39.5681
24-Hr Clear Runoff Volume (ac-ft)	2.0258
24-Hr Clear Runoff Volume (cu-ft)	88245.6325



Peak Flow Hydrologic Analysis

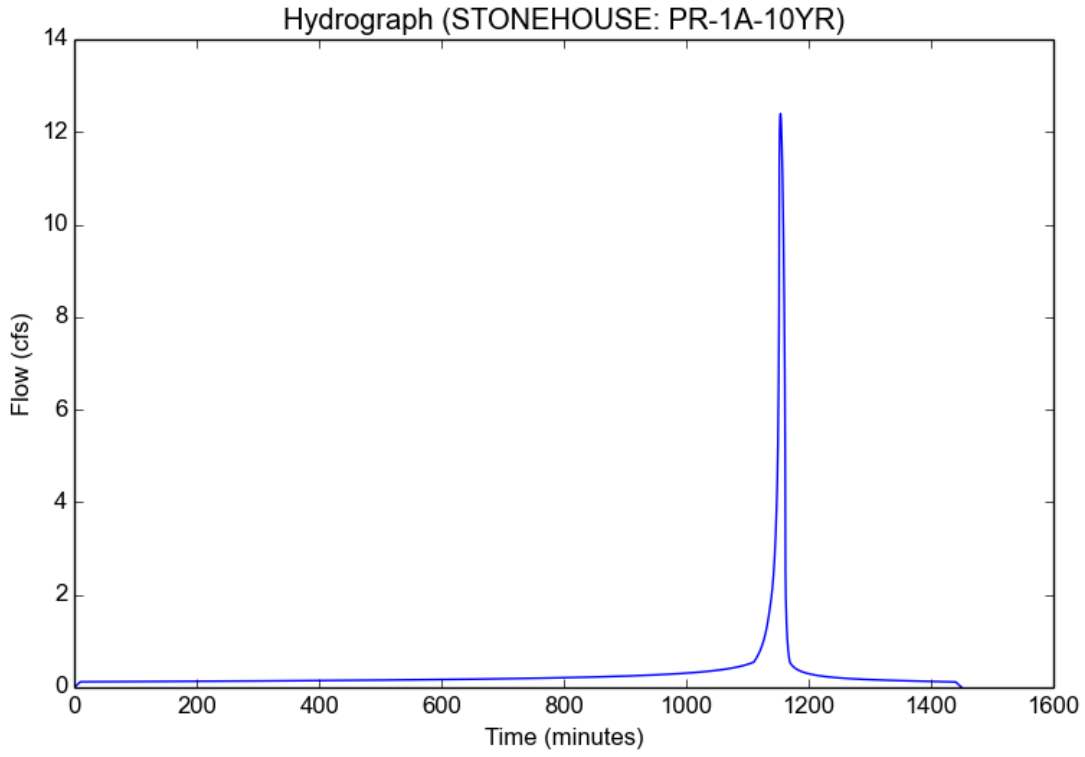
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - PR-1A-10YR.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	STONEHOUSE
Subarea ID	PR-1A-10YR
Area (ac)	6.4
Flow Path Length (ft)	1660.7
Flow Path Slope (vft/hft)	0.16144
50-yr Rainfall Depth (in)	9.685
Percent Impervious	0.029321
Soil Type	88
Design Storm Frequency	10-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	6.9151
Peak Intensity (in/hr)	2.9786
Undeveloped Runoff Coefficient (Cu)	0.6425
Developed Runoff Coefficient (Cd)	0.6501
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	12.3928
Burned Peak Flow Rate (cfs)	14.2603
24-Hr Clear Runoff Volume (ac-ft)	0.6289
24-Hr Clear Runoff Volume (cu-ft)	27393.6369



Peak Flow Hydrologic Analysis

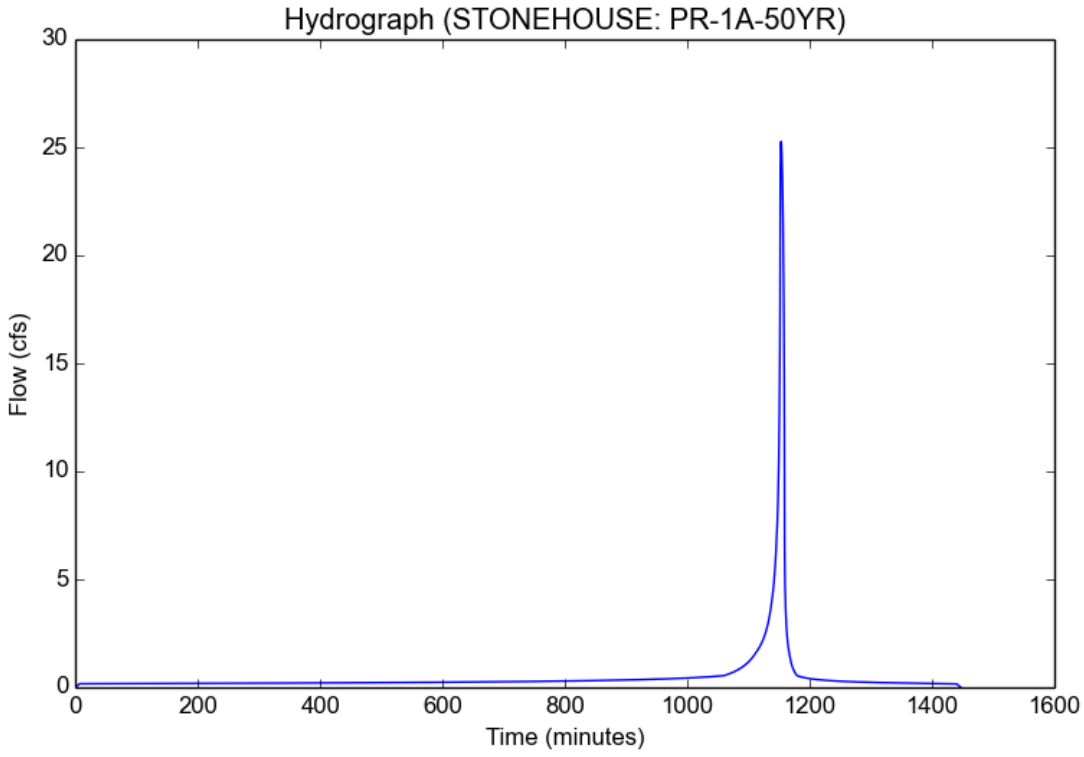
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - PR-1A-50YR.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	STONEHOUSE
Subarea ID	PR-1A-50YR
Area (ac)	6.4
Flow Path Length (ft)	1660.7
Flow Path Slope (vft/hft)	0.16144
50-yr Rainfall Depth (in)	9.685
Percent Impervious	0.029321
Soil Type	88
Design Storm Frequency	50-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	9.685
Peak Intensity (in/hr)	4.9331
Undeveloped Runoff Coefficient (Cu)	0.7976
Developed Runoff Coefficient (Cd)	0.8006
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	25.276
Burned Peak Flow Rate (cfs)	27.1745
24-Hr Clear Runoff Volume (ac-ft)	1.0176
24-Hr Clear Runoff Volume (cu-ft)	44327.3648



Peak Flow Hydrologic Analysis

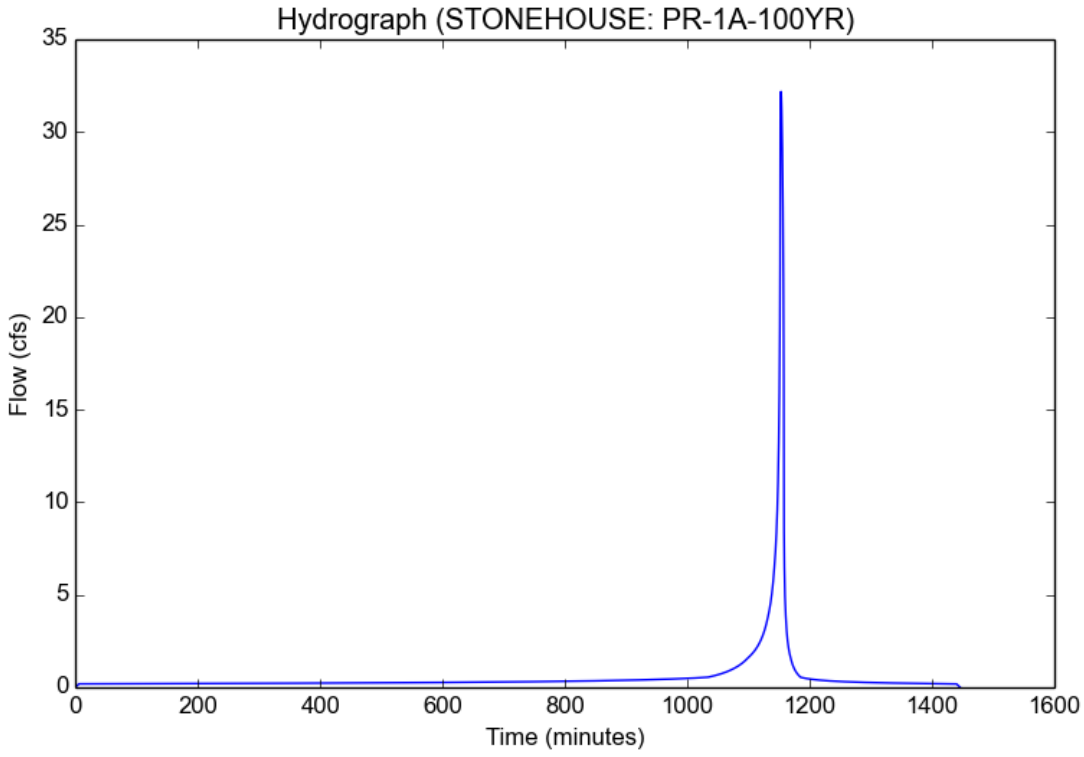
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - PR-1A-100YR.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	STONEHOUSE
Subarea ID	PR-1A-100YR
Area (ac)	6.4
Flow Path Length (ft)	1660.7
Flow Path Slope (vft/hft)	0.16144
50-yr Rainfall Depth (in)	9.685
Percent Impervious	0.029321
Soil Type	88
Design Storm Frequency	100-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	10.8666
Peak Intensity (in/hr)	5.9509
Undeveloped Runoff Coefficient (Cu)	0.8434
Developed Runoff Coefficient (Cd)	0.845
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	32.1829
Burned Peak Flow Rate (cfs)	34.0085
24-Hr Clear Runoff Volume (ac-ft)	1.2048
24-Hr Clear Runoff Volume (cu-ft)	52480.8209



Peak Flow Hydrologic Analysis

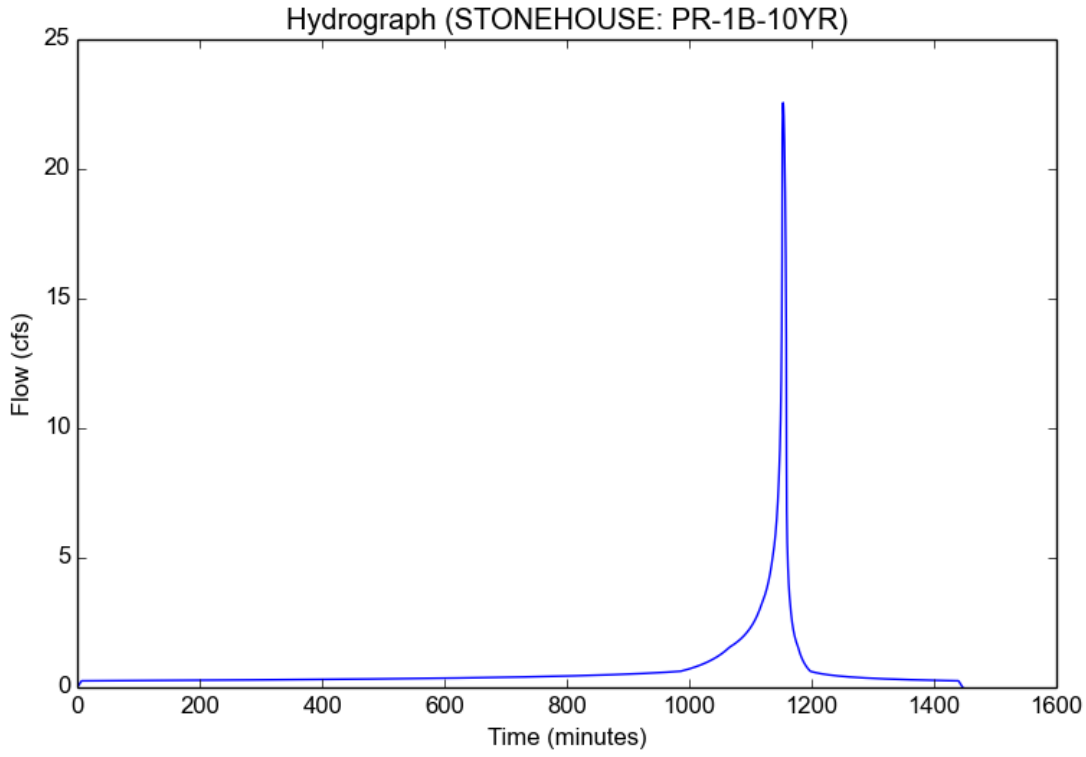
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - PR-1B-10YR.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	STONEHOUSE
Subarea ID	PR-1B-10YR
Area (ac)	7.54
Flow Path Length (ft)	1293.5
Flow Path Slope (vft/hft)	0.1639
50-yr Rainfall Depth (in)	9.542
Percent Impervious	0.153397
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	6.813
Peak Intensity (in/hr)	3.4702
Undeveloped Runoff Coefficient (Cu)	0.8553
Developed Runoff Coefficient (Cd)	0.8622
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	22.5588
Burned Peak Flow Rate (cfs)	23.5926
24-Hr Clear Runoff Volume (ac-ft)	1.4289
24-Hr Clear Runoff Volume (cu-ft)	62242.6718



Peak Flow Hydrologic Analysis

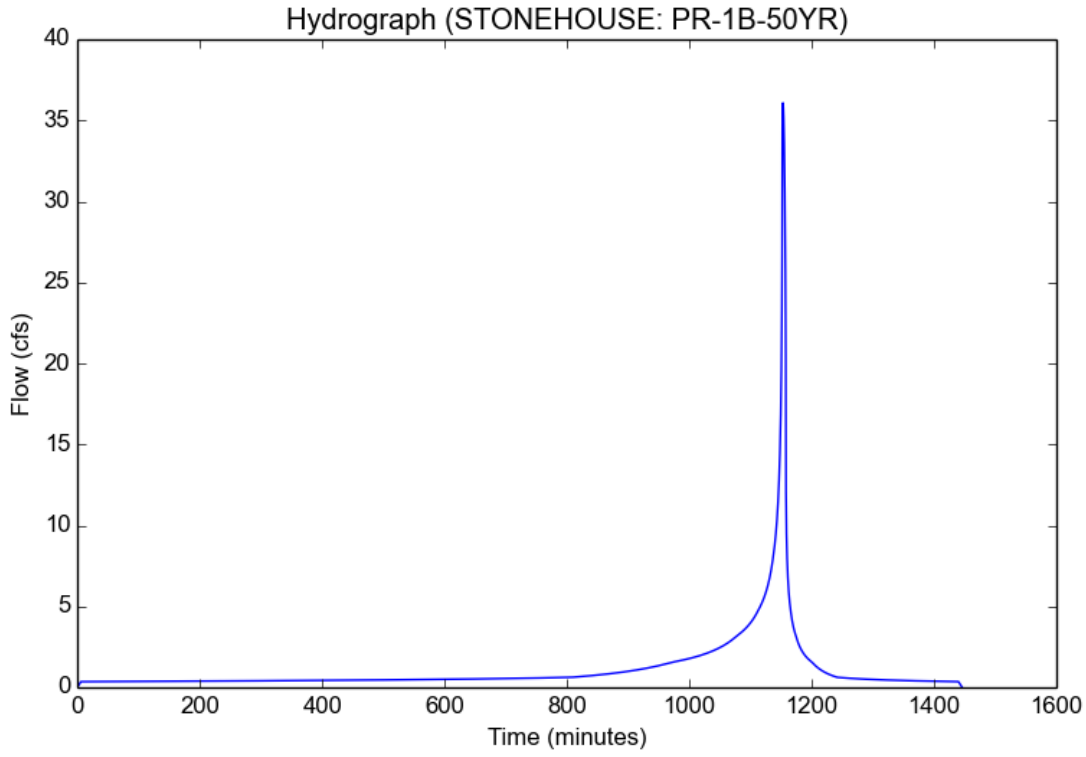
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - PR-1B-50YR.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	STONEHOUSE
Subarea ID	PR-1B-50YR
Area (ac)	7.54
Flow Path Length (ft)	1293.5
Flow Path Slope (vft/hft)	0.1639
50-yr Rainfall Depth (in)	9.542
Percent Impervious	0.153397
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	9.542
Peak Intensity (in/hr)	5.2255
Undeveloped Runoff Coefficient (Cu)	0.9186
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	35.4602
Burned Peak Flow Rate (cfs)	36.6577
24-Hr Clear Runoff Volume (ac-ft)	2.3203
24-Hr Clear Runoff Volume (cu-ft)	101072.2701



Peak Flow Hydrologic Analysis

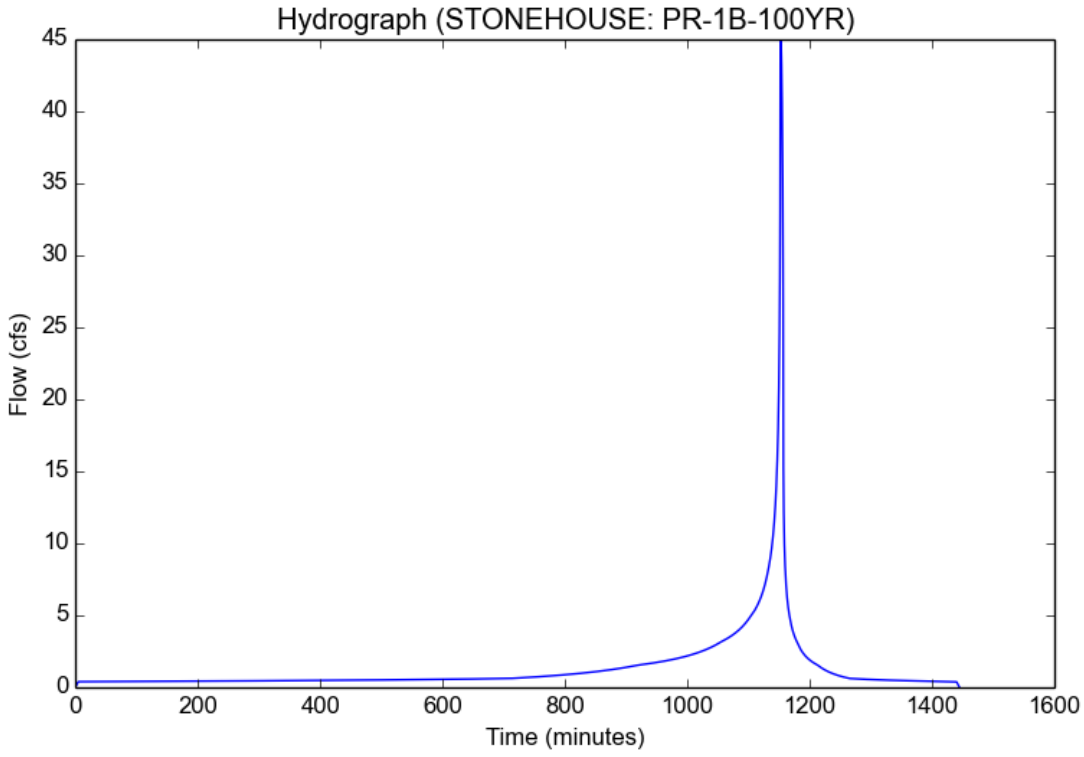
File location: C:/Users/rstev/Google Drive/ACG/Projects/100101/Hydro/STONEHOUSE - PR-1B-100YR.pdf
Version: HydroCalc 1.0.2

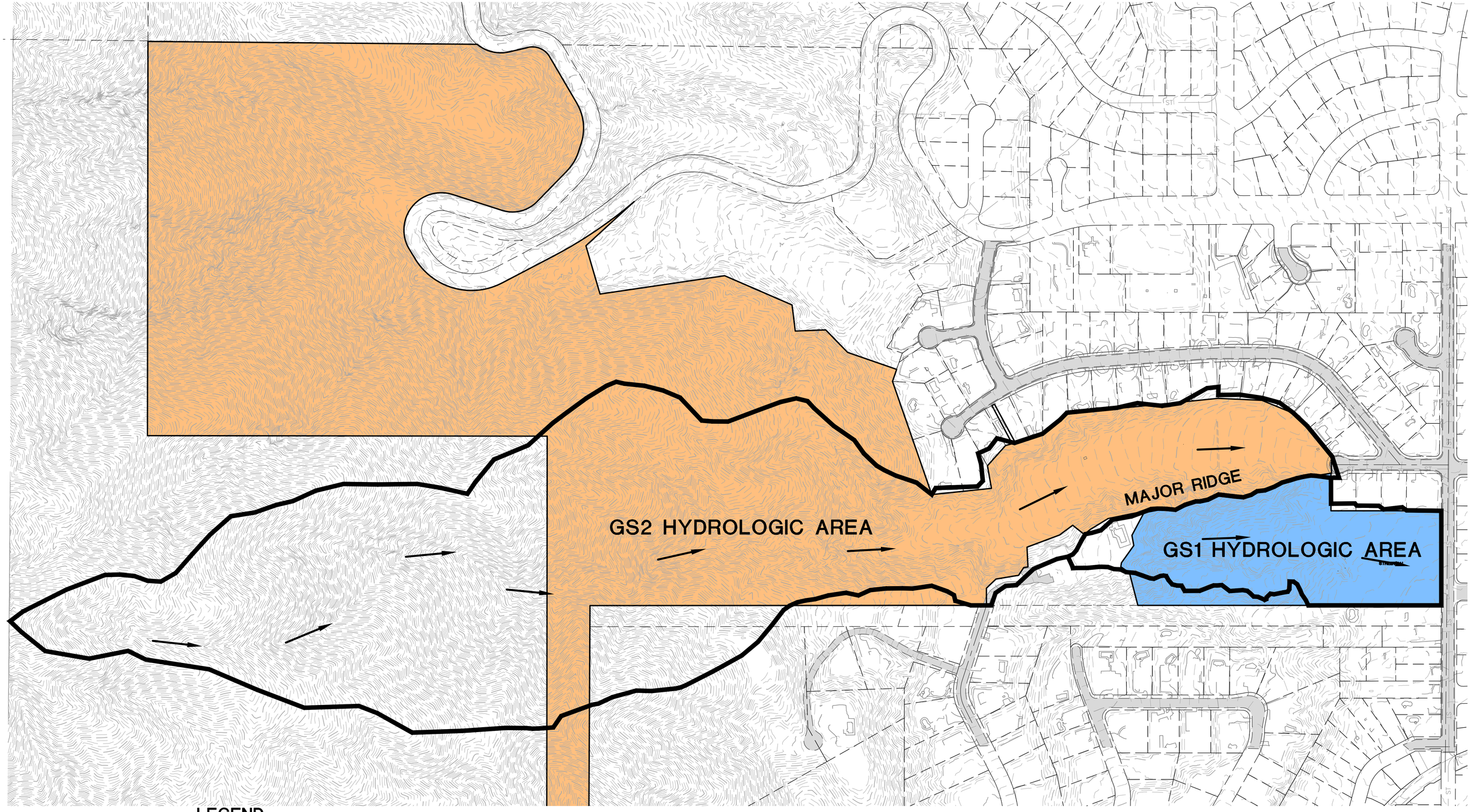
Input Parameters

Project Name	STONEHOUSE
Subarea ID	PR-1B-100YR
Area (ac)	7.54
Flow Path Length (ft)	1293.5
Flow Path Slope (vft/hft)	0.1639
50-yr Rainfall Depth (in)	9.542
Percent Impervious	0.153397
Soil Type	6
Design Storm Frequency	100-yr
Fire Factor	0.71
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	10.7061
Peak Intensity (in/hr)	6.3876
Undeveloped Runoff Coefficient (Cu)	0.9385
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	43.346
Burned Peak Flow Rate (cfs)	44.8495
24-Hr Clear Runoff Volume (ac-ft)	2.7588
24-Hr Clear Runoff Volume (cu-ft)	120173.6666





LEGEND:

- GS1 PROPERTY
- GS2 PROPERTY
- HYDROLOGIC BOUNDARY
- FLOW DIRECTION

HYDROLOGY BOUNDARIES EXHIBIT

SCALE: 1"=150'

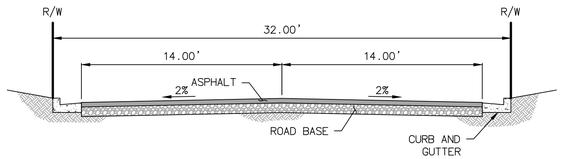
150 75 0 150 300 450

SCALE: 1"=150'

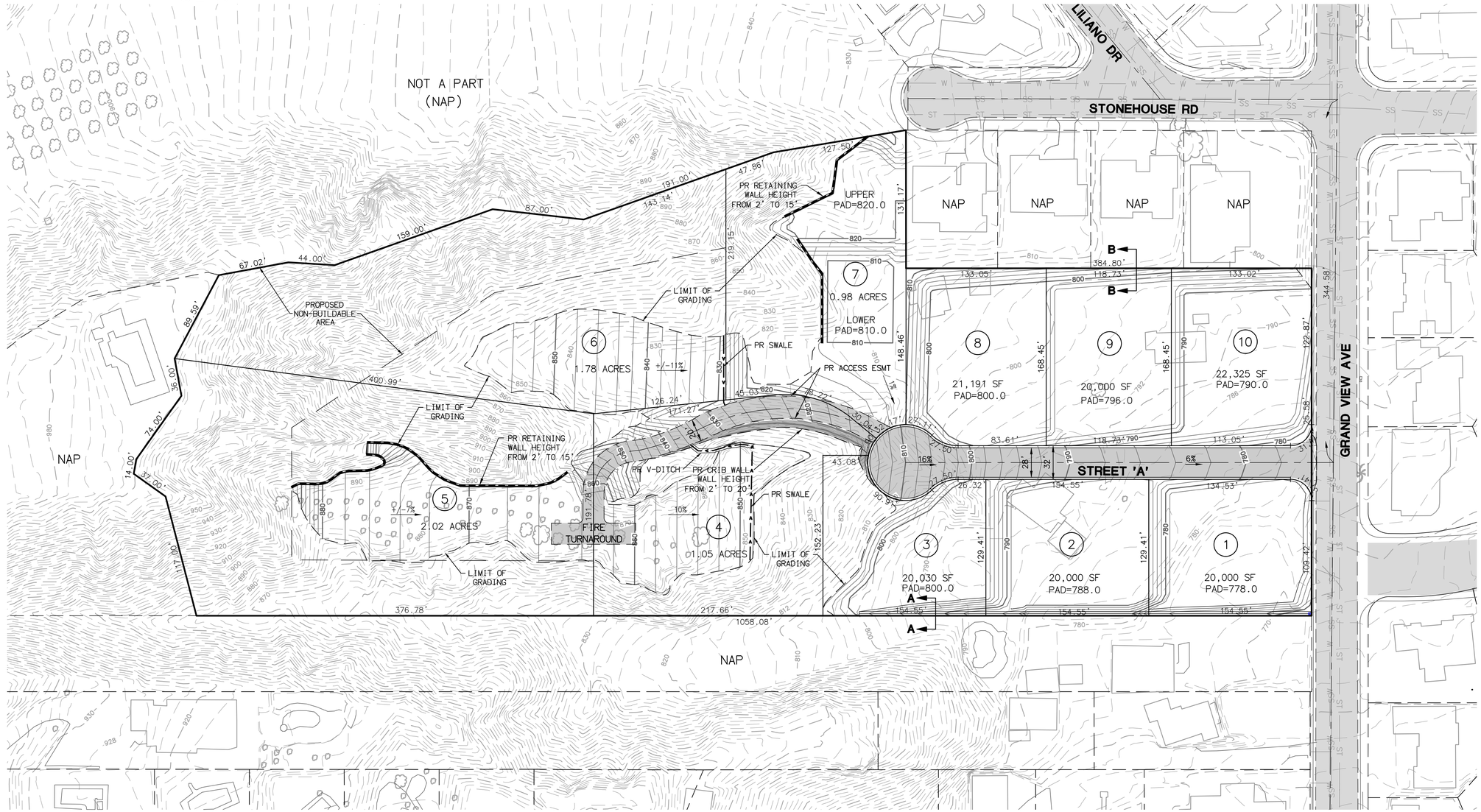
NOTE:

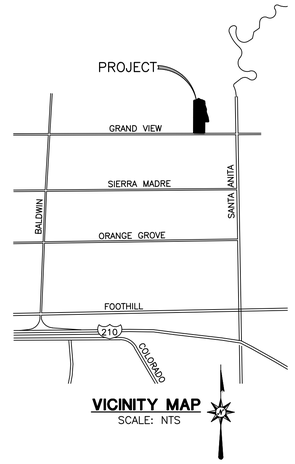
GS1 AND GS2 PROPERTIES ARE TOPOGRAPHICLY AND HYDROLOGICLY SEPARATED BY A MAJOR RIDGE THAT DIVIDES THE TWO PROPERTIES. RUNOFF FROM GS2 DOES NOT DRAIN ON TO GS1.

VESTING
TENTATIVE TRACT MAP NO. 65348

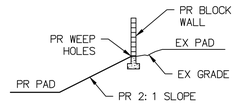


STREET 'A'
(PRIVATE STREET)
SCALE: NTS





VICINITY MAP
SCALE: NTS



SECTION B-B
SCALE: NTS

STORM WATER AND LID

REQUIRED STORM WATER RETENTION AND LOW IMPACT DEVELOPMENT BMPS WILL BE IMPLEMENTED ON EACH LOT AS DEVELOPED.

LOT TABLE:

LOT	AREA (ACRES)	AREA (SF)	LAND USE
1	0.46	20,000	SFR
2	0.46	20,000	SFR
3	0.46	20,030	SFR
4	1.05	45,760	SFR
5	2.02	87,778	SFR
6	2.05	89,256	SFR
7	1.01	43,957	SFR
8	0.49	21,191	SFR
9	0.46	20,000	SFR
10	0.51	22,325	SFR

UTILITY PROVIDERS:

WATER:	CITY OF SIERRA MADRE WATER DEPARTMENT
SEWER:	CITY OF SIERRA MADRE PUBLIC WORKS DEPARTMENT
GAS:	SOUTHERN CALIFORNIA GAS CO
ELECTRIC:	SOUTHERN CALIFORNIA EDISON CO
STORM DRAIN:	LOS ANGELES COUNTY FLOOD CONTROL
COMMUNICATION:	VERIZON
CABLE:	TIME WARNER CABLE

OWNER:

GINKGO STONEHOUSE, LLC
805 WEST DUARTE ROAD NO. 101
ARCADIA, CA 91007
CONTACT: HOMER YEN
PHONE: (626)374-3000

APPLICANT:

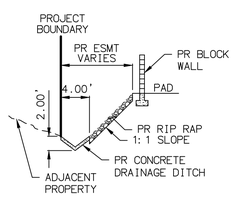
GINKGO STONEHOUSE, LLC
805 WEST DUARTE ROAD NO. 101
ARCADIA, CA 91007
CONTACT: HOMER YEN
PHONE: (626)374-3000

ENGINEER:

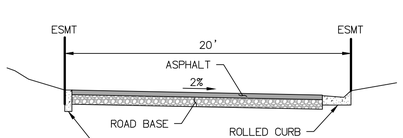
ADVANCED CIVIL GROUP, INC
30251 GOLDEN LANTERN
SUITE E, PMB 251
LAGUNA NIGUEL, CA 92677
CONTACT: R. STEVEN AUSTIN, PE
PHONE: (949)391-7772

LEGEND

- PROJECT BOUNDARY
- PROPOSED LOT LINE
- EXISTING LOT LINE
- PROPOSED SWALE
- PROPOSED MAJOR CONTOUR
- PROPOSED INTERVAL CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING INTERVAL CONTOUR
- PROPOSED RETAINING WALL
- EXISTING SANITARY SEWER
- EXISTING DOMESTIC WATER
- EXISTING STORM DRAIN
- PROPOSED ASPHALT PAVING
- EXISTING ASPHALT PAVING



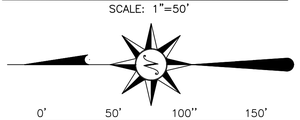
SECTION A-A
SCALE: NTS



PR ACCESS ESMT
SCALE: NTS

VESTING TTM NO. 65348

SCALE: 1"=50'



NOTES:

1. EXISTING LAND USE:

LOT NOS.	TYPE OF USE
2,8,9 & 10	EXISTING RESIDENCE TO BE DEMOLISHED
1,3,4,5,6,& 7	UNDEVELOPED

2. ZONING:
   EXISTING - HILLSIDE RESIDENTIAL
   PROPOSED - HILLSIDE RESIDENTIAL
3. A PROPOSED HOMEOWNERS ASSOCIATION WILL MAINTAIN STREET 'A' AND PRIVATE DRAINAGE
4. PROPOSED ACCESS EASEMENTS WILL BE PAVED WITH ASPHALT OR CONCRETE PAVING.
5. SEWER AND WATER MAIN LINES WILL BE EXTENDED UP STREET 'A' AND THE PROPOSED ACCESS EASEMENTS TO CONNECT PROPOSED LOTS TO CITY OF SIERRA MADRE SEWER AND WATER SYSTEMS.
6. EARTHWORK QUANTITIES:
   CUT: 15,600 CUBIC YARDS
   FILL: 15,600 CUBIC YARDS
7. ASSESSOR PARCEL NOS. 5764-001-017 & 5764-001-018
8. TOPOGRAPHY SOURCE: AERIAL SURVEY 2005 W/ FIELD SURVEY FOR LOT LINE ADJUSTMENT IN 2009

D1

SCALE VERIFICATION
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET
ADJUST SCALES ACCORDINGLY

REVISIONS

NO.	DESCRIPTIONS	DATE	BY

ADVANCED CIVIL GROUP
30251 GOLDEN LANTERN, SUITE E, PMB 251
LAGUNA NIGUEL, CA 92677
(949) 391-7772 PHONE
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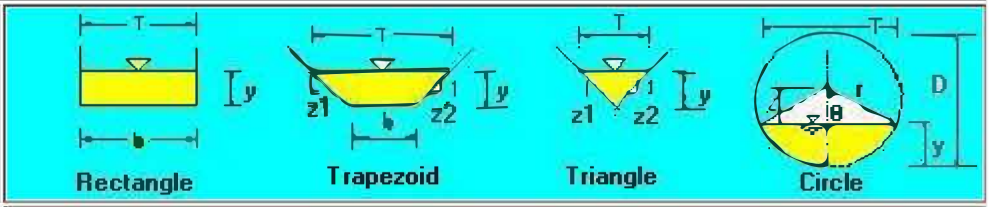
STONEHOUSE
description
VESTING
TENTATIVE TRACT MAP NO. 65348
prepared for
GINGKO STONEHOUSE, LLC

DRAWN BY:	DESIGNED BY:	CHECKED BY:	APPROVED BY:
JCC	RSA	RSA	RSA

JOB NUMBER: 100101
DATE: 8/26/2015
SCALE: 1"=50'
SHEET NO: 1 OF 1

The open channel flow calculator

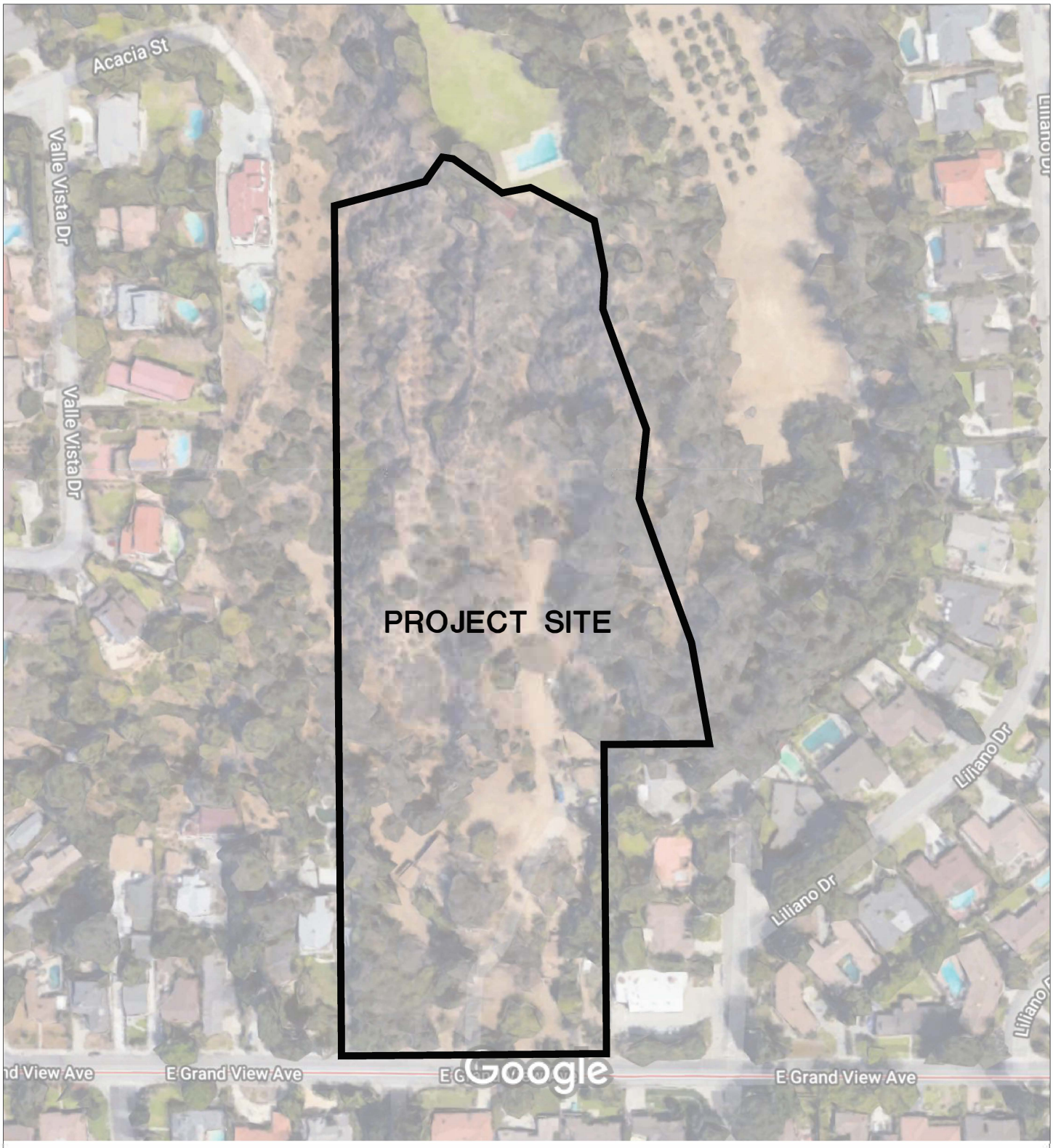
Select Channel Type: Triangle



Depth from Q

Select unit system: Feet(ft)

Channel slope: 0.01 ft/ft	Water depth(y): 1.85 ft	Bottom W(b) 0 ft
Flow velocity 7.414 ft/s	LeftSlope (Z1): 1 to 1 (H:V)	RightSlope (Z2): 1 to 1 (H:V)
Flow discharge 25.3 ft^3/s	Input n value 0.015 or select n	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 5.22 ft	Flow area 3.41 ft^2	Top width(T) 3.69 ft
Specific energy 2.7 ft	Froude number 1.36	Flow status Supercritical flow
Critical depth 2.09 ft	Critical slope 0.0051 ft/ft	Velocity head 0.85 ft



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AERIAL MAP