Appendix G

Preliminary Drainage Study for Lake Creek – Wilson

SDH & Associates

February 25, 2022

PRELIMINARY DRAINAGE STUDY
(HYDROLOGY AND HYDRAULICS)
FOR
LAKE CREEK–WILSON
(PRELIMINARY ENGINEERING)

City Case #: TBD

Job Number 2130

February 25, 2022

PRELIMINARY DRAINAGE STUDY
(HYDROLOGY AND HYDARULICS)
FOR
LAKE CREEK–WILSON
(PRELIMINARY ENGINEERING)

City Case #: TBD

Job Number 2130

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February 25, 2022

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1.0 INTRODUCTION

1.1 Project Location

This drainage study presents preliminary engineering hydrologic and hydraulic analyses for the proposed Lake Creek–Wilson project (herein referred to as "the project"). The project is located in the City of Perris, bounded by Wilson Avenue to the east, and undeveloped parcels to the north, west, and south. Refer to Figure 1.0 for a Vicinity Map of the project. Applicable Assessor Parcel Numbers (APNs) are 300-210-025 and 300-210-017.

1.2 Project Description

The overall project parcel (on-site) consists of approximately 4.8 acres and the on-site drainage area is approximately 4.7 acres. The project also has westerly offsite run-on with an approximate area of 4.6 acres. The proposed on-site improvements will consist of a tilt-up warehouse building and associated parking areas, sidewalks, and landscape areas. The proposed warehouse building footprint is approximately 80,800 square feet and there will be a total of approximately 82 parking spaces to be provided. The proposed impervious and pervious footprints within the drainage management area are approximately 182,322 square feet and 23,873 square feet, respectively. This also includes minor improvement for the easterly frontage Wilson Avenue. In order to comply with the Riverside County drainage and water quality management requirements, the project also includes construction of permanent stormwater BMPs.

1.3 Drainage Characteristics

In the existing condition, the site consists of open, undeveloped space, draining generally from west to east towards Wilson Avenue. There is an offsite run-on to the site from the westerly undeveloped land with an approximate area of 4.6 acres. At a later stage, the drainage delineation may be further refined with additional topographic information; however, based on our preliminary evaluation, this should be close. Runoff from Wilson Avenue is conveyed in a southeasterly direction and eventually discharge into the existing MDP Perris Valley Storm Drain (PVSD) Channel, which ultimately discharges into Canyon Lake and then Lake Elsinore.

In the post-project condition, the drainage characteristics will be maintained similar as compared to the pre-project condition. Runoff from the site will be captured via proposed catch basins and conveyed via proposed storm drain pipes towards a proposed biotreatment LID BMP and a proprietary Modular Wetland System (MWS) for treatment purpose prior to discharging into a proposed catch basin on west side of Wilson Avenue. It is understood that a separate offsite development will construct a segment of the MDP Line H along Placentia Avenue (between Murrieta Avenue and Wilson Avenue) and a lateral storm drain pipe along Wilson Avenue from the intersection of Wilson/Placentia up to this project location. The aforementioned catch basin will connect into this storm drain line. This downstream storm drain pipe is expected to have adequate capacity to convey the project's on-site un-detained peak flow rates. Lastly, in an effort to maintain the existing drainage characteristics, the westerly offsite area will be picked up and bypassed around the project via proposed on-site perimeter v-ditches and outlet to Wilson Avenue.

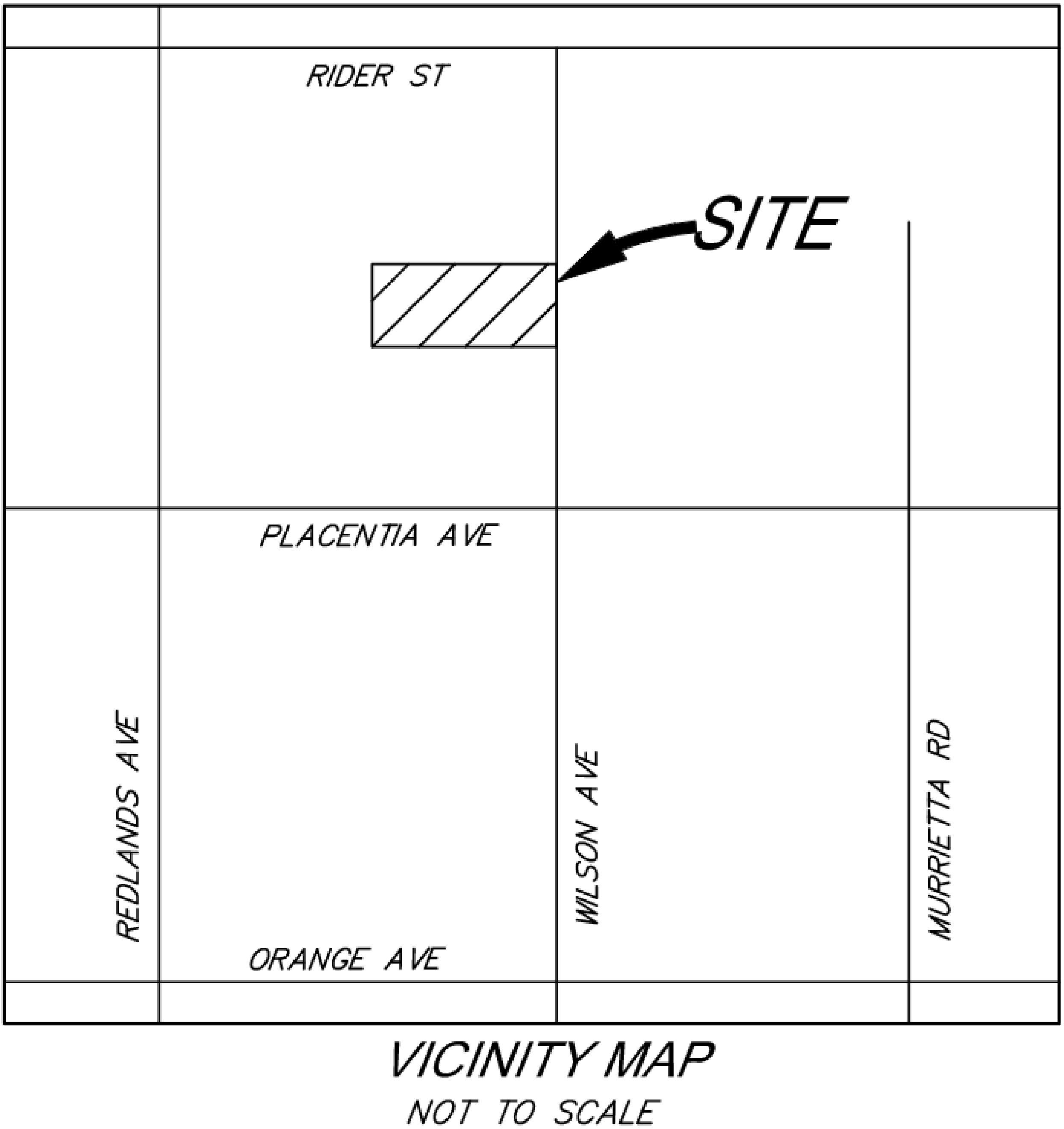
1.4 FEMA Flood Hazard Zone Information

The water courses around the project have been identified by the Federal Emergency Management Agency (FEMA) as Zone D. The project is shown on the FEMA Flood Insurance Rate Map (FIRM) number 0065C1430H, effective August 18, 2014 and labeled as Zone X. No FEMA submittals are anticipated to be required for this project. For reference purpose, a copy of the FIRMette (reduced size) is included at the end of Appendix A.

1.6 Water Quality Management

In support of the preliminary site plan, a preliminary Water Quality Management Plan (WQMP) has been prepared for the project. The report is titled, "Preliminary Water Quality Management Plan for Lake Creek – Wilson," dated February 25, 2021, prepared by SDH & Associates, Inc. (Job Number 2130). The preliminary WQMP documents how the project addresses the requirements regarding permanent stormwater quality management, in accordance with the stormwater guidance document titled, "2010 Water Quality Management Plan for the Santa Ana Region of Riverside County."

Figure 1: Vicinity Map



2.0 HYDROLOGY

Preliminary hydrologic calculations were prepared in accordance with the Riverside County Flood Control and Water Conservation District - Hydrology Manual, dated April 1978 (manual) for preliminary on-site storm drain sizing purpose. The Advanced Engineering Software (AES) 2016 Rational Method Analysis (Version 23.0) program was used to perform the hydrologic analysis in this study.

The AES hydrologic model is developed by creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points. The program has the capability to perform calculations for 15 hydrologic processes. These processes are assigned code numbers that appear in the results. The code numbers and their significances are as follows:

Subarea Hydrologic Processes (Codes)

Code 1: Confluence analysis at a node
Code 2: Initial subarea analysis
Code 3: Pipe flow travel time (computer-estimated pipe sizes)
Code 4: Pipe flow travel time (user-specified pipe size)
Code 5: Trapezoidal channel travel time
Code 6: Street flow analysis through a subarea
Code 7: User-specified information at a node
Code 8: Addition of the subarea runoff to mainline
Code 9: V-Gutter flow through a subarea
Code 10: Copy main-stream data onto a memory bank
Code 11: Confluence a memory bank with the main-stream memory
Code 12: Clear a memory bank
Code 13: Clear the main-stream memory
Code 14: Copy a memory bank onto the main-stream memory
Code 15: Hydrologic data bank storage functions

In order to perform the hydrologic analysis; base information for the study area is required. This information includes the drainage facility locations and sizes, land uses, flow patterns, drainage basin boundaries, and topographic elevations. Compiled Hydrologic backup is included as Appendix A to this report.

Area

Drainage boundaries were delineated to distinguish areas with similar flow characteristics and hydrologic properties as well as to determine peak flows at confluence points, existing and proposed storm drain facilities, and to facilitate hydraulic analyses. Drainage basin boundaries, flow patterns, and topographic elevations are shown on the hydrologic workmap for the site, included in Appendix B.

Time of Concentration/Intensity

The time of concentration was calculated using AES to determine the intensity for the 100-year storm events. The rainfall intensity was calculated in AES using the 10 and 60-minute intensity values for the project area using NOAA Atlas 14 Point Precipitation Frequency Estimates. An annotated chart has been included in Appendix A.

Runoff Coefficient

The runoff coefficients used for each minor basin were calculated by the AES software based on the user-entered information of the hydrologic soil group and the land use for each basin. The percentage of impervious area (i.e. land use) in each subdrainage area was used to determine the land use entered within AES per Plate D-5.6 of the Hydrology Manual. Supporting information for parameters assigned to AES calculations is included with Appendix A of this report.

Hydrologic soil group data is available for the site through the Natural Resource Conservation Service (NRCS) Web Soil Survey, showing the site consisting of Hydrologic Soil Groups “B” and “D”. For the purpose of hydrologic calculations for the proposed condition, Soil Group D has been applied.

Topography

The onsite project specific topography consists of 1-foot contours on the NAVD-88 vertical datum, provided by Arrowhead Mapping Corp.

2.1 Hydrologic Results

The hydrologic results at key points of interest for the project can be found in Table 2.1. The summary shows the hydrologic results at the proposed on-site catch basin locations (major catch basin locations) and overall on-site peak flow rate at the project outlet point of interest along the easterly edge of the project. The summary table also shows the hydrologic results for the existing westerly offsite area that is expected to be picked up by the proposed on-site perimeter v-ditches and conveyed towards Wilson Avenue.. The detailed hydrologic calculation results are located in Appendix B of this report.

Table 2.1 – On-site Hydrologic Data Summary at Key Locations (10-year & 100-year)

Key Drainage Node ID[3]	Post-project[1]		
	Total Area (Acres)	Peak Flow Rate, Q_{10} (cfs)[2]	Peak Flow Rate, Q_{100} (cfs)[2]
110 (On-site Catch Basin - Surface)	0.4	0.7	1.2
120 (On-site Catch Basin - Surface)	0.6	1.0	1.8
130 (On-site Catch Basin - Surface)	0.6	1.0	1.8
150 (On-site Catch Basin - Surface)	0.4	0.7	1.2
190 (On-site Drainage Outlet at Wilson Ave.)	**4.5**	**7.4**	**13.0**
1010 (Westerly Offsite Drainage – Open Space)	2.3	2.0	4.0
1020 (Offsite Drainage Outlet at Wilson Ave.)	**2.4**	**2.1**	**4.1**
1030 (Westerly Offsite Drainage – Open Space)	2.3	2.0	4.0
1040 (Offsite Drainage Outlet at Wilson Ave.)	**2.4**	**2.1**	**4.1**

Note:

1: Refer to Appendix A for supporting information.

2: “cfs”= cubic feet per second.

3: Refer to Appendix B for Drainage Study Map

3.0 HYDRAULICS

3.1 Hydraulic Methodology and Criteria

The 10-year, 1-hour proposed peak flow rates determined using the Modified Rational Method (AES Rational Method) outputs are used to determine preliminary sizes for the on-site storm drain system.

3.2 Inlet Sizing

Inlet design calculation specific to the proposed surface catch basin will be conducted during final engineering and calculation output will be incorporated in Appendix C. In the post-project condition, the on-site proposed private storm drain catch basins (inlets) will be designed to intercept, at a minimum, the 10-year, 1-hour peak flow rates.

3.3 Storm Drain Sizing

Preliminary storm drain sizing calculations were conducted in order to size the proposed on-site private storm drain pipes. The calculations were prepared using the 10-year, 1-hour peak flow rate output from the AES Rational Method and the Manning's equation along with a sizing bump-up factor (typically in the range of 15 to 30%) in an effort to account for potential hydraulic losses. Typically, this calculation approach is adequate for on-site private storm drain sizing. If necessary, a more detailed hydraulic calculation may be provided on a case-by-case basis during final engineering to validate the required storm drain sizes. A summary of relevant on-site storm drain sizing calculations is provided in Appendix D.

The westerly offsite run-on will be picked up by proposed on-site perimeter ditches and conveyed towards Wilson Avenue. The proposed v-ditches are expected to have 2:1 sides with a minimum of 1-foot depth. Base on the normal depth calculations for the proposed v-ditches within the Rational Method outputs indicate the normal depths are expected to be less than 1 foot.

4.0 FLOOD CONTROL ASSESSMENT

The project is expected to increase the peak flow rate as a result of the proposed improvements. As indicated in Section 1.0 of this report, runoff from the proposed project will be connected into a proposed catch basin on west side of Wilson Avenue and discharged into a storm drain pipe along Wilson that is expected to be constructed as part of an offsite (separate) development. This storm drain is expected to directly discharge into the existing Perris Valley Storm Drain (PVSD) Channel via Master Drainage Plan (MDP) "Line H" in the vicinity of Placentia Avenue. Also, it is understood that the downstream storm drain will have capacity to convey the project's on-site un-detained peak flow rates. Therefore, the Riverside County Flood Control and Water Conservation District's (RCFC&WCD's) increased runoff mitigation criteria should not be applicable and a flood control detention analysis should not be necessary for this project. Additionally, the project is anticipated to be exempt from the hydrologic condition of concern (HCOC) requirements.

5.0 CONCLUSION

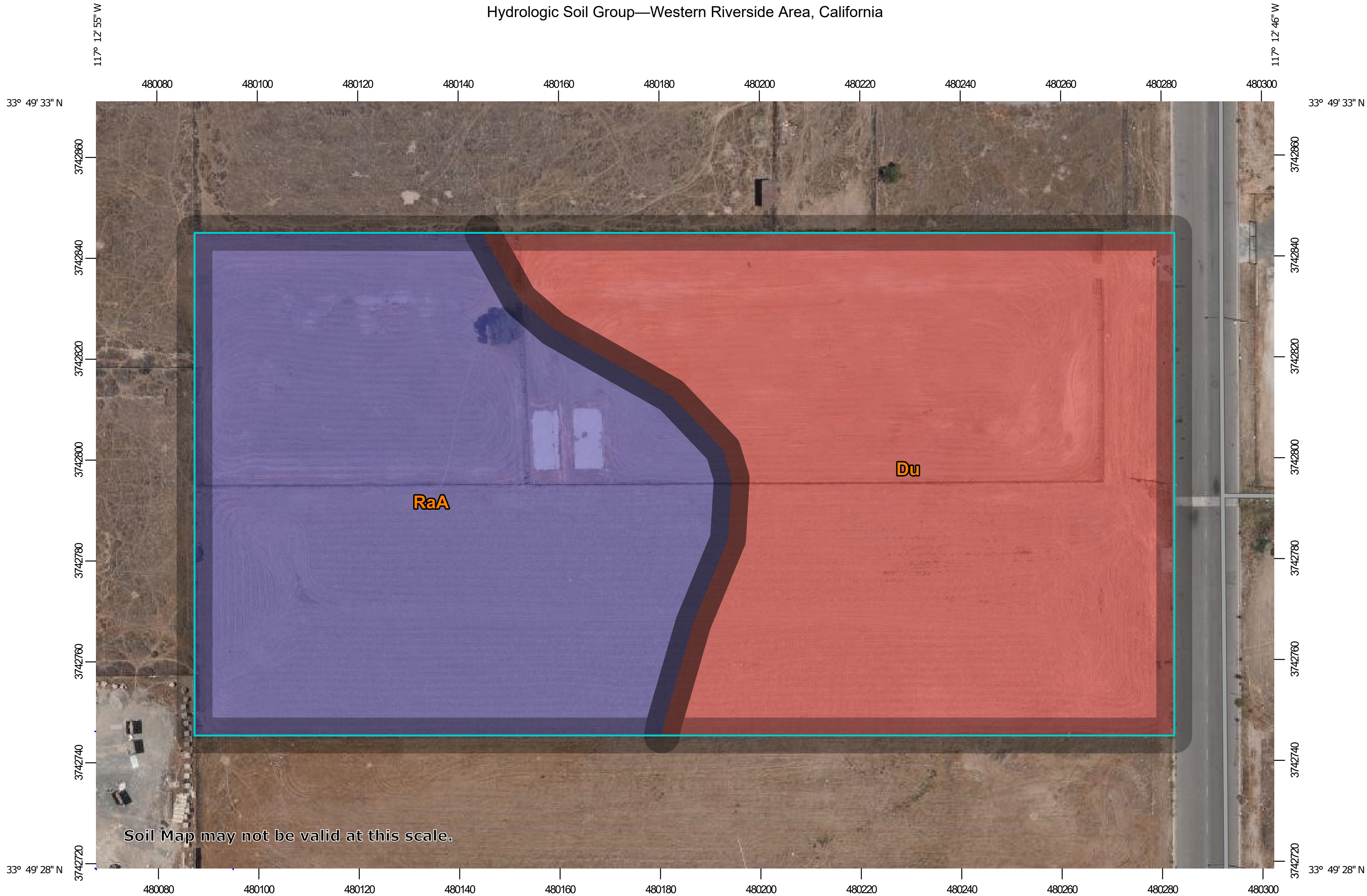
This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed Lake Creek–Wilson project. Hydrologic calculations were computed in accordance with the Riverside County Flood Control and Water Conservation District - Hydrology Manual, dated April 1978 (manual). The Advanced Engineering Software (AES) 2016 Rational Method Analysis (Version 23.0) program was used for the rational method modeling in this study. The peak discharge rates for the 10-year and 100-year storm events with 1-hour storm frequency have been determined for the project. The relevant peak flow rates were used to determine the preliminary onsite storm drain sizes. Runoff from the project will connect into a proposed catch basin on west side of Wilson Avenue and discharge into a storm drain in Wilson Avenue that directly discharge into the MDP Perris Valley Storm Drain Channel (via MDP Line H). It is understood that the downstream storm drain will have adequate capacity to convey the proposed project's un-detained peak flow rates. Therefore, flood control mitigation should not be necessary for this project. The westerly offsite flows are expected to be picked up by proposed on-site perimeter v-ditches and conveyed toward Wilson Avenue, in order to maintain the existing drainage characteristics. In summary, no adverse impacts are anticipated to the downstream drainage facilities as a result of this project.

Appendix A

Hydrologic Backup Information

Includes:

1. Web Soil Survey Hydrologic Soil Group
2. NOAA Atlas 14 Annotated Rainfall Intensity Chart
3. FEMA FIRMette



Map Scale: 1:1,070 if printed on A landscape (11" x 8.5") sheet.

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

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

Date(s) aerial images were photographed: May 25, 2019—Jun 25, 2019

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Du	Domino silt loam	D	2.6	53.1%
RaA	Ramona sandy loam, 0 to 2 percent slopes, MLRA 19	B	2.3	46.9%
Totals for Area of Interest			**4.8**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

SUPPORTING MATERIALS - NOAA ATLAS 14 - INTENSITY
10-YEAR AND 100-YEAR (10-MIN. & 60-MIN.)

NOAA Atlas 14, Volume 6, Version 2
Location name: Perris, California, USA*
Latitude: 33.8251°, Longitude: -117.2141°
Elevation: 1439.54 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**1.06** (0.888-1.28)	**1.48** (1.24-1.79)	**2.06** (1.72-2.50)	**2.56** (2.11-3.13)	**3.28** (2.62-4.15)	**3.86** (3.01-5.00)	**4.49** (3.42-5.98)	**5.17** (3.82-7.08)	**6.17** (4.36-8.81)	**6.98** (4.76-10.3)
10-min	**0.762** (0.636-0.918)	**1.06** (0.888-1.28)	**1.48** (1.23-1.79)	**1.84** (1.51-2.24)	**2.35** (1.87-2.98)	**2.77** (2.16-3.59)	**3.22** (2.45-4.28)	**3.71** (2.74-5.08)	**4.42** (3.12-6.31)	**5.00** (3.41-7.41)
15-min	**0.612** (0.512-0.740)	**0.856** (0.712-1.04)	**1.19** (0.992-1.44)	**1.48** (1.22-1.81)	**1.89** (1.51-2.40)	**2.23** (1.74-2.89)	**2.60** (1.97-3.45)	**2.99** (2.21-4.09)	**3.56** (2.52-5.09)	**4.03** (2.75-5.97)
30-min	**0.496** (0.416-0.600)	**0.692** (0.578-0.838)	**0.964** (0.802-1.17)	**1.20** (0.988-1.47)	**1.53** (1.22-1.94)	**1.81** (1.41-2.34)	**2.10** (1.60-2.79)	**2.42** (1.79-3.32)	**2.88** (2.04-4.12)	**3.27** (2.23-4.84)
60-min	**0.330** (0.276-0.399)	**0.460** (0.384-0.557)	**0.641** (0.533-0.777)	**0.796** (0.657-0.974)	**1.02** (0.812-1.29)	**1.20** (0.937-1.56)	**1.40** (1.06-1.86)	**1.61** (1.19-2.20)	**1.92** (1.36-2.74)	**2.17** (1.48-3.22)
2-hr	**0.249** (0.208-0.300)	**0.333** (0.278-0.403)	**0.446** (0.372-0.542)	**0.542** (0.448-0.664)	**0.676** (0.539-0.856)	**0.782** (0.610-1.01)	**0.894** (0.679-1.19)	**1.01** (0.746-1.38)	**1.18** (0.831-1.68)	**1.31** (0.892-1.94)
3-hr	**0.205** (0.171-0.247)	**0.270** (0.226-0.327)	**0.358** (0.298-0.434)	**0.431** (0.356-0.527)	**0.531** (0.424-0.674)	**0.611** (0.476-0.791)	**0.693** (0.526-0.920)	**0.778** (0.574-1.07)	**0.897** (0.634-1.28)	**0.991** (0.676-1.47)
6-hr	**0.146** (0.122-0.176)	**0.191** (0.159-0.230)	**0.249** (0.208-0.302)	**0.297** (0.245-0.364)	**0.363** (0.290-0.460)	**0.414** (0.323-0.537)	**0.466** (0.354-0.620)	**0.520** (0.384-0.712)	**0.594** (0.420-0.848)	**0.651** (0.444-0.964)
12-hr	**0.096** (0.080-0.116)	**0.126** (0.105-0.153)	**0.166** (0.138-0.202)	**0.198** (0.164-0.243)	**0.242** (0.193-0.307)	**0.276** (0.215-0.357)	**0.310** (0.235-0.411)	**0.345** (0.254-0.471)	**0.392** (0.277-0.560)	**0.428** (0.292-0.634)
24-hr	**0.063** (0.055-0.072)	**0.084** (0.074-0.097)	**0.112** (0.099-0.130)	**0.135** (0.118-0.157)	**0.165** (0.140-0.199)	**0.189** (0.157-0.232)	**0.213** (0.172-0.268)	**0.237** (0.187-0.307)	**0.270** (0.205-0.364)	**0.296** (0.216-0.412)
2-day	**0.036** (0.032-0.041)	**0.049** (0.043-0.057)	**0.066** (0.058-0.077)	**0.081** (0.071-0.094)	**0.100** (0.085-0.121)	**0.115** (0.096-0.142)	**0.131** (0.106-0.165)	**0.147** (0.116-0.190)	**0.169** (0.128-0.228)	**0.187** (0.137-0.260)
3-day	**0.025** (0.022-0.029)	**0.035** (0.031-0.040)	**0.048** (0.042-0.056)	**0.059** (0.051-0.068)	**0.074** (0.062-0.089)	**0.085** (0.071-0.105)	**0.097** (0.079-0.123)	**0.110** (0.087-0.142)	**0.128** (0.097-0.172)	**0.141** (0.104-0.197)
4-day	**0.020** (0.018-0.023)	**0.028** (0.025-0.033)	**0.039** (0.034-0.045)	**0.048** (0.042-0.056)	**0.061** (0.051-0.073)	**0.070** (0.058-0.087)	**0.081** (0.065-0.102)	**0.091** (0.072-0.118)	**0.106** (0.081-0.143)	**0.118** (0.087-0.165)
7-day	**0.012** (0.011-0.014)	**0.018** (0.016-0.020)	**0.025** (0.022-0.029)	**0.030** (0.027-0.036)	**0.039** (0.033-0.047)	**0.045** (0.037-0.055)	**0.052** (0.042-0.065)	**0.059** (0.046-0.076)	**0.069** (0.052-0.093)	**0.077** (0.056-0.107)
10-day	**0.009** (0.008-0.010)	**0.013** (0.011-0.015)	**0.018** (0.016-0.021)	**0.022** (0.020-0.026)	**0.028** (0.024-0.034)	**0.033** (0.028-0.041)	**0.038** (0.031-0.048)	**0.044** (0.035-0.057)	**0.051** (0.039-0.069)	**0.057** (0.042-0.080)
20-day	**0.005** (0.005-0.006)	**0.007** (0.007-0.009)	**0.011** (0.009-0.012)	**0.013** (0.012-0.016)	**0.017** (0.015-0.021)	**0.020** (0.017-0.025)	**0.024** (0.019-0.030)	**0.027** (0.022-0.035)	**0.033** (0.025-0.044)	**0.037** (0.027-0.051)
30-day	**0.004** (0.003-0.004)	**0.006** (0.005-0.006)	**0.008** (0.007-0.009)	**0.010** (0.009-0.012)	**0.013** (0.011-0.016)	**0.016** (0.013-0.019)	**0.019** (0.015-0.023)	**0.022** (0.017-0.028)	**0.026** (0.020-0.035)	**0.029** (0.022-0.041)
45-day	**0.003** (0.003-0.003)	**0.004** (0.004-0.005)	**0.006** (0.005-0.007)	**0.008** (0.007-0.009)	**0.010** (0.009-0.012)	**0.012** (0.010-0.015)	**0.015** (0.012-0.018)	**0.017** (0.014-0.022)	**0.021** (0.016-0.028)	**0.024** (0.018-0.033)
60-day	**0.003** (0.002-0.003)	**0.004** (0.003-0.004)	**0.005** (0.004-0.006)	**0.006** (0.006-0.008)	**0.009** (0.007-0.010)	**0.010** (0.009-0.013)	**0.012** (0.010-0.016)	**0.015** (0.012-0.019)	**0.018** (0.014-0.024)	**0.021** (0.015-0.029)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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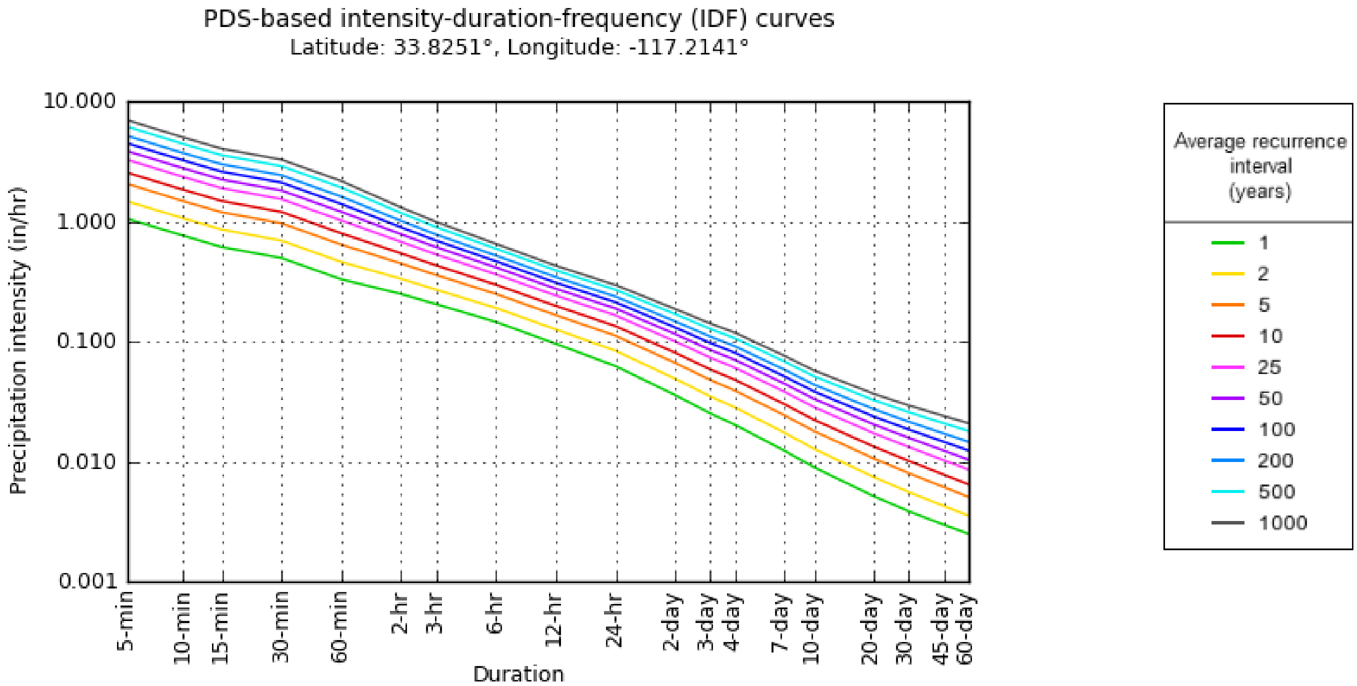
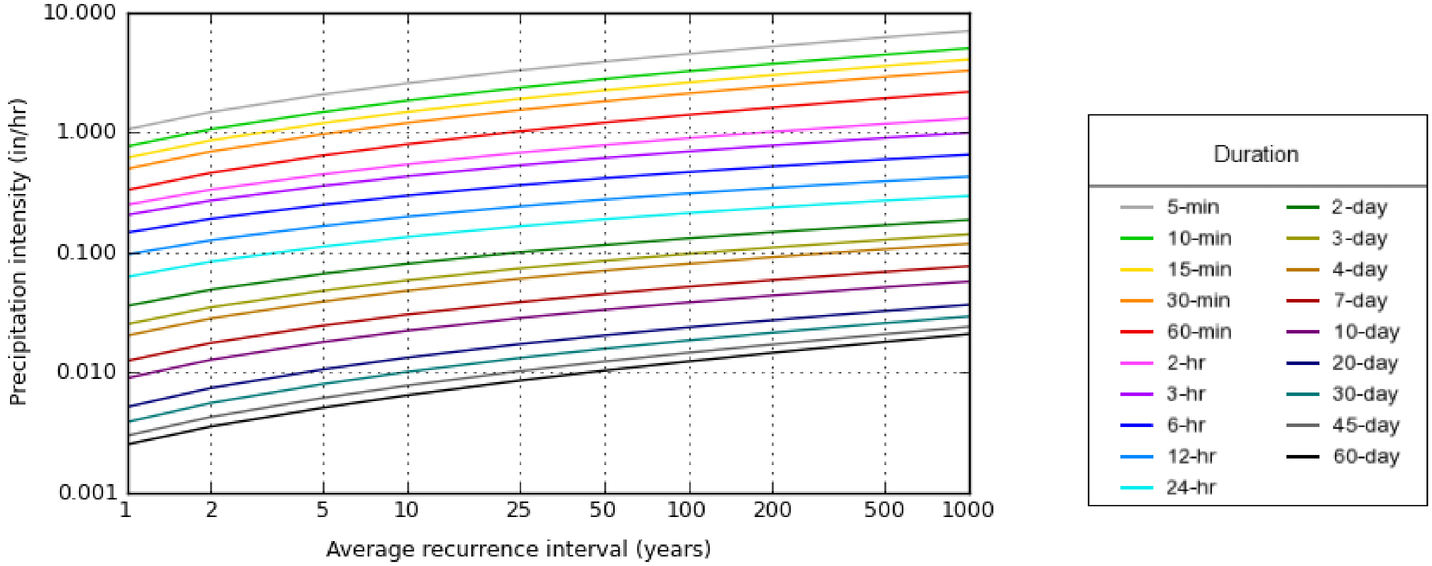
PF graphical





NOAA Atlas 14, Volume 6, Version 2 Created (GMT): Tue Feb 22 22:12:59 2022

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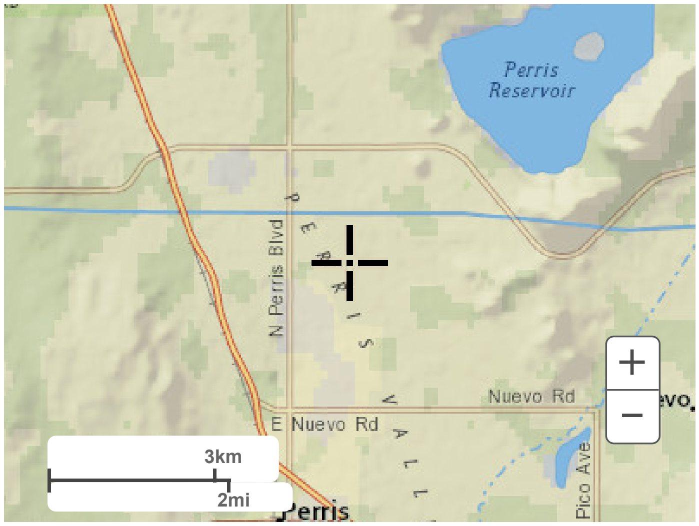
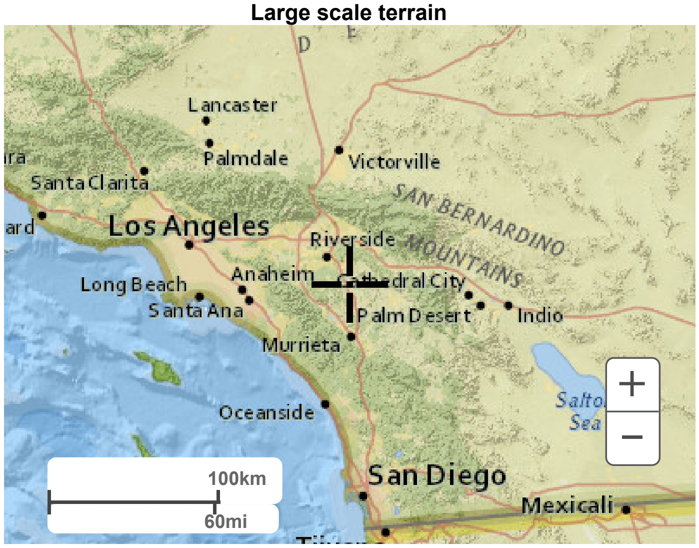
Maps & aerials

Small scale terrain

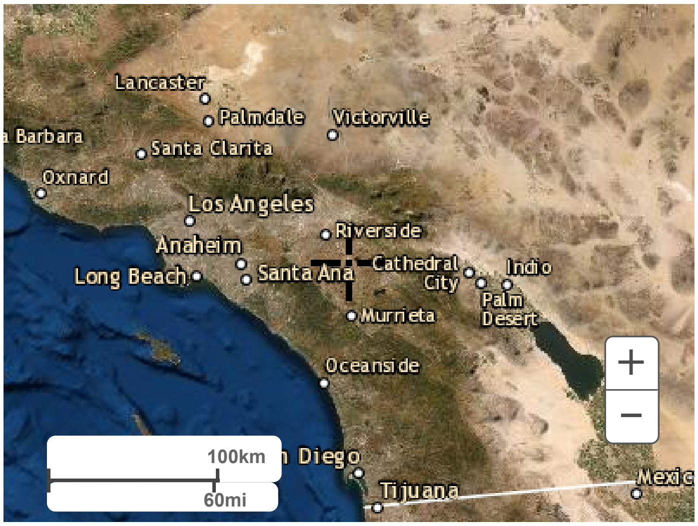


Large scale terrain



Large scale map

Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

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 (BFEs) 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 State Plane 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, Maryland 20910-3282
(301) 713-3242

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 multiple sources including the Riverside County, CA effective database, and the National Geodetic Survey. Base map imagery for Riverside County, CA is a mosaic of the NAIP 2009 images, 1 meter resolution.

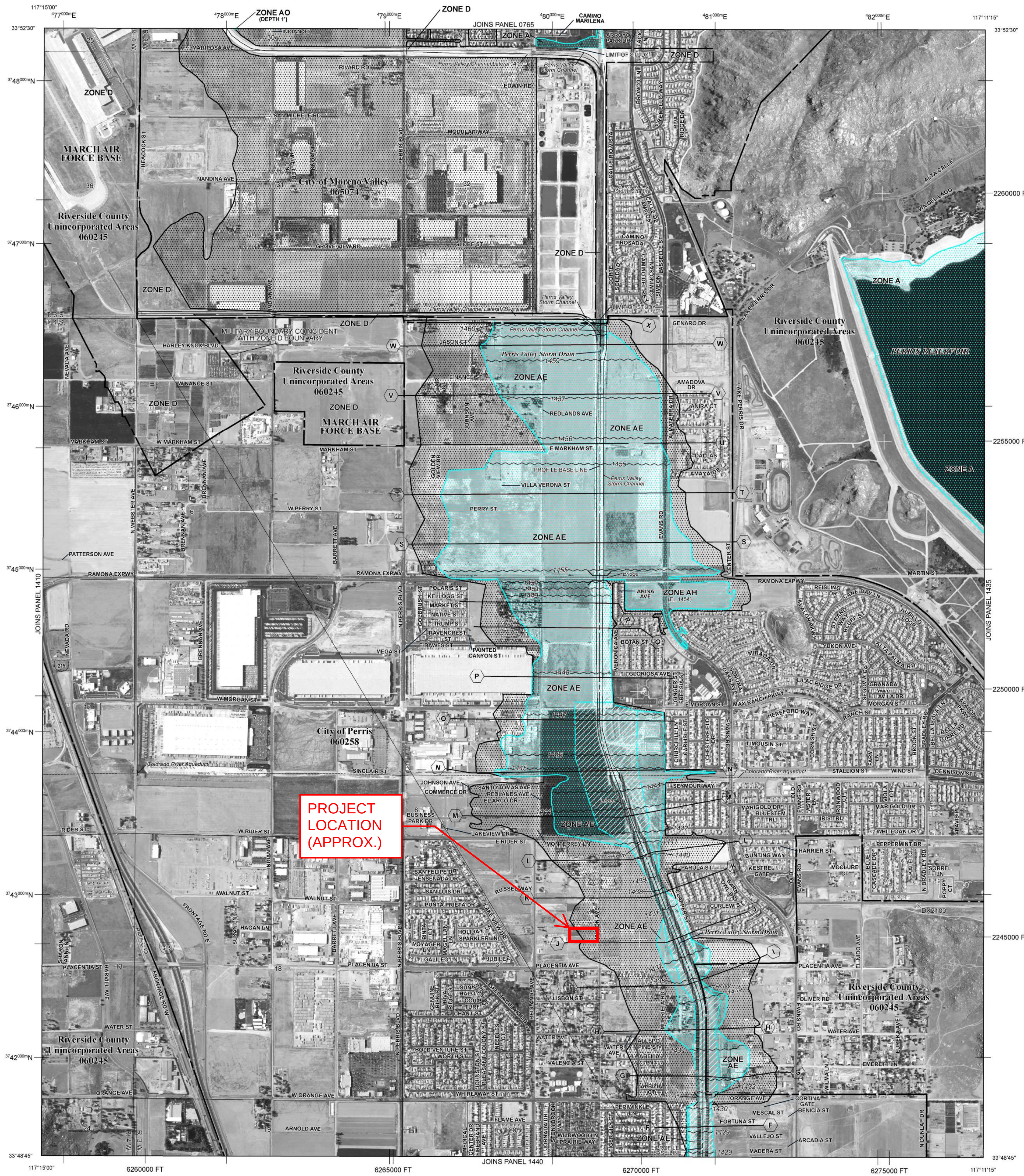
The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

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.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

NOTE:
THE PROJECT IS SITUATED WITHIN FEMA ZONE X; THEREFORE, NO PROCESSING SHOULD BE REQUIRED THROUGH FEMA.



LEGEND

SPECIAL FLOOD HAZARD AREAS 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 equaled 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	Areas to be protected from 1% annual chance flood event 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 Area Zones and 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

(A)———(A)	Cross section line
(23)- - - -(23)	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4275000mE	1000-meter Universal Transverse Mercator grid ticks, zone 11
6000000 FT	5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
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
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 18, 2014: for a description of revisions, see Notice to Users page in the Flood Insurance Study report.

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" = 1000'

500 0 500 1,000 1,500 2,000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1430H

FIRM

FLOOD INSURANCE RATE MAP
RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1430 OF 3805

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MORENO VALLEY, CITY OF	065074	1430	H
PERRIS, CITY OF	060258	1430	H
RIVERSIDE COUNTY UNINCORPORATED AREAS	060245	1430	H

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 06065C1430H

MAP REVISED AUGUST 18, 2014

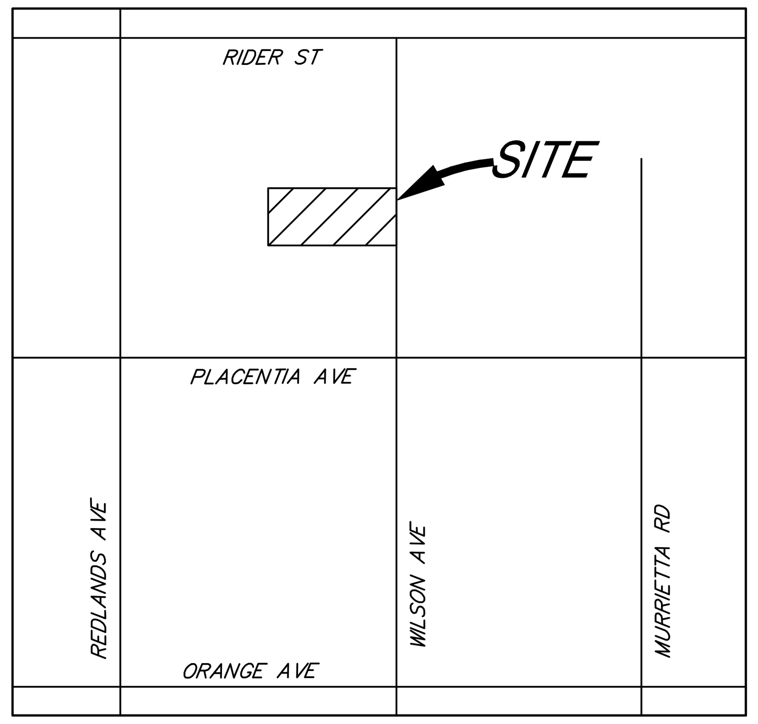
Federal Emergency Management Agency

Appendix B

Modified Rational Method Results

Includes:

1. Post-project Drainage Study Map
2. Post-project AES Rational Method Output (10-year & 100-year)



VICINITY MAP
NOT TO SCALE

GENERAL NOTES

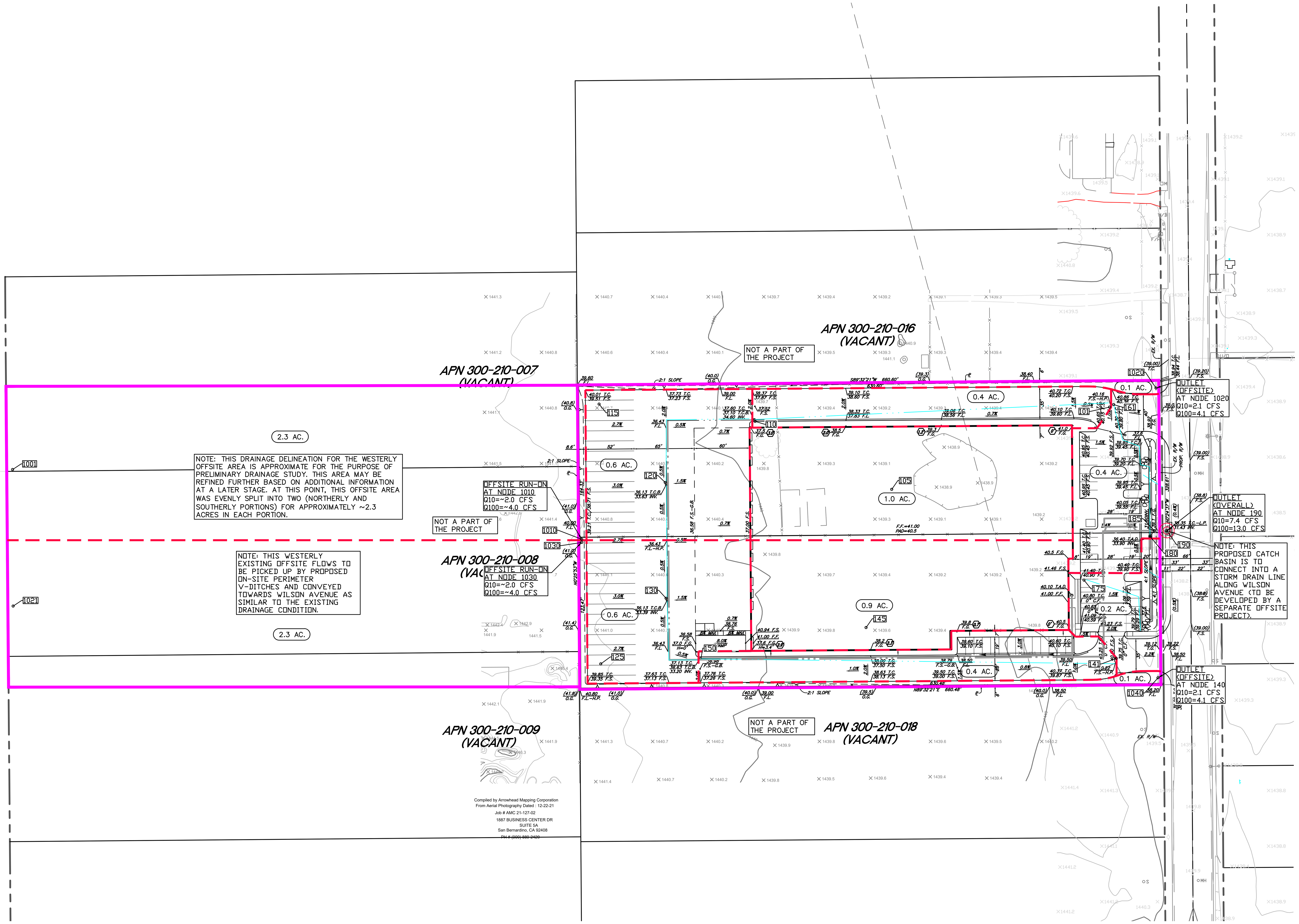
1. THE EXISTING SITE CONSISTS OF OPEN, UNDEVELOPED SPACE, DRAINING GENERALLY FROM WEST TO EAST TOWARDS WILSON AVENUE. THERE IS AN OFFSITE RUN-ON TO THE SITE FROM WESTERLY UNDEVELOPED LAND. RUNOFF FROM THE PROJECT RUNOFF FROM WILSON AVENUE IS CONVEYED IN A SOUTHEASTERLY DIRECTION AND EVENTUALLY DISCHARE INTO THE EXISTING MASTER DRAINAGE PLAN (MDP) PERRIS VALLEY STORM DRAIN CHANNEL, WHICH ULTIMATELY DISCHAGES INTO CANYON LAKE AND THEN LAKE ELSINORE.
2. THE POST-PROJECT DRAINAGE CHARACTERISTICS WILL BE MAINTAINED SIMILAR AS COMPARED TO THE PRE-PROJECT CONDITION. RUNOFF FROM THE SITE WILL BE CAPTURED VIA PROPOSED CATCH BASINS AND CONVEYED VIA PROPOSED STORM DRAIN PIPES TOWARDS A PROPOSED BIOTREATMENT LID BMP AND A PROPRIETARY MODULAR WETLAND SYSTEM (MWS) FOR TREATMENT PURPOSE PRIOR TO OUTLET INTO A PROPOSED CATCH BASIN IN WEST SIDE OF WILSON AVENUE. IT IS UNDERSTOOD THAT AN OFFSITE DEVELOPMENT WILL CONSTRUCT A SEGMENT OF THE MDP LINE H ALONG PLACENTIA AVENUE (BETWEEN MURRIETA AVENUE AND WILSON AVENUE) AND A LATERAL STORM DRAIN PIPE ALONG WILSON AVENUE FROM THE INTERSECTION OF WILSON/PLACENTIA UP TO THIS PROJECT LOCATION. THE AFOREMENTIONED CATCH BASIN WILL CONNECT INTO THIS STORM DRAIN LINE. THE WESTERLY OFFSITE AREA WILL BE BYPASSED AROUND THE PROJECT VIA A STORM DRAIN DITCH AND OUTLET TO WILSON AVENUE.
3. IN AN EFFORT TO MAINTAIN THE EXISTING DRAINAGE CHARACTERISTICS, THE WESTERLY OFFSITE AREA WILL BE PICKED UP BY PROPOSED ON-SITE PERIMETER V-DITCHES AND CONVEYED TOWARDS WILSON AVENUE IN THE POST-PROJECT CONDITION.
4. SINCE RUNOFF FROM THE PROJECT IS ANTICIPATED TO CONNECT INTO A STORM DRAIN PIPE THAT DISCHARGE DIRECTLY INTO THE EXISTING MDP PERRIS VALLEY STORM DRAIN CHANNEL FURTHER DOWNSTREAM, THE RCFC&WCD'S INCREASED RUNOFF MITIGATION CRITERIA SHOULD NOT BE REQUIRED FOR THIS PROJECT.
5. BASED ON THE WEB SOIL SURVEY (ONLINE RESOURCE), THE PROJECT PREDOMINANTLY CONSISTS OF HYDROLOGIC SOIL GROUPS B AND D. FOR THE PURPOSE OF THE HYDROLOGIC ANALYSIS, SOIL GROUP DWAS UTILIZED FOR PERVIOUS AREAS. BASED ON THE SITE-SPECIFIC INFILTRATION TESTING BY THE GEOTECHNICAL ENGINEER, THE FIELD INFILTRATION RATE OF 1.0 INCH/HOUR WAS RECOMMENDED FOR THE PROPOSED BMP DESIGN. FOR STORM WATER QUALITY MANAGEMENT, PLEASE REFER TO A SEPARATE TECHNICAL DOCUMENT TITLED, "WATER QUALITY MANAGEMENT PLAN (WQMP) FOR LAKE CREEK-WILSON."
6. THE PROJECT IS SITUATED WITHIN THE FEMA ZONE X; THEREFORE, PROCESSING THROUGH FEMA IS NOT EXPECTED TO BE REQUIRED FOR THIS PROJECT.

HYDROLOGIC SUMMARY

POST-PROJECT: OUTLET AT NODE 190

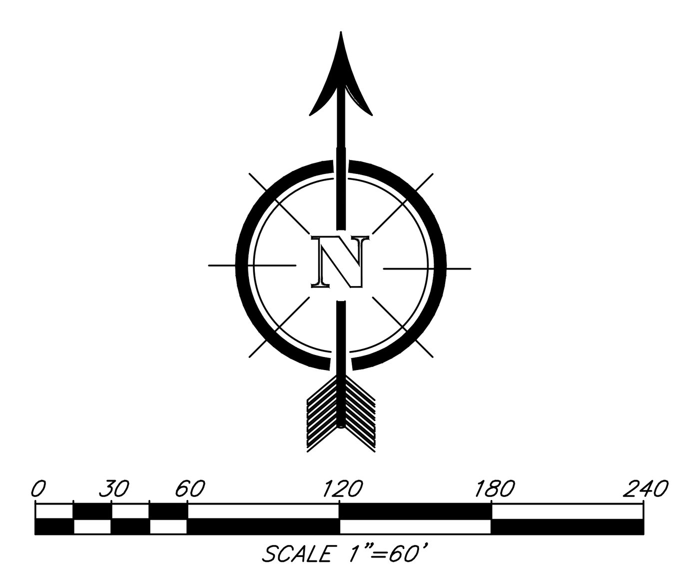
- AREA=4.5 ACRES
- PROPOSED LAND USE: LIGHT INDUSTRIAL
- % IMPERVIOUS=~93% / % PERVIOUS=~7%
- Q10=~7.4 CFS; TC=13.2 MIN.
- Q100=~13.0 CFS; TC=12.8 MIN.

NOTE: THIS IS A RE-DEVELOPMENT PROJECT AND THE POST-PROJECT DRAINAGE CHARACTERISTICS WILL BE MAINTAINED AS SIMILAR TO THE PRE-PROJECT CONDITION. AS INDICATED ABOVE, RUNOFF FROM THE PROPOSED PROJECT WILL CONNECT INTO A STORM DRAIN LINE IN WILSON AVENUE THAT IS EXPECTED TO DIRECTLY DISCHARGE INTO THE EXISTING PERRIS VALLEY STORM DRAIN CHANNEL (THROUGH MDP LINE H). IT IS UNDERSTOOD THAT THE AFOREMENTIONED STORM DRAIN LINE IN WILSON WILL BE CONSTRUCTED AS PART OF AN OFFSITE DEVELOPMENT DOWNSTREAM. THEREFORE, A FLOOD CONTROL MITIGATION INCLUDING THE RCFC&WCD'S INCREASED RUNOFF MITIGATION SHOULD NOT BE REQUIRED FOR THIS PROJECT.



LEGEND

TRACT BOUNDARY	
MAJOR DRAINAGE BOUNDARY	
SUB BASIN BOUNDARY	
DRAINAGE FLOW PATH	
DRAINAGE ACREAGE	X.XX AC.
BASIN NODE ID	XXX
POINT OF INTEREST (OUTLET)	
PROPOSED STORM DRAIN	



DRAINAGE STUDY MAP
FOR
LAKE CREEK-WILSON
(POST-PROJECT)
CITY CASE #: TBD

JN 2130 REVISED: 2/25/2022

NOT FOR CONSTRUCTION — EXHIBIT FOR DRAINAGE STUDY ONLY

```
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
          RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                        (RCFC&WCD)  1978 HYDROLOGY MANUAL
           (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                        (Rational Tabling Version 23.0)
                    Release Date: 07/01/2016  License ID 1717

                           Analysis prepared by:

                           SDH & ASSOCIATES, INC.
                            27363 VIA INDUSTRIA
                             TEMECULA, CA 92590
                               (951) 683-3691

 ************************** DESCRIPTION OF STUDY **************************
* LAKE CREEK-WILSON (JN 2130)                                              *
* POST-PROJECT CONDITION: 10-YEAR, 1-HOUR STORM EVENT                      *
* 2/25/2022                                                                *
 **************************************************************************

  FILE NAME: LCW1HP10.RAT
  TIME/DATE OF STUDY: 14:48 02/23/2022
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.840
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.796
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.220
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.400
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4676529
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4648553
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.804
  SLOPE OF INTENSITY DURATION CURVE = 0.4677
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    110.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   385.00
  UPSTREAM ELEVATION(FEET) =     40.20
  DOWNSTREAM ELEVATION(FEET) =     37.10
  ELEVATION DIFFERENCE(FEET) =      3.10
  TC = 0.303*[(  385.00**3)/(     3.10)]**.2 =    8.602
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.994
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8836
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.70
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      0.70

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.994
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8836
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    1.76
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       2.47
  TC(MIN.) =    8.60

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.60  DOWNSTREAM(FEET) =    33.63
  FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.16
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.47
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =    9.24
```

```
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =     543.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.929
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8831
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.02
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       3.49
  TC(MIN.) =    9.24

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.63  DOWNSTREAM(FEET) =    33.39
  FLOW LENGTH(FEET) =   121.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.96
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.49
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =    9.92
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =     664.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.866
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8827
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    0.99
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       4.48
  TC(MIN.) =    9.92

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.39  DOWNSTREAM(FEET) =    33.20
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.7 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.10
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.48
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   10.43
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    150.00 =     759.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.43
  RAINFALL INTENSITY(INCH/HR) =   1.82
  TOTAL STREAM AREA(ACRES) =     2.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.48

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    150.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   448.00
  UPSTREAM ELEVATION(FEET) =     40.20
  DOWNSTREAM ELEVATION(FEET) =     36.60
  ELEVATION DIFFERENCE(FEET) =      3.60
  TC = 0.303*[(  448.00**3)/(     3.60)]**.2 =    9.143
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.938
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8832
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.68
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      0.68

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.938
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8832
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    1.54
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       2.23
  TC(MIN.) =    9.14

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

```
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.14
 RAINFALL INTENSITY(INCH/HR) =   1.94
 TOTAL STREAM AREA(ACRES) =     1.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.23

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        4.48    10.43        1.822          2.60
     2        2.23     9.14        1.938          1.30

 *********************************WARNING**********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        6.15     9.14       1.938
     2        6.57    10.43       1.822

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.57   Tc(MIN.) =   10.43
 TOTAL AREA(ACRES) =        3.9
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    150.00 =     759.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    185.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    33.20  DOWNSTREAM(FEET) =    31.60
 FLOW LENGTH(FEET) =   625.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.85
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.57
```

```
  PIPE TRAVEL TIME(MIN.) =   2.71    Tc(MIN.) =   13.14
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    185.00 =    1384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.14
  RAINFALL INTENSITY(INCH/HR) =   1.64
  TOTAL STREAM AREA(ACRES) =     3.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.57

****************************************************************************
  FLOW PROCESS FROM NODE    161.00 TO NODE    180.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   155.00
  UPSTREAM ELEVATION(FEET) =     40.30
  DOWNSTREAM ELEVATION(FEET) =     36.40
  ELEVATION DIFFERENCE(FEET) =      3.90
  TC = 0.303*[(  155.00**3)/(     3.90)]**.2 =    4.760
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.570
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8867
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.91
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      0.91

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    180.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.570
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8867
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.46
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       1.37
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    185.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.90  DOWNSTREAM(FEET) =    31.60
  FLOW LENGTH(FEET) =     6.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.93
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.37
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    5.01
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    185.00 =     161.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.01
  RAINFALL INTENSITY(INCH/HR) =   2.57
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.37

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1         6.57    13.14        1.636          3.90
     2         1.37     5.01        2.568          0.60

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc     INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1         3.87     5.01       2.568
     2         7.44    13.14       1.636

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        7.44    Tc(MIN.) =   13.14
  TOTAL AREA(ACRES) =         4.5
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    185.00 =    1384.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    190.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.60  DOWNSTREAM(FEET) =    31.43
  FLOW LENGTH(FEET) =    14.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.06
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        7.44
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.17
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    190.00 =    1398.00 FEET.

+--------------------------------------------------------------------------+
| BELOW ARE RM OUTPUT FOR WESTERLY OFFSITE AREA                            |
| OFFSITE DRAINAGE NODES:                                                  |
| 1001 THRU 1020 & 1021 THRU 1040                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1010.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   620.00
  UPSTREAM ELEVATION(FEET) =     43.60
  DOWNSTREAM ELEVATION(FEET) =     41.00
  ELEVATION DIFFERENCE(FEET) =      2.60
  TC = 0.533*[(  620.00**3)/(     2.60)]**.2 =   20.837
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.318
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6731
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      2.04
  TOTAL AREA(ACRES) =      2.30   TOTAL RUNOFF(CFS) =      2.04

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1020.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     41.00  DOWNSTREAM(FEET) =     39.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   785.00   CHANNEL SLOPE =  0.0025
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
```

```
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.176
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6532
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.08
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.27
  AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =   5.75
  Tc(MIN.) =   26.59
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.08
  TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =      2.12

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) =   2.26
  LONGEST FLOWPATH FROM NODE   1001.00 TO NODE   1020.00 =    1405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1030.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   620.00
  UPSTREAM ELEVATION(FEET) =     43.60
  DOWNSTREAM ELEVATION(FEET) =     41.00
  ELEVATION DIFFERENCE(FEET) =      2.60
  TC = 0.533*[(  620.00**3)/(     2.60)]**.2 =   20.837
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.318
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6731
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      2.04
  TOTAL AREA(ACRES) =      2.30   TOTAL RUNOFF(CFS) =      2.04

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1040.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     41.00  DOWNSTREAM(FEET) =     39.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   780.00   CHANNEL SLOPE =  0.0026
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.177
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6533
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.08
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.27
  AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =   5.72
```

```
  Tc(MIN.) =   26.55
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.08
  TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =       2.12

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) =   2.28
  LONGEST FLOWPATH FROM NODE   1021.00 TO NODE   1040.00 =    1400.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.4  TC(MIN.) =     26.55
  PEAK FLOW RATE(CFS)   =       2.12
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
         RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                       (RCFC&WCD)  1978 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                       (Rational Tabling Version 23.0)
                    Release Date: 07/01/2016  License ID 1717

                           Analysis prepared by:

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                               (951) 683-3691

 ************************** DESCRIPTION OF STUDY **************************
* LAKE CREEK-WILSON (JN 2130)                                              *
* POST-PROJECT CONDITION: 100-YEAR, 1-HOUR STORM EVENT                     *
* 2/25/2022                                                                *
 **************************************************************************

  FILE NAME: LCW1HP00.RAT
  TIME/DATE OF STUDY: 14:16 02/23/2022
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.840
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.796
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.220
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.400
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4676529
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4648553
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.400
  SLOPE OF INTENSITY DURATION CURVE = 0.4649
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    110.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   385.00
  UPSTREAM ELEVATION(FEET) =     40.20
  DOWNSTREAM ELEVATION(FEET) =     37.10
  ELEVATION DIFFERENCE(FEET) =      3.10
  TC = 0.303*[(  385.00**3)/(     3.10)]**.2 =    8.602
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.454
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8897
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.23
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.23

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.454
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8897
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    3.07
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       4.30
  TC(MIN.) =    8.60

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.60  DOWNSTREAM(FEET) =    33.63
  FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.81
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.30
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =    9.15
```

```
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =     543.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.356
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8895
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.79
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       6.09
  TC(MIN.) =    9.15

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.63  DOWNSTREAM(FEET) =    33.39
  FLOW LENGTH(FEET) =   121.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.10
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.09
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =    9.80
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =     664.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.250
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8892
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.73
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       7.83
  TC(MIN.) =    9.80

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.39  DOWNSTREAM(FEET) =    33.20
```

```
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.11
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.83
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   10.31
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    150.00 =     759.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.31
  RAINFALL INTENSITY(INCH/HR) =   3.17
  TOTAL STREAM AREA(ACRES) =     2.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.83

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    150.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   448.00
  UPSTREAM ELEVATION(FEET) =     40.20
  DOWNSTREAM ELEVATION(FEET) =     36.60
  ELEVATION DIFFERENCE(FEET) =      3.60
  TC = 0.303*[(  448.00**3)/(     3.60)]**.2 =    9.143
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.357
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8895
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.19
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.19

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.357
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8895
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.69
```

```
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       3.88
  TC(MIN.) =    9.14

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.14
  RAINFALL INTENSITY(INCH/HR) =   3.36
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.88

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.83    10.31        3.175         2.60
      2        3.88     9.14        3.357         1.30

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       10.82     9.14       3.357
      2       11.50    10.31       3.175

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.50   Tc(MIN.) =   10.31
  TOTAL AREA(ACRES) =        3.9
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    150.00 =     759.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    185.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.20  DOWNSTREAM(FEET) =    31.60
  FLOW LENGTH(FEET) =   625.00   MANNING'S N =  0.012
```

```
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.26
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.50
  PIPE TRAVEL TIME(MIN.) =   2.44    Tc(MIN.) =   12.75
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    185.00 =    1384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.75
  RAINFALL INTENSITY(INCH/HR) =   2.88
  TOTAL STREAM AREA(ACRES) =     3.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.50

****************************************************************************
  FLOW PROCESS FROM NODE    161.00 TO NODE    180.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   155.00
  UPSTREAM ELEVATION(FEET) =     40.30
  DOWNSTREAM ELEVATION(FEET) =     36.40
  ELEVATION DIFFERENCE(FEET) =      3.90
  TC = 0.303*[(  155.00**3)/(     3.90)]**.2 =    4.760
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.444
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8918
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.59
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.59

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    180.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.444
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8918
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.79
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.38
  TC(MIN.) =    5.00
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    185.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.90  DOWNSTREAM(FEET) =    31.60
  FLOW LENGTH(FEET) =     6.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.73
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.38
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    5.01
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    185.00 =     161.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.01
  RAINFALL INTENSITY(INCH/HR) =   4.44
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.38

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       11.50    12.75        2.876          3.90
     2        2.38     5.01        4.442          0.60

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        6.89     5.01       4.442
     2       13.04    12.75       2.876
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       13.04    Tc(MIN.) =   12.75
  TOTAL AREA(ACRES) =         4.5
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    185.00 =    1384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    190.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.60  DOWNSTREAM(FEET) =    31.43
  FLOW LENGTH(FEET) =    14.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.19
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.04
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   12.78
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    190.00 =    1398.00 FEET.

+--------------------------------------------------------------------------+
| BELOW ARE RM OUTPUT FOR WESTERLY OFFSITE AREA                            |
| OFFSITE DRAINAGE NODES:                                                  |
| 1001 THRU 1020 & 1021 THRU 1040                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1010.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   620.00
  UPSTREAM ELEVATION(FEET) =     43.60
  DOWNSTREAM ELEVATION(FEET) =     41.00
  ELEVATION DIFFERENCE(FEET) =      2.60
  TC = 0.533*[(  620.00**3)/(     2.60)]**.2 =   20.837
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.289
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7537
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      3.97
  TOTAL AREA(ACRES) =      2.30   TOTAL RUNOFF(CFS) =      3.97

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1020.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     41.00  DOWNSTREAM(FEET) =     39.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   785.00   CHANNEL SLOPE =  0.0025
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.074
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7412
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.66
  AVERAGE FLOW DEPTH(FEET) =   0.87   TRAVEL TIME(MIN.) =   4.93
  Tc(MIN.) =   25.76
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.15
  TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =      4.12

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.87   FLOW VELOCITY(FEET/SEC.) =   2.69
  LONGEST FLOWPATH FROM NODE   1001.00 TO NODE   1020.00 =    1405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1030.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   620.00
  UPSTREAM ELEVATION(FEET) =     43.60
  DOWNSTREAM ELEVATION(FEET) =     41.00
  ELEVATION DIFFERENCE(FEET) =      2.60
  TC = 0.533*[(  620.00**3)/(     2.60)]**.2 =   20.837
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.289
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7537
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      3.97
  TOTAL AREA(ACRES) =      2.30   TOTAL RUNOFF(CFS) =      3.97

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1040.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     41.00  DOWNSTREAM(FEET) =     39.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   780.00   CHANNEL SLOPE =  0.0026
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.075
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7412
```

```
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.66
  AVERAGE FLOW DEPTH(FEET) =   0.87   TRAVEL TIME(MIN.) =   4.89
  Tc(MIN.) =   25.73
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.15
  TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =       4.12

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.87   FLOW VELOCITY(FEET/SEC.) =   2.69
  LONGEST FLOWPATH FROM NODE   1021.00 TO NODE   1040.00 =    1400.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.4  TC(MIN.) =     25.73
  PEAK FLOW RATE(CFS)   =       4.12
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix C

Preliminary Inlet Sizing

Note: Detailed onsite inlet calculations will be conducted during final engineering at the time of the final drainage study and will be incorporated in this Appendix.

Appendix D

Preliminary Storm Drain Sizing

Includes:

1. On-site preliminary storm drain sizing

Preliminary Storm Drain Size

The purpose of this table is to provide an estimated preliminary pipe sizes to convey the anticipated 10-year peak flow rates with a preliminary sizing bump-up factor to account for potential head losses through the pipe.

Manning's n: 0.012 HDPE or equivalent

Preliminary Sizing Bump-up (%): 30

		Slope at:	Preliminary Sizes per Varying Slopes 0.2%		0.5%		1.0%		
Node ID's:	**Q_{10} (cfs[1])**	**Q_{100} with Sizing Factor (cfs[1])**	**Minimum Pipe Size[2] (feet)**	**Suggested Pipe Size (inches)**	**Minimum Pipe Size[2] (feet)**	**Suggested Pipe Size (inches)**	**Minimum Pipe Size [2] (feet)**	**Suggested Pipe Size (inches)**	**PRELIMINARY RECOMMENDATIONS[3]**
110 - 120	2.5	3.3	1.27	18"	1.07	18"	0.94	12"	**Use 18" HDPE @ 0.2%**
120 - 130	3.5	4.6	1.44	18"	1.21	18"	1.06	18"	**Use 18" HDPEs @ 0.2%**
130 - 150	4.5	5.9	1.58	24"	1.33	18"	1.17	18"	**Use 18" HDPEs @ 0.2%**
150 - 185	6.6	8.6	1.82	24"	1.53	24"	1.35	18"	**Use 24" HDPE @ 0.2%**
180 - 185	1.4	1.8	1.02	18"	0.86	12"	0.75	10"	**Use 18" HDPE @ 0.2%**
185 - 190	7.4	9.6	1.90	24"	1.60	24"	1.41	18"	**Use 24" HDPE @ 0.2%**

March 1, 2022

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Lake Creek Industrial, LLC
1320 Brittany Cross Road
Santa Ana, California 92705

Attention: Mr. Jake Swan
Director

Project No.: **22G102-2**

Subject: **Results of Infiltration Testing**
Proposed Warehouse
Wilson Avenue, North of Placentia Avenue
Perris, California

Reference: Geotechnical Investigation, Proposed Warehouse, Wilson Avenue, North of Placentia Avenue, Perris, California, prepared for Lake Creek Industrial, LLC, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 22G102-1, dated February 21, 2022.

Mr. Swan:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 21P515, dated December 21, 2021. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the on-site soils. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

The subject site is located on the west side of Wilson Avenue, 620± feet north of the intersection of Placentia Avenue and Wilson Avenue in Perris, California. The site is bounded to the north by a single-family residence, to the west and south by vacant lots, and to the east by Wilson Avenue. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1.

The subject site consists of two rectangular-shaped parcels which total 4.93± acres in size. The site is currently vacant and undeveloped. The ground surface cover consists of exposed soil with sparse to moderate native grass and weed growth. There are two rectangular concrete slabs near the center of the two lots, and localized areas of minor scattered debris and trash.

Detailed topographic information was not available at the time of this report. However, based on topographic information obtained from the USGS topo map, the site is at approximately 1460± feet mean sea level (msl). The overall site is relatively flat with a slight slope to the west at an estimated gradient of less than 1± percent.

Proposed Development

Based on a preliminary site plan (A1-1PA) provided to SCG prepared by RGA, the site will be developed with one (1) warehouse. The building will be 85,322± ft² in size and will be located in the east-central area of the site. The building will be constructed with dock-high doors along a portion of the west building wall. The building is anticipated to be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, and concrete flatwork with limited areas of landscape planters throughout.

The proposed development will include on-site storm water infiltration. Based on conversations with the project civil engineer, we understand that the infiltration system will consist a below-grade chamber system located in the western area of the site. The bottom of the infiltration system will be 10± feet below the existing site grades.

Concurrent Study

SCG concurrently conducted a geotechnical investigation at the subject site, which is referenced above. As part of this study, four (4) borings were advanced to depths of 20 to 50± feet below existing site grades.

Native alluvial soils were encountered at the ground surface at all of the boring locations. The near surface alluvium was observed to be disturbed by previous activities at the site, which may have included agricultural activities. These disturbed alluvium soils were observed to be in approximately the upper 2½ to 5± feet, and generally consisted of medium dense to dense sandy silt and silty to clayey fine sand. The undisturbed alluvial soils generally consist of medium dense to dense silty to clayey fine sand and fine sandy silt with trace to little clay, medium sand and coarse sand. Some of the alluvium samples contained calcareous nodules and veining.

Groundwater

Groundwater was encountered in Boring No. B-1 at a depth of approximately 39 feet. As part of our research, we reviewed readily available groundwater data in order to determine regional groundwater depths. Recent water level data was obtained from the California Department of Water Resources website, http://www.water.ca.gov/waterdatalibrary/. The nearest monitoring well on record is located approximately 4,340 feet northeast of the site. Water level readings within this monitoring well indicate a groundwater level of 25± feet below the ground surface in November 2019.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of two (2) backhoe-excavated trenches, extending to a depth 10± feet below existing site grades. The trenches were logged during excavation by a member of our staff. The approximate locations of the infiltration trenches (identified as I-1 and I-2) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Artificial fill soils were encountered at the ground surface at both of the infiltration test locations extending to depths of 1½ to 2± feet. The fill soils consist of silty fine sands with trace amounts of clay. Native alluvial soils were encountered beneath the fill soils at both of the infiltration test locations extending to at least a depth of 10± feet, the maximum depth explored. The alluvium consists of very dense fine to medium sandy silt to silty fine to medium sands. The Trench Logs, which illustrate the conditions encountered at the infiltration test locations, are presented in this report.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration system that will be used at the subject site. As previously mentioned, the infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter and 20 inches in height. At the test locations, the outer ring was driven 3± inches into the soil at the base of each trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trench. The rings were driven into the soil using a ten-pound sledge hammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

Infiltration testing was performed at both of the trench locations. The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4 inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings was maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded. A cap was placed over the rings to minimize the evaporation of water during the tests.

The schedule for readings was determined based on the observed soil type at the base of each backhoe-excavated trench. Based on the existing soils at the trench locations, the volumetric measurements were made at 15-minute increments. The water volume measurements are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for the infiltration tests are calculated in centimeters per hour and then converted to inches per hour. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Infiltration Rate (inches/hour)
I-1	10	Brown fine to medium Sandy Silt to Silty fine to medium Sand, trace coarse Sand	1.1
I-2	10	Brown fine to medium Sandy Silty to Silty fine to medium Sand, trace coarse Sand	1.0

Design Recommendations

Two (2) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration test locations range between 1.0 and 1.1 inches per hour. The major factors affecting the lack of infiltration at these locations is the presence of very dense alluvium and higher fines content. **Therefore, we recommend an infiltration rate of 1.0 inches per hour be used in the design of the stormwater infiltration system.**

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration system to identify the soil classification at the base of the infiltration basin. It should be confirmed that the soils at the base of the proposed infiltration system corresponds with those presented in this report to ensure that the performance of the system will be consistent with the rates reported herein.

The design of storm water disposal systems should be performed by the project civil engineer, in accordance with the City of Perris and/or County of Riverside guidelines. It is recommended any such systems be designed and constructed to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the system. The presence of such materials would decrease the flow rates through the system. It should be noted that the recommended infiltration rates are based on infiltration testing at two (2) discrete locations and that the overall infiltration rates of the proposed infiltration systems could vary considerably.

Infiltration Rate Considerations

The infiltration rates presented herein was determined in accordance with the Riverside County guidelines and are considered valid only for the time and place of the actual test. Varying subsurface conditions will exist in other areas of the site, which could alter the recommended infiltration rates presented above. The infiltration rates will decline over time between maintenance cycles as silt or clay particles accumulate on the BMP surface. The infiltration rate is highly dependent upon a number of factors, including density, silt and clay content, grainsize distribution throughout the range of particle sizes, and particle shape. Small changes in these factors can cause large changes in the infiltration rates.

Infiltration rates are based on unsaturated flow. As water is introduced into soils by infiltration, the soils become saturated and the wetting front advances from the unsaturated zone to the saturated zone. Once the soils become saturated, infiltration rates become zero, and water can only move through soils by hydraulic conductivity at a rate determined by pressure head and soil permeability. Changes in soil moisture content will affect the infiltration rate. Infiltration rates should be expected to decrease until the soils become saturated. Soil permeability values will then govern groundwater movement. Permeability values may be on the order of 10 to 20 times less than infiltration rates. The system designer should incorporate adequate factors of safety and allow for overflow design into appropriate traditional storm drain systems, which would transport storm water off-site.

Construction Considerations

The infiltration rates presented in this report are specific to the tested locations and tested depths. Infiltration rates can be significantly reduced if the soils are exposed to excessive disturbance or compaction during construction. Compaction of the soils at the bottom of the infiltration system can significantly reduce the infiltration ability of the basins. Therefore, the subgrade soils within proposed infiltration system areas should not be over-excavated, undercut or compacted in any significant manner. **It is recommended that a note to this effect be added to the project plans and/or specifications.**

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration systems to identify the soil classification at the base of each system. It should be confirmed that the soils at the base of the proposed infiltration systems correspond with those presented in this report to ensure that the performance of the systems will be consistent with the rates reported herein.

We recommend that scrapers and other rubber-tired heavy equipment not be operated on the basin bottom, or at levels lower than 2 feet above the bottom of the system, particularly within basins. As such, the bottom 24 inches of the infiltration systems should be excavated with non-rubber-tired equipment, such as excavators.

Chamber Maintenance

The proposed project may include below-grade infiltration chambers. Water flowing into these chambers will carry some level of sediment. This layer has the potential to significantly reduce the infiltration rate of the basin subgrade soils. Therefore, a formal chamber maintenance program should be established to ensure that these silt and clay deposits are removed from the chamber on a regular basis.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration area could potentially be damaged due to saturation of the subgrade soils. **The proposed infiltration systems for this site should be located at least 25 feet away from any structures, including retaining**

walls. Even with this provision of locating the infiltration system at least 25 feet from the building(s), it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

The infiltration system designer should also give special consideration to the effect that the proposed infiltration systems may have on nearby subterranean structures, open excavations, or descending slopes. In particular, infiltration systems should not be located near the crest of descending slopes, particularly where the slopes are comprised of granular soils. Such systems will require specialized design and analysis to evaluate the potential for slope instability, piping failures and other phenomena that typically apply to earthen dam design. This type of analysis is beyond the scope of this infiltration test report, but these factors should be considered by the infiltration system designer when locating the infiltration systems.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Daryl Kas, CEG 2467
Senior Geologist

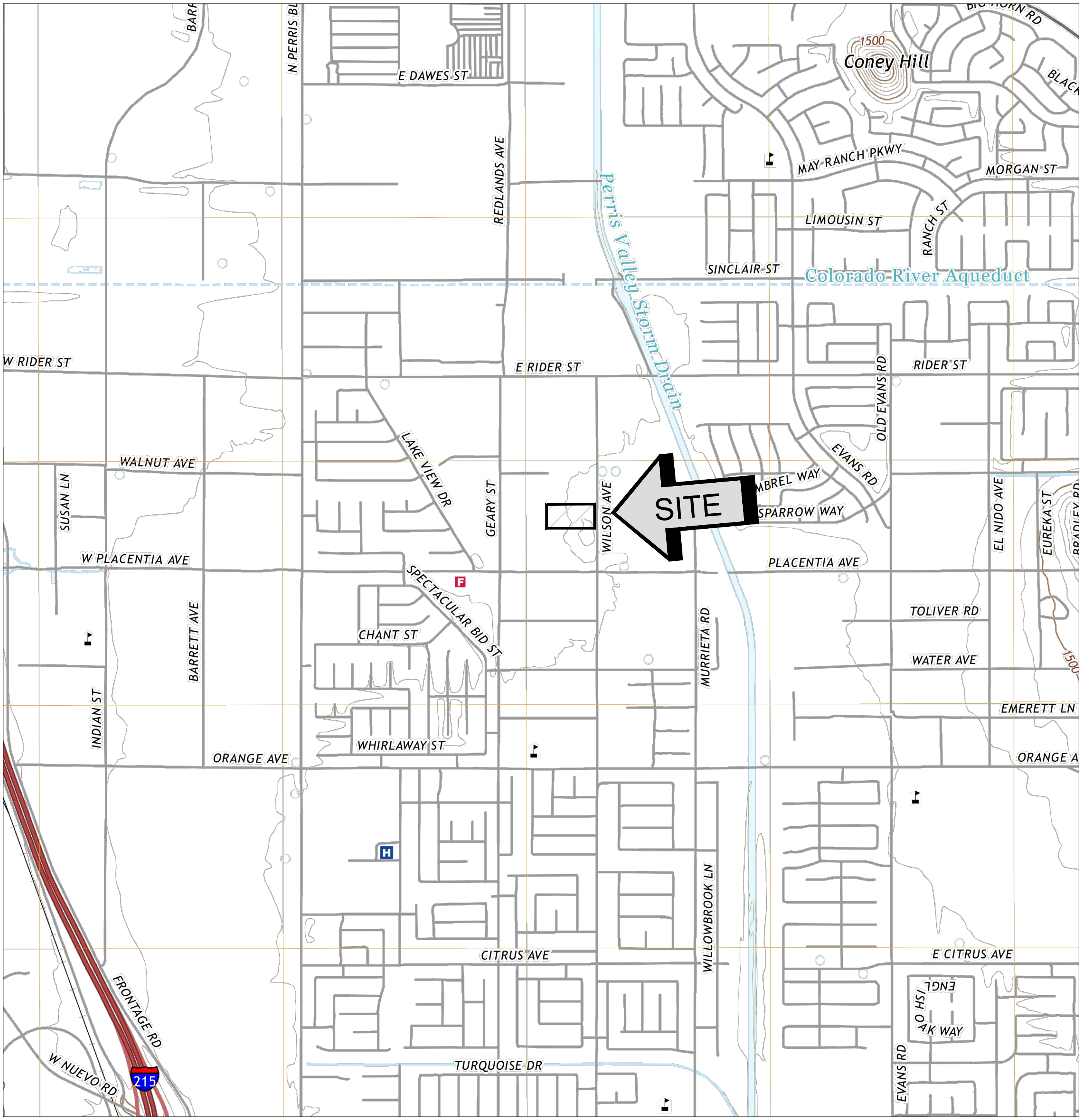
PROFESSIONAL GEOLOGIST DARYL R. KAS No. 2467 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

Robert G. Trazo, GE 2655
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER ROBERT TRAZO No. 2655 GEOTECHNICAL STATE OF CALIFORNIA

Distribution: (1) Addressee

Enclosures: Plate 1: Site Location Map
Plate 2: Infiltration Test Location Plan
Trench Log Legend and Logs (4 pages)
Infiltration Test Results Spreadsheets (2 pages)
Grainsize Distribution Graphs (2 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF THE PERRIS QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA, 2018.

SITE LOCATION MAP

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

SCALE: 1" = 2000'

DRAWN: MD
CHKD: RGT

SCG PROJECT
22G102-2

PLATE 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL

GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION LOCATION
- APPROXIMATE BORING LOCATION (SCG PROJECT NO. 22G102-1)
- PROPOSED INFILTRATION SYSTEM

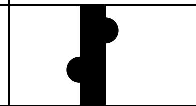
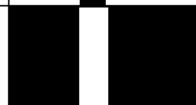
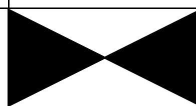
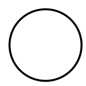
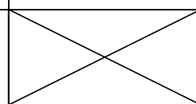
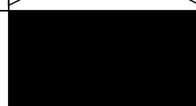
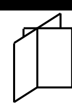
NOTE: CONCEPTUAL SITE PLAN PREPARED BY RGA ARCHITECTS.
AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH.

INFILTRATION TEST LOCATION PLAN
PROPOSED WAREHOUSE
PERRIS, CALIFORNIA

SCALE: 1" = 60'
DRAWN: MD
CHKD: EA
SCG PROJECT 22G102-2
PLATE 2

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3” indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-1

JOB NO.: 22G102-2
PROJECT: Proposed Warehouse
LOCATION: Perris, California

EXCAVATION DATE: 1/26/22
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Brown fine Sandy Silt, trace Clay, trace fine root fibers, loose-damp							
5					ALLUVIUM: Brown fine to medium Sandy Silt to Silty fine to medium Sand, trace coarse Sand, trace calcareous veining, very dense-very moist							
10	(hand sample)						18			48		
					Trench Terminated at 10'							

TBL 22G102-2.GPJ SOCALGEO.GDT 3/2/22

TEST TRENCH LOG

TRENCH NO.
I-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 22G102-2
PROJECT: Proposed Warehouse
LOCATION: Perris, California

EXCAVATION DATE: 1/26/22
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Brown Silty fine Sand, trace to little Clay, trace fine root fibers, porous, loose-damp							
					ALLUVIUM: Brown fine to medium Sandy Silt to Silty fine to medium Sand, trace coarse Sand, trace calcareous veining, very dense-moist							
5												
	(hand sample)						10			54		
10												
					Trench Terminated at 10'							

TBL 22G102-2.GPJ SOCALGEO.GDT 3/2/22

TEST TRENCH LOG

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Perris, California
Project Number	22G102-2
Engineer	Caleb Brackett

Infiltration Test No	I-1

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	9:00 AM	15	0	800	0	4000	4.39	7.31	1.73	2.88
	Final	9:15 AM	**15**	800		4000					
2	Initial	9:15 AM	15	0	700	0	3600	3.84	6.58	1.51	2.59
	Final	9:30 AM	**30**	700		3600					
3	Initial	9:30 AM	15	0	650	0	3400	3.56	6.21	1.40	2.45
	Final	9:45 AM	**45**	650		3400					
4	Initial	9:45 AM	15	0	550	0	3300	3.02	6.03	1.19	2.37
	Final	10:00 AM	**60**	550		3300					
5	Initial	10:00 AM	15	0	550	0	3100	3.02	5.66	1.19	2.23
	Final	10:15 AM	**75**	550		3100					
6	Initial	10:15 AM	15	0	500	0	3000	2.74	5.48	1.08	2.16
	Final	10:30 AM	**90**	500		3000					

INFILTRATION CALCULATIONS

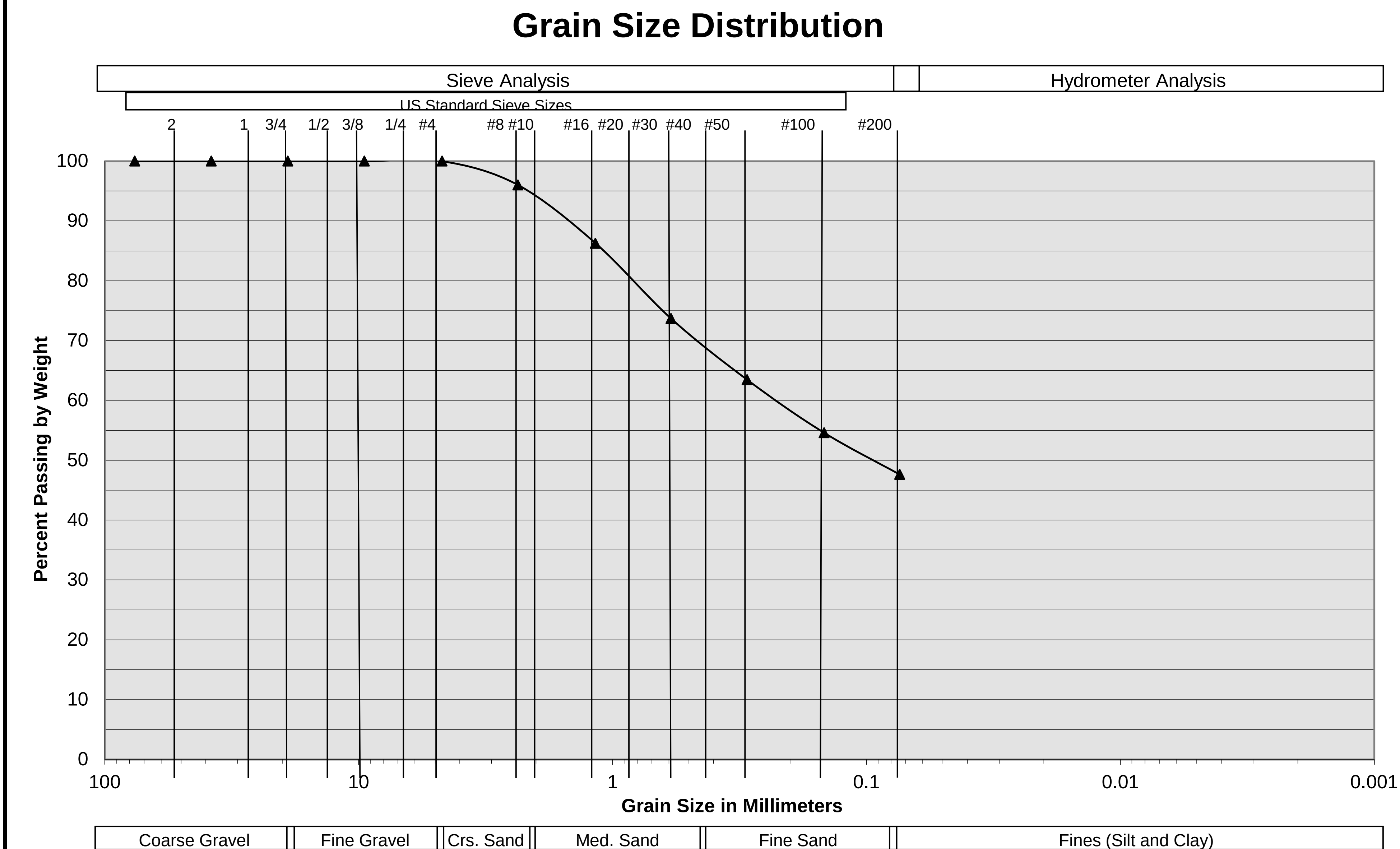
Project Name	Proposed Warehouse
Project Location	Perris, California
Project Number	22G102-2
Engineer	Caleb Brackett

Infiltration Test No: I-2

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

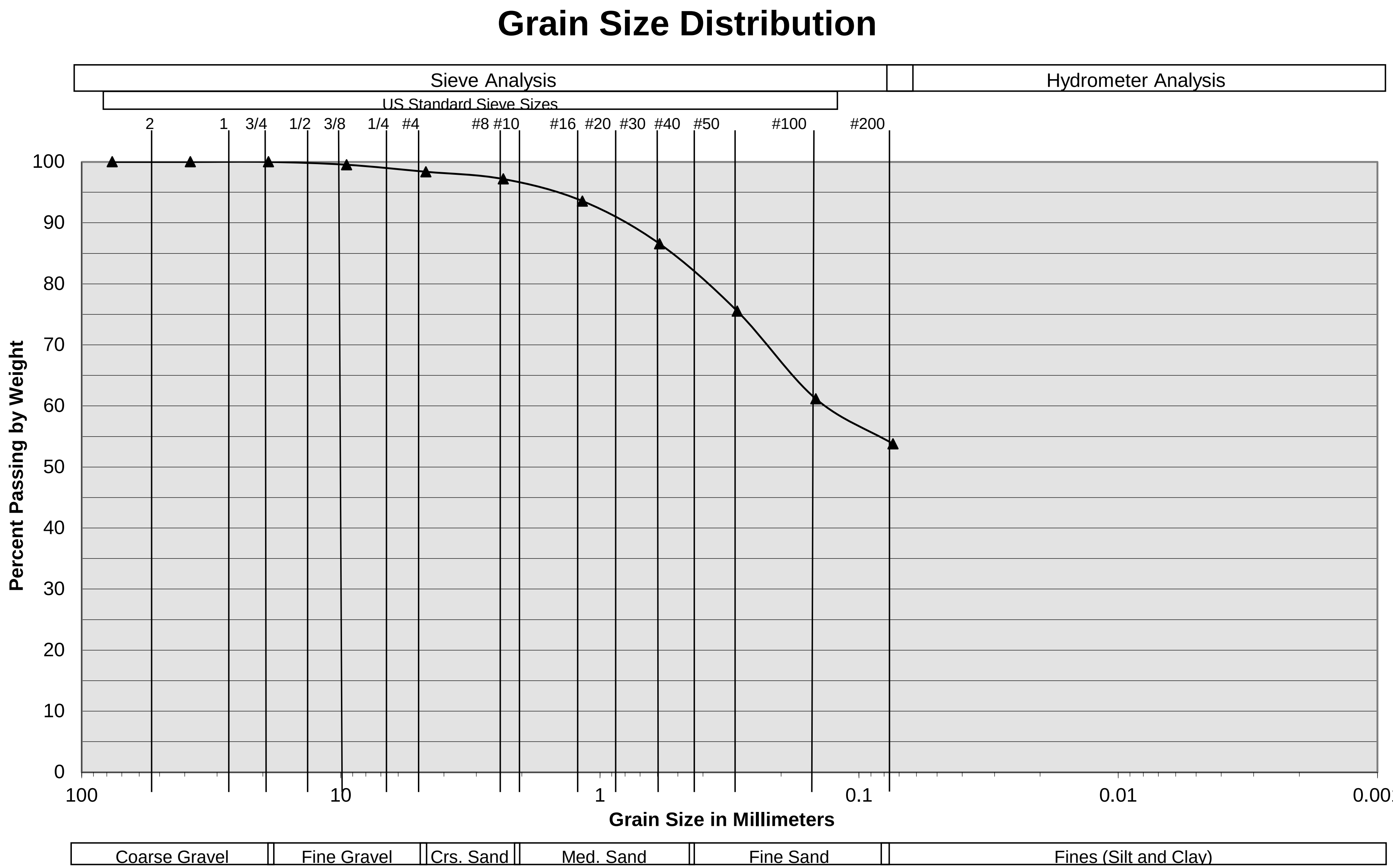
				Flow Readings				Infiltration Rates			
Test Interval		Time (hr)	Interval **Elapsed** (min)	Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	12:00 PM	15	0	700	0	4400	3.84	8.04	1.51	3.17
	Final	12:15 PM	**15**	700		4400					
2	Initial	12:15 PM	15	0	650	0	4200	3.56	7.68	1.40	3.02
	Final	12:30 PM	**30**	650		4200					
3	Initial	12:30 PM	15	0	600	0	4100	3.29	7.49	1.30	2.95
	Final	12:45 PM	**45**	600		4100					
4	Initial	12:45 PM	15	0	500	0	2600	2.74	4.75	1.08	1.87
	Final	1:00 PM	**60**	500		2600					
5	Initial	1:00 PM	15	0	450	0	2500	2.47	4.57	0.97	1.80
	Final	1:15 PM	**75**	450		2500					
6	Initial	1:15 PM	15	0	450	0	2400	2.47	4.39	0.97	1.73
	Final	1:30 PM	**90**	450		2400					



Sample Description	I-1 @ 10'
Soil Classification	Brown fine to medium Sandy Silt to Silty fine to medium Sand, trace coarse Sand

Proposed Warehouse
Perris, California
Project No. 22G102-2
PLATE C- 1

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL *A California Corporation*



Sample Description	I-2 @ 10'
Soil Classification	Brown fine to medium Sandy Silt to Silty fine to medium Sand, trace coarse Sand

Proposed Warehouse
Perris, California
Project No. 22G102-2
PLATE C- 2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation