ATTACHMENT NO. 4

CEQA Class 32
Categorical Exemption Memorandum

To: City of Fontana Planning Department

From: Cheryl Tubbs, Lilburn Corporation

Date: February 3, 2026

Subject: Hilton Drive Warehouse Development – CEQA Class 32 Categorical Exemption Memorandum

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This memorandum presents an environmental analysis for the proposed development of two warehouse buildings totaling 71,985 square-feet (41,218 SF Building 1 & 30,767 SF Building 2) ("Proposed Project"), located along the north side of Hilton Drive between Redwood Avenue and Hemlock Avenue. An Application for the Proposed Project has been submitted to the City of Fontana by Hilton Drive LLC. The intent of this analysis is to document whether the Project is exempt from the California Environmental Quality Act (CEQA) under the Class 32 Categorical Exemption (CE) set forth in CEQA Guidelines Section 15332. This memorandum provides an introduction, project description, and evaluation of the Project's consistency with the requirements for a Class 32 CE. This memorandum further evaluates whether any of the exceptions to categorical exemptions set forth in CEQA Guidelines Section 15300.2 apply to the Project.

CEQA Guidelines Section 15332 states that a Class 32 CE applies when:

a) *The project is consistent with the applicable general plan designation and all applicable general plan policies as well as with applicable zoning designation and regulations.*

b) *The proposed development occurs within city limits on a project site of no more than five acres substantially surrounded by urban uses.*

c) *The project site has no value as habitat for endangered, rare or threatened species.*

d) *Approval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality.*

e) *The site can be adequately served by all required utilities and public services.*

CEQA Guidelines Section 15300.2 lists the following exceptions to categorical exemptions:

a) *Location. Classes 3, 4, 5, 6, and 11 are qualified by consideration of where the project is to be located – a project that is ordinarily insignificant in its impact on the environment may in a particularly sensitive environment be significant. Therefore, these classes are considered to apply all instances, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.*

b) *Cumulative Impact. All exemptions for these classes are inapplicable when the cumulative impact of successive projects of the same type in the same place, over time is significant.*

c) *Significant Effect. A categorical exemption shall not be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances.*

d) *Scenic Highways. A categorical exemption shall not be used for a project which may result in damage to scenic resources, including but not limited to, trees, historic buildings, rock outcroppings, or similar resources, within a highway officially designated as a state scenic highway. This does not apply to improvements which are required as mitigation by an adopted negative declaration or certified EIR.*

e) *Hazardous Waste Sites. A categorical exemption shall not be used for a project located on a site which is included on any list compiled pursuant to Section 65962.5 of the Government Code.*

f) *Historical Resources. A categorical exemption shall not be used for a project which may cause a substantial adverse change in the significance of a historical resource.*

PROJECT LOCATION AND SETTING

The City of Fontana (City) is located in the southwestern portion of San Bernardino County. The City is bordered by the San Gabriel Mountain Range to the north, Rialto and Bloomington to the east, Jurupa Valley to the south, and Rancho Cucamonga and Ontario to the west. Regional access is available via Interstate 210 (I-210), which traverses the City in an east-west orientation, and Interstate-15 (I-15), which runs along the City's northwest border; refer to Figure 1, Regional Vicinity.

The approximately 4.0-acre Project Site is located in the western portion of the City. Specifically, the Project Site is located along the north side of Hilton Drive between Redwood Avenue and Hemlock Avenue in the City of Fontana, San Bernardino County. Refer to Figure 2, Site Vicinity. Access to the site is provided along southern frontage of the Project Site with driveways on east and west at Hilton Drive; refer to Figure 3, Site Plan.

EXISTING CONDITIONS

The Project Site is currently vacant and generally flat. Ruderal vegetation and tree stumps occur on-site. The Project Site is surrounded by industrial uses.

The Project Site has a City of Fontana General Plan (General Plan) land use designation of Light Industrial (I-L) and is zoned as West End Specific Plan(BP3).[1] According to the General Plan, business parks, research and development, technology centers, corporate and support office uses, clean industry, supporting retail uses, truck and equipment sales and related services are allowed. Warehouses that are designed in ways that limit off-site impacts are also permitted.[2]

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[1] City of Fontana, *City of Fontana General Plan Land Use Map*, https://www.fontanaca.gov/DocumentCenter/View/44297, accessed July 18,2025.

[2] City of Fontana, *Fontana Forward General Plan Update 2015-2035*, November 13, 2018.

N

0 1 Mile

LILBURN CORPORATION

REGIONAL VICINITY

HILTON DRIVE WAREHOUSE DEVELOPMENT

City of Fontana, California

FIGURE 1

VICINITY MAP

HILTON DRIVE WAREHOUSE DEVELOPMENT

City of Fontana, California

LILBURN CORPORATION

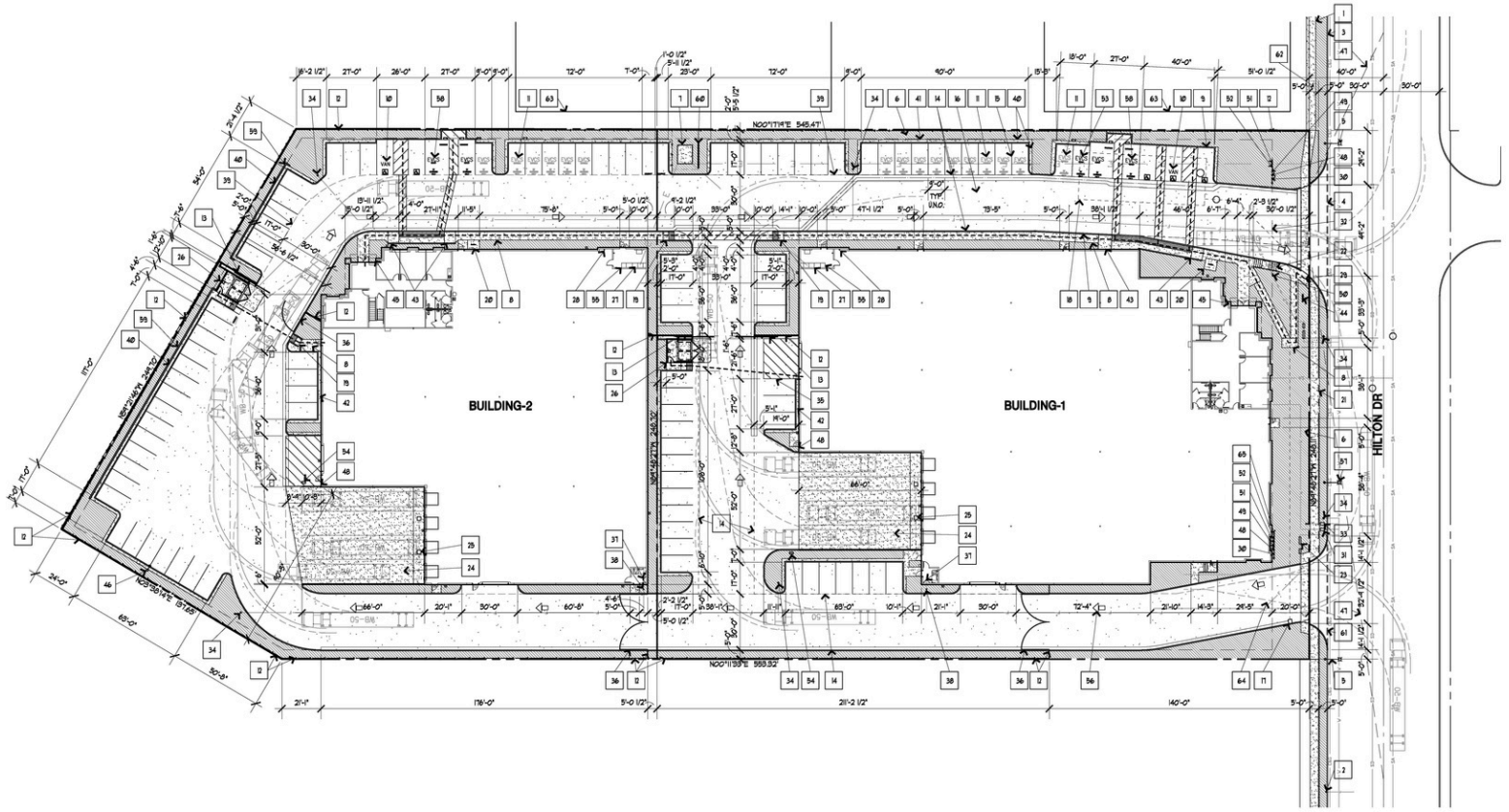
FIGURE 2

SITE PLAN NOTES

1. EXISTING CONCRETE SIDEWALK
2. EXISTING FIRE HYDRANT
3. EXISTING CONCRETE CURB AND GUTTER
4. REMOVE EXISTING CONCRETE CURB AND REPLACE WITH NEW CONCRETE DRIVE APPROACH PER CITY STANDARDS, SEE CIVIL
5. EXISTING STREET LIGHT
6. NEW LANDSCAPING SHOWN HATCHED, SEE LANDSCAPE
7. NEW TRANSFORMER
8. NEW CONCRETE WALK, SEE A/A-1.1
9. NEW CONCRETE CURB, SEE CIVIL
10. NEW ACCESSIBLE PARKING, SEE 2/A-1.1
11. EVCS CAPABLE (FUTURE) PARKING STALL, TYPICAL
12. NEW TUBE STEEL FENCE 6' HIGH, BLACK, SEE 8/A-1.2
13. NEW TUBE STEEL ROLLING GATE, 6' HIGH, BLACK, WITH FIRE DEPT. KNOX LOCK, SEE 1/A-1.2
14. PROPOSED 30' WIDE PUBLIC UTILITY, ACCESS AND DRAINAGE EASEMENT
15. NEW 4" WIDE WHITE PAINTED STRIPING FOR STANDARD 9'-0" WIDE X 19' DEEP PARKING STALLS, TYPICAL U.N.O.
16. NEW CONCRETE PAVING, SEE CIVIL
17. NEW GRATED INLET, SEE CIVIL
18. NEW SUBTERRANEAN INFILTRATION STRUCTURE, SEE CIVIL
19. NEW CONCRETE CURB RAMP, SEE 16/A-1.1
20. NEW SHORT TERM BICYCLE PARKING 4 BIKE CAPCITY, SEE 3/A-1.1
21. NEW CONCRETE SIDEWALK, SEE CIVIL
22. NEW CONCRETE STAIR
23. NEW DETECTOR CHECK ASSEMBLY
24. NEW TRUCK WELL CONCRETE PAVING, SEE CIVIL
25. NEW SUMP PUMP PIT
26. NEW TILT UP CONCRETE TRASH ENCLOSURE, 50% OF AREA TO BE USED FOR RECYCLING. NO HAZARDOUS WASTE TO BE STORED IN ANY TRASH BIN, SEE 15/A-1.2
27. NEW ELECTRICAL GEAR
28. NEW LONG TERM BICYCLE PARKING 3 BIKE CAPACITY WITH ELECTRIC PLUGS FOR CHARGING ELECTRIC BIKES, SEE 15/A-1.1
29. NEW ACCESSIBLE PATH OF TRAVEL
30. NEW ACCESSIBLE SITE ENTRANCE SIGN
31. NEW WATER METER
32. BUILDING SETBACK
33. NEW IRRIGATION METER
34. NEW FIRE HYDRANT PROVIDE BLUE REFLECTIVE PAVEMENT MARKER PER SBCFD STND. 505.5.2
35. NEW 4" WIDE WHITE DIAGONAL STRIPING AT 36" O.C.
36. NEW TUBE STEEL SWING GATE, 6' HIGH, BLACK WITH FIRE DEPT. KNOX LOCK, SEE 9/A-1.2
37. NEW FIRE RISER FOR NFPA-13 FIRE SPRINKLER SYSTEM WITH WATER FLOW MONITORING FIRE ALARM SYSTEM
38. NEW P.I.V.
39. NEW FIRE ACCESS LANE, 30' WIDE WITH MIN. 14' INSIDE TURNING RADIUS
40. NEW 6" CONCRETE CURB AND 1'-6" WIDE CONCRETE STRIP STAMPED WITH 6' GRID PATTERN TOTAL 2' WIDE DECORATIVE WALKING SURFACE AT PLANTERS ADJACENT TO PARKING STALLS, TYPICAL
41. 2' PARKING STALL OVERHANG
42. NEW CONCRETE CURB 6" HIGH X 24" WIDE WITH 6" STAMPED CONC. GRID PATTERN
43. NEW CONCRETE CURB RAMP, SEE 13/A-1.1
44. NEW MONUMENT SIGN WITH MIN. 6" HIGH ADDRESS NUMBERS PER CFC 505 AND SBCFD STND. 505.1
45. NEW FIRE DEPT. KEY BOX WITH TAMPER SWITCH MONITORED BY FIRE DEPT. APPROVED CENTRAL MONITORING DEVICE PER SBCFD STND. 506
46. NEW POLE MOUNTED LIGHT FIXTURE 25' HIGH
47. CLEAR LINE OF SIGHT WITH NO OBJECTS MORE THAN 30" HIGH
48. NEW SIGN: ANTI-IDLING
49. NEW SIGN: OFF SITE PARKING PROHIBITED
50. NEW SIGN: TRUCKING ROUTING PLAN DIRECTION
51. NEW SIGN: CONTACT INFORMATION FOR COMPLAINT REPRESENTATIVE
52. NEW SIGN: EVCS 10% AWAY SIGN
53. NEW ELECTRIC VEHICLE CHARGING STATION, TYPICAL
54. FUTURE ELECTRIC TRUCK CHARGING STATION
55. ELECTRICAL GEAR SPACE FOR 25% SIZE INCREASE
56. PAINTED TRUCK DIRECTIONAL ARROWS ON PAVEMENT, TYPICAL
57. NEW STREET LIGHT
58. NEW ACCESSIBLE ELECTRIC VEHICLE CHARGING STATION, SEE 17/A-1.1
59. NEW RETAINING WALL, SEE CIVIL
60. NEW TILT UP CONCRETE SCREEN WALL 4'-0" HIGH PAINT COLOR-A
61. NEW TRUCK ACCESS DRIVEWAY PER CITY STANDARDS, SEE CIVIL
62. 5' STREET DEDICATION
63. EXISTING BUILDING
64. INGRESS ONLY DRIVE AISLE
65. NEW SIGN: TRUCK ENTRANCE ONLY

BUILDING AREAS AND PARKING CALCULATION

Name	Occ.	Ground Floor Area	Level-2 Floor Area	Total Area	Parking Ratio	Parking Required	Parking Provided
Building-1 Office	B	2,248	2,420	4,668	250	18.67	
Building-1 Warehouse S-1		36,550	0	36,550	1,000	36.55	56
Building-2 Office	B	2,248	2,420	4,668	250	18.67	
Building-2 Warehouse S-1		26,099	0	26,099	1,000	26.10	48
Total		67,145	4,840	71,985		99.99	104



PRELIMINARY SITE PLAN

SCALE: 1"=30'-0"

4

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HILTON INDUSTRIAL FACILITY
HILTON DRIVE
FONTANA, CA
MASTER CASE NO. 18-013 TPM NO. 38-355 DESIGN REVIEW NO. 18-010

PRELIMINARY SITE PLAN

REVISION:

DATE MARCH 17, 2025

JOB NO. 21088
SHEET:

A-1.0
OF .. SHEETS

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SITE PLAN

HILTON DRIVE WAREHOUSE DEVELOPMENT

City of Fontana, California

FIGURE 3

LILBURN CORPORATION

The Project Site is surrounded by a Target warehouse to the north, Vision Communications and Open Door Solutions to the east, Southern California Edison to the west, and a Service Partners, a building supply warehouse to the south. Surrounding uses predominantly consist of industrial uses.

The land uses and zoning designations surrounding the Project Site are as follows:

- *North*: Uses to the north are designated Light Industrial (L-I) and zoned West End Specific Plan(BP3).
- *East*: Uses to the east are designated Light Industrial (L-I) and zoned West End Specific Plan(BP3).
- *South*: Uses to the south are designated Light Industrial (L-I) and zoned West End Specific Plan(BP3).
- *West*: Uses to the west are designated Light Industrial (L-I) and zoned West End Specific Plan(BP3).

PROJECT DESCRIPTION

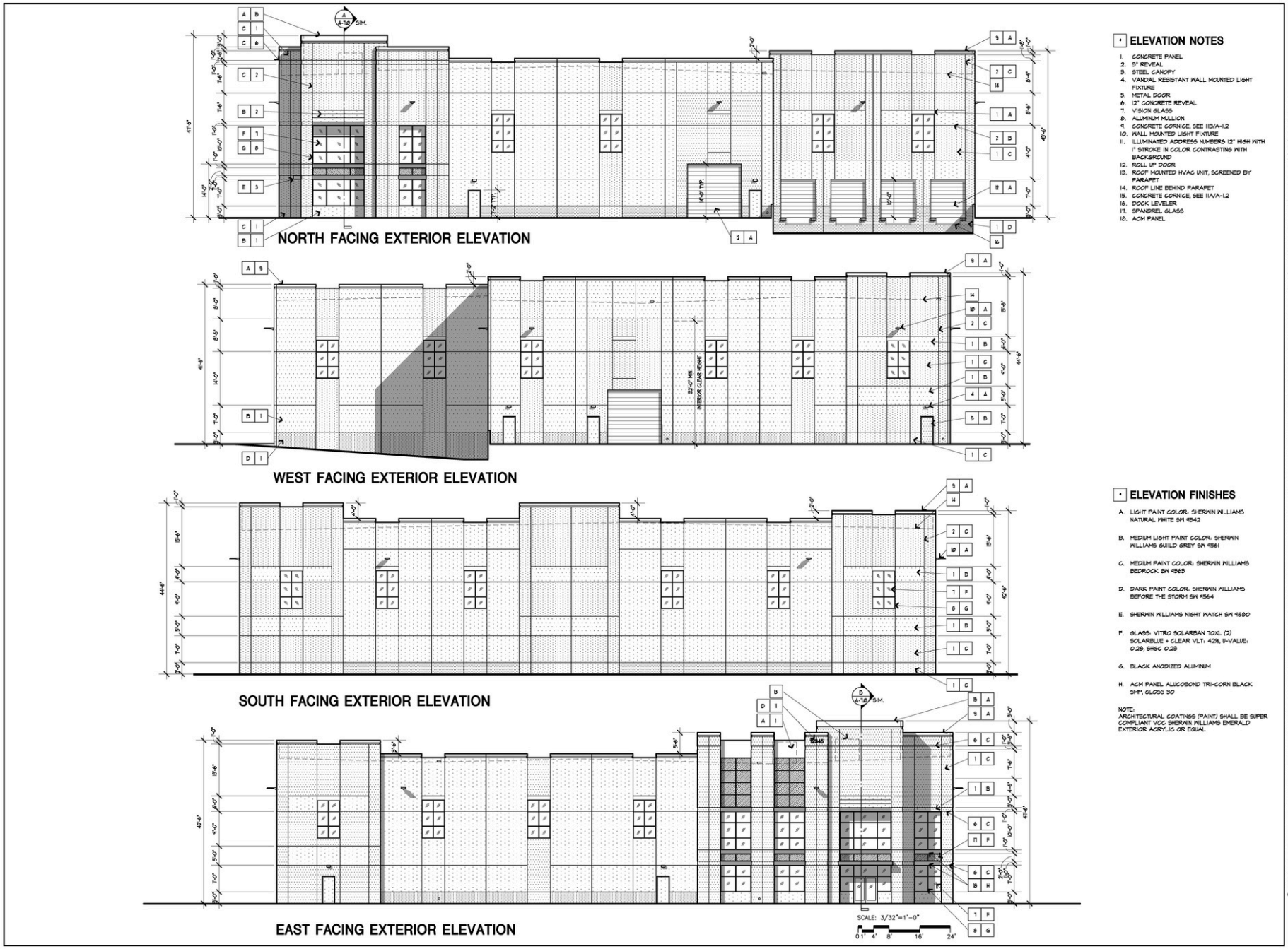
The Proposed Project is the development of two warehouse buildings totaling 71,985 square-feet (41,218 SF Building 1 & 30,767 SF Building 2) on an approximately 4.0-acre site in the western portion of the City of Fontana, located along the north side of Hilton Drive between Redwood Avenue and Hemlock Avenue. The Project Site is identified as Assessor's Parcel Numbers 1110-151-03.

The Proposed Project would include improvements such as landscaping, new curbs, sidewalks, gutters, driveways, and signage (refer to Figure 3, Site Plan). Each building will include a 2,248 square-foot office areas. The trash enclosures would be designed to comply with City requirements and consistent with the architecture of the proposed warehouses. The Proposed Project would provide nighttime lighting, and safety and security cameras. Vehicle ingress and egress access to the proposed warehouses would be from two driveways along Hilton Drive.

Construction is anticipated to occur for a duration of approximately 12 months and would comply with the City of Fontana Zoning and Development Code Noise standards, which limits demolition and construction to the hours of 7:00 AM to 6:00 PM on weekdays and 8:00 AM to 5:00 PM on Saturdays. Construction materials required for the project include an excavator, a grader, a tractor, a crane, a concrete saw, paving equipment, a roller, and a rough terrain forklift.

Architecture

The two warehouses would have a total building area of 71,985 square-feet and a maximum building height of 47.5 feet; refer to Figure 4, Elevations. As a result, the project would be consistent with the Light Industrial maximum building height of 75 feet. The architectural design of the buildings includes tilt-up concrete walls to be painted with colors shown on Figure 4, glass and black anodized aluminum on buildings' outer surfaces.



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HILTON INDUSTRIAL FACILITY
HILTON DRIVE
FONTANA, CA
MASTER CASE NO. 18-053 TPM NO. 18-005 DESIGN REVIEW NO. 18-010

EXTERIOR ELEVATIONS BUILDING-2

REVISION:

DATE MARCH 17, 2025

JOB NO.: 21088
SHEET:
A-5.2
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ELEVATIONS

HILTON DRIVE WAREHOUSE DEVELOPMENT

City of Fontana, California

FIGURE 4

LILBURN CORPORATION

Parking

The Proposed Project consists of approximately 56 parking spaces for warehouse building 1 and 48 parking spaces for warehouse building 2 (total of 104 spaces), which include electric vehicle and accessible parking stalls.

Landscaping

Landscaping for the Proposed Project consist of a total of 19,957 sf landscaped area along the perimeters of the Project Site and the building frontages, as well as in the parking areas as required by Municipal Code Section No. 9-71(e) (see Figure 3). The landscaped area will include various drought tolerant trees and shrubs.

CONSTRUCTION

The Project Site is currently vacant and does not require demolition. Construction is anticipated to occur for a duration of approximately 12 months and would comply with the City of Fontana Zoning and Development Code Noise standards, which limits demolition and construction to the hours of 7:00 AM to 6:00 PM on weekdays and 8:00 AM to 5:00 PM on Saturdays. Construction materials required for the project include an excavator, a grader, a tractor, a crane, a concrete saw, paving equipment, a roller, and a rough terrain forklift.

CLASS 32 EXEMPTION CRITERIA ANALYSIS

Criterion (a) *The project is consistent with the applicable general plan designation and all applicable general plan policies as well as with applicable zoning designation and regulations.*

General Plan Consistency

The Project Site has a City of Fontana General Plan (General Plan) land use designation of Light Industrial (L-I) and zoned as West End Specific Plan(BP3).[3] According to the General Plan, business parks, research and development, technology centers, corporate and support office uses, clean industry, supporting retail uses, truck and equipment sales and related services are allowed. Off-site improvements include groundcover, sidewalks, and curbs. Therefore, the Proposed Project is considered allowed use and is consistent with the applicable general plan designation. Table 1, City of Fontana General Plan Project Consistency Analysis, evaluates the project's consistency with applicable General Plan land use policies.

3 City of Fontana, Fontana Forward General Plan Update 2015-2035, November 13, 2018.

Table 1
General Plan Land Use, Zoning, and Urban Design Element Project Consistency Analysis

Applicable General Plan Land Use Goals and Policies	Project Consistency Analysis
Land Use Element	
Goal: Fontana development patterns support high quality of life and economic prosperity.	
Policy: Locate high-quality industrial uses where there is appropriate access to regional transportation routes where there is appropriate access to regional transportation routes.	Consistent. The Proposed Project consists of two warehouse buildings located approximately 2 miles from the I-15 and I-210, which serve as regional transportation routes. As such, the Proposed Project is consistent with this Land Use Element policy.
Goal: High-quality job- producing industrial uses are concentrated in a few locations where there is easy access to regional transportation routes.	
Maintain but do expand existing heavy land use areas in proximity to one another and to services for industrial uses.	Consistent. The proposed project consists of two warehouse buildings that would be consistent with existing surrounding uses. The surrounding land uses are industrial. Therefore, the project is consistent with this Land Use Element policy.
Source: City of Fontana, *Fontana Forward General Plan Update 2015-2045*, *Land Use, Zoning, and Urban Design Element*, updated July, 2023.	

Zoning Code Consistency

The Project Site is zoned as West End (BP3) within the West End Specific Plan.[4] According to the West End Specific Plan, the Project Site is identified as Rail Service Industrial (BP3) which is designated development of rail served industrial uses and has the opportunity for direct rail service to the Southern Pacific Railroad is expected service primary large distribution type uses[5] As a warehouse use, the Proposed Project is a permitted land use under the City of Fontana West End Specific Plan. The Project has been designed to comply with all applicable land use regulations and development standards set forth in the West End Specific Plan. To ensure compliance, the Project Site will be reviewed by the City's Planning Division for consistency with applicable Specific Plan development standards. Development Standards include:

- **Floor Area Ratio (FAR):**

  The floor area shall not exceed a floor area ratio of 0.4 multiplied by the net lot area.

- **Separation:**
  Any landscaped area shall be separated from adjacent vehicular areas by a wall or curb at least six (6) inches higher than the adjacent vehicular area.

- **Berming:**
  An earthen berm shall be provided beginning at the curb and extending a minimum of twenty-one (21) feet. All slopes facing streets shall be landscaped with turf and trees, except at sign locations where shrubs, turf, and ground cover are permitted.

- **Parking Lots and Service Areas Adjacent to Public Streets:**

  These areas shall be screened with shrubs planted on the building side of tree rows. Screening shrubs shall be spaced no more than four (4) feet apart and shall be a minimum five-gallon size at planting.

4 City of Fontana, West End Specific Plan. April 1985. Revised March 15, 1994.
5 City of Fontana, West End Specific Plan. April 1985. Revised March 15, 1994.

- **Street/Parkway Trees:**

  Street tree planting shall consist of a double row of trees. Trees shall be fifteen-gallon size and planted five (5) feet from the curb or sidewalk line, except where located within a parkway.

- **Setbacks:**
  Internal industrial buildings shall maintain a minimum setback of twenty (20) feet, with parking areas requiring a minimum setback of fifteen (15) feet.

- **Landscaping:**
  Landscaping shall consist of evergreen and/or deciduous trees, shrubs, and ground cover, and may also include public sidewalks. Landscaping shall comply with the following standards; Private Parcel Landscaping:

  a) A fully automatic irrigation system shall be provided.

  b) All unpaved, non-work areas not used for parking or storage shall be landscaped with turf, ground cover, and trees.

- **Signage:**
  Flashing or moving signs are not permitted. Freestanding signage shall not exceed 100 square feet in area or eight (8) feet in height. Roof-mounted signs and signs painted directly on walls or buildings are prohibited.

- **Exterior Architectural Appearance:**

  1. Building Material Guidelines: Exterior walls for industrial buildings may be constructed of concrete, masonry, glass, or metal. Sheets or corrugated metal is not permitted. A maximum of three (3) colors per building is allowed.

  2. Parking Structure Design: Parking structures shall be compatible with surrounding buildings.

- **Screening Requirements:**

  1. Rooftop equipment screening

     a. Architecturally compatible screening shall be provided to conceal all roof top materials and are subject to approval of the planning director.

     b. With nominally flat roof, the ridge line elevation shall not exceed the parapet elevation, except as approved by the planning commission.

     c. No part of the flat roof may project above parapet, except for antennas, satellite disk, elevator shafts, stairways and helicopter pads.

  2. Refuse area screening: Trash container areas shall be screened from the streets and adjacent parcels with material to match building architecture

  3. Screening along street frontages: An architecturally compatible screen shall be installed along all parking areas along street frontage

  4. Any building exceeding thirty-five (35) feet in height shall be set back from exterior property boundaries by a distance equal to the building height

  5. Landscape coverage for each site shall be determined by setback requirements. All areas not occupied by buildings, parking, or designated storage shall be landscaped.

As analyzed above, the project is consistent with applicable General Plan designation and policies and zoning designation and regulations. Thus, the project would meet Criterion (a) requirements.

Criterion (b) *The proposed development occurs within city limits on a project site of no more than five acres substantially surrounded by urban uses.*

The Project Site is a 4.0-acre parcel located along the north side of Hilton Drive between Redwood Avenue and Hemlock Avenue, west of Sierra Avenue within the City of Fontana. As shown on Figure 2, the site is within an industrial area and adjacent to industrial uses.

The project location within the City and the size of the Project Site provide consistency with Criterial (b) requirements.

Criterion (c) *The project site has no value as habitat for endangered, rare or threatened species.*

A Biological Resources Assessment Letter Report dated September 2025, was prepared for the Proposed Project by Jennings Environmental LLC. (Jennings) (Appendix A). The findings are summarized herein.

Jennings conducted the general reconnaissance survey within the Project Site to identify the potential for the occurrence of special status species, vegetation communities, or habitats that could support special status wildlife species. The surveys were conducted on foot, throughout the Project Site on September 10, 2025.

No rare, State and/or federally-listed threatened or endangered species are documented/or expected to occur within the Project site. Additionally, no plant species with the CNPS California Rare Plant Rank (CRPR) of 1 or 2 were observed on-site or documented to occur on-site in the relevant databases. No other sensitive species were observed within the project area or buffer area.

The Project Site is highly disturbed. The habitat on-site is ruderal/disturbed vegetation with gravel surfaces. The site offers no suitable habitat for any rare sensitive species including listed species. Therefore, no further surveys are required. Although the site is highly disturbed, there is some habitat within the Project site and adjacent area that is suitable for nesting birds in general. In general, the following condition of approval, in accordance with the Fontana General Plan Final Environmental Impact Report (August 10, 2018) Mitigation Measure BIO-3 and as recommended in the 2025 Biological Resources Assessment, nesting bird surveys shall be implemented prior to construction if construction occurs during the period of February 1 through September 15. Mitigation Measure BIO-3 states that the City of Fontana shall require that all future project applicants prepare a Biological Assessment in conjunction with a project-level analysis and that the requirements of the Biological Assessment shall be a **condition of approval of the individual development project**.

Accordingly, the following shall be implemented prior to construction:

> Prior to initial grading or clearing of areas of suitable habitat within the Planning Area (e.g., a vacant site with a landscape of grassland or low-growing, arid scrub vegetation or agricultural use or vegetation), a qualified biologist shall conduct a pre-construction

survey, in accordance with the CDFG Staff Report on Burrowing Owl Mitigation, to determine the presence or absence of burrowing owl within the proposed area of impact.

Results of surveys, including mitigation recommendations (i.e. a Burrowing Owl Mitigation and Monitoring Report) shall be incorporated into the project-level CEQA compliance documentation.

Construction grading/clearing of areas of suitable habitat should occur between September 1 and January 31 to avoid impacts to breeding owls. If occupied burrows are discovered, they shall not be removed during nesting season [February 1 through August 31), unless a qualified biologist can determine that either the owls have not laid eggs or are incubating eggs, or that any young from the burrows are able to forage independently. If initial grading is scheduled to occur during nesting season, the following measures shall be implemented.

If removal of occupied burrows is necessary, passive relocation outside of nesting season shall be implemented under the supervision of the qualified biologist. This shall include covering/excavation of burrows and installation of one-way doors as necessary. One-way doors will allow owls inside the burrow to exit but not allow them to re-enter. The biologist shall wait a minimum of one week before the burrow may be excavated to allow the owls time to leave the area.

The Project Site is located within the developed western area of the City and is mostly surrounded by urban land uses. There are no sensitive natural communities on the Project Site. No endangered, rare, or threatened species, as defined in CEQA Guidelines Section 15380, are expected to inhabit the site. The site is not within the designated critical habitat of any species. As such, the Project Site has no value as habitat for endangered, rare, or threatened species. Thus, the Proposed Project would meet Criterion (c) requirements.

Criterion (d) *Approval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality.*

TRAFFIC

A Traffic Memorandum dated December 9 2025, was prepared for the Proposed Project by Gandini Group, Inc. (Appendix B). The findings are summarized herein.

Trip Generation

As stated in the Traffic Memorandum, the Proposed Project is forecast to generate approximately 99 daily vehicle trips, including 9 vehicle trips during the AM peak hour and 11 vehicle trips during the PM peak hour which equates to approximately 150 daily PCE trips, including 13 PCE trips during the AM peak hour and 15 PCE trips during the PM peak hour.

The project would generate and contribute fewer than 50 peak hour trips to any intersection of two streets designated as Collector or higher on the City's General Plan circulation system. The project does not propose any deviation from the City's TIA Guidelines or design standards. Subject to verification by the City Traffic Engineer, the project does not appear to contribute to unique existing or proposed traffic conditions in the project vicinity to warrant further evaluation.

Therefore, the project does not warrant the preparation of a transportation impact study with LOS analysis based on the City-established screening criteria and LOS impacts may be presumed to be negligible.

Vehicle Miles Traveled (VMT) Screening Criteria

The City TIA Guidelines identify screening criteria for certain types of projects that typically reduce VMT and may be presumed to result in a less than significant VMT impact. In accordance with the City's project type screening, projects generating less than 500 daily vehicle trips may be presumed to have a less than significant VMT impact.

The Proposed Project satisfies the City-established vehicle miles traveled (VMT) screening criteria for projects generating less than 500 daily trip. The Proposed Project is forecast to generate approximately 99 daily vehicle trips, including 9 vehicle trips during the AM peak hour and 11 vehicle trips during the PM peak hour which equates to approximately 150 daily PCE trips, including 13 PCE trips during the AM peak hour and 15 PCE trips during the PM peak hour.. Therefore, based on the City's guidelines, the project would be screened out from a VMT analysis based on the daily trip thresholds and is anticipated to have a less than significant VMT impact.

NOISE

A Noise Impact Analysis, dated December 23, 2025, was prepared for the Proposed Project by Ganddini Group, Inc. (see Appendix C for report). The unit of measurement used to describe a noise level is the decibel (dB)
Construction Noise On-site

The City of Fontana has set restrictions to control noise impacts associated with the construction of the Proposed Project. According to Section 18-63 of the city's Municipal Code, Construction or repairing of buildings or structures, construction activity is limited: between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 8:00 a.m. and 5:00 p.m. on Saturdays except in the case of urgent necessity. Project construction noise levels are, therefore, considered exempt from municipal regulation if activities occur within the hours specified in the City of Fontana Municipal Code, Section 18-63 of 7:00 a.m. to 6:00 p.m. on weekdays and between the hours of 8:00 a.m. to 5:00 p.m. on Saturdays. However, neither the General Plan nor the Municipal Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers for CEQA analysis purposes. Therefore, a numerical construction threshold based on Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual is used for analysis of daytime construction impacts, as discussed below. According to the FTA, local noise ordinances are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise. the FTA considers a daytime exterior construction noise level of 80 dBA Leq(8-hour) for noise sensitive residential land uses, 85 dBA Leq(8-hour) for commercial uses, and 90 dBA Leq(8-hour) for industrial uses. Construction noise would affect adjacent light industrial/warehouse land uses.

Project construction noise levels at nearby sensitive receptors were calculated using the FTA methodology. Modeled construction noise levels reach up to 70.7 dBA Leq at the property line shared with the industrial warehouse land use to the north, up to 68.5 dBA Leq at the property

line shared with the industrial land use to the south, and up to 77.9 dBA Leq at the industrial properties located to the east and west. Project construction noise levels will not exceed the FTA 90 dBA Leq (8-hour) construction noise standard for impacts to residential land uses. This impact would be less than significant.

Construction Noise Off-site

Project construction would generate up to 31 employee trips and 12 truck trips per day traveling to and from the project site via Hilton Avenue, Redwood Avenue and Hemlock Avenue to Foothill Boulevard where project trips would result in negligible increases in ambient noise levels. There are existing residential land uses along Redwood Avenue and Hemlock Avenue that would be exposed to these trips. Existing noise levels and existing plus project construction noise levels were calculated using FHWA methodology .

The existing noise levels range between 62.9 and 65.6 dBA CNEL and existing plus project construction noise levels would range between 63.2 and 65.7 dBA CNEL. Project construction traffic would result in a less than 1 dB increase along both roadways and would not exceed the applicable FICON noise increase thresholds. Impacts would be less than significant and no mitigation measures are required.

Operational Noise

The Proposed Project is considered an allowed use in accordance with the General Plan and West End Specific Plan standards, and the proposed warehouses are compatible with surrounding industrial developments. Noise generated by the Project would be consistent with existing industrial noise levels and would occur within an established industrial area. As a result, anticipated warehouse-related noise would not exceed the City's noise standards and would not introduce a new substantial noise source compared to existing conditions. Impacts would be less than significant.

AIR QUALITY

This analysis is based on the California Emissions Estimator Model (CalEEMod) version 2022 outputs (Appendix D).

Regulatory Requirements

The Project Site is located in the South Coast Air Basin (SCAB). The South Coast Air Quality Management District (SCAQMD) has jurisdiction over air quality issues and regulations within the SCAB. An evaluation of potential air quality impacts related to the Proposed Project (Warehouse Development) was prepared. The CalEEMod recommended by the SCAQMD for all general development projects within the SCAB was used to estimate project emissions.

Operational Emissions

As stated, based on the City of Fontana Traffic Engineering Division Traffic Impact Analysis (TIA) Guidelines for Vehicle Miles Traveled (VMT) and Level of Service (LOS) Assessment, dated October 2020, all truck trips were converted to passenger car equivalents (PCEs) using a 2.0 PCE factor for 2-axle trucks, 2.5 for 3-axle trucks, and 3.0 for 4- and more axle trucks. The Proposed

Project is anticipated to generate 20 PCE trips in the a.m. peak hour, 23 PCE trips in the p.m. peak hour, and 195 daily PCE rips. The Proposed Project's operation and construction emissions were screened using the California Emissions Estimator Model (CalEEMod) version 2022 prepared in collaboration with the SCAQMD (see Attachment B).

Construction Emissions

CalEEMod was utilized to estimate the on-site and off-site construction emissions. The emissions incorporate Rules 402 and 403 for fugitive dust by default as required during construction. The criteria pollutants screened for include reactive organic gases (ROG), nitrous oxides (NOx), carbon monoxide (CO), sulfur dioxide (SO_2), and fine and respirable particulates (PM_{10} and $PM_{2.5}$). Two of the analyzed pollutants, ROG and NO_x, are ozone precursors. These criteria pollutants are key contributors to air quality degradation and can have potential significant environmental and public health impacts. Screening for these pollutants helps identify potential air quality impacts to protect public health, and comply with SCAQMD Thresholds.

Construction is anticipated to start late 2026 and end in late 2027. Construction and activities associated with the Proposed Project would have the potential to generate air emissions and toxic air contaminant emissions. The resulting emissions generated during construction and demolition of the Proposed Project are shown in Table 2 and Table 3 below which represent summer and winter conditions respectively.

Table 2
Maximum Summer Construction Emissions
(Pounds per Day)

Equipment	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
2026 Max	1.2	10.4	15.4	0	0.9	0.5
SCAQMD Threshold	**75**	**100**	**550**	**150**	**150**	**55**
Significance	**No**	**No**	**No**	**No**	**No**	**No**

Source: CalEEMod 2022 Summer Construction Emissions.

Table 3
Maximum Winter Construction Emissions
(Pounds per Day)

Equipment	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
2026 Max	3.2	29.2	29.8	0.1	9.1	5.1
2026 Max	38.0	10.0	15.0	0.0	0.9	0.4
SCAQMD Threshold	**75**	**100**	**550**	**150**	**150**	**55**
Significance	**No**	**No**	**No**	**No**	**No**	**No**

Source: CalEEMod 2022 Winter Construction Emissions.
Notes:
ROG = Reactive Organic Gases NOx = Nitrogen Oxides
CO = Carbon Monoxide SO2 = Sulfur Dioxides PM = Particulate Matter
SCAQMD = South Coast Air Quality Management District

As shown in Table 2 and 3, both summer and winter construction emissions are below SCAQMD thresholds. The Proposed Project does not exceed applicable SCAQMD regional thresholds during construction activities. Therefore, impacts are considered less than significant.

Operational Emissions

Operational emissions are categorized as energy (generation and distribution of energy to the end use), area (operational use of the project), and mobile (vehicle trips). Operational emissions were estimated using the CalEEMod version 2022 and are listed in Table 4 and 5, below.

Table 4
Summer Operational Emissions Summary
(Pounds Per Day)

Source	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Mobile	0	0	0	0	0	0
Area	2.3	0	3.2	0	0	0
Energy	0.1	0.9	0.7	0	0.1	0.1
Totals	**2.4**	**0.9**	**3.9**	**0**	**0.1**	**0.1**
SCAQMD Threshold	55	55	550	150	150	55
Significant	**No**	**No**	**No**	**No**	**No**	**No**

Source: CalEEMod 2022 Summer Emissions

Table 5
Winter Operational Emissions Summary
(Pounds Per Day)

Source	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Mobile	0	0	0	0	0	0
Area	1.8	-	-	-	-	-
Energy	0.1	0.9	0.7	0	0.1	0.1
Totals	**1.8**	**0.9**	**0.7**	**0**	**0.1**	**0.1**
SCAQMD Threshold	55	55	550	150	150	55
Significant	**No**	**No**	**No**	**No**	**No**	**No**

Source: CalEEMod 2022 Winter Emissions

As shown, both summer and winter season operational emissions are below SCAQMD thresholds. The Proposed Project would not exceed any SCAQMD thresholds for criteria pollutants during construction (see Table 2, 3). Operational emissions are less than significant and would not result in a cumulatively considerable net increase of any criteria pollutant (see Tables 4 and 5). Therefore, less than significant adverse impacts are identified or anticipated, and no mitigation measures are required.

SCAQMD has developed a methodology to assess the localized impacts of emissions from a Proposed Project as outlined within the Final Localized Significance Threshold (LST) Methodology report; completed in June 2003 and revised in July 2008. The use of LSTs is voluntary, to be implemented at the discretion of local public agencies acting as a lead agency pursuant to CEQA. LSTs apply to projects that must undergo CEQA or the National Environmental Policy Act (NEPA) and are five acres or less. LST methodology is incorporated to represent worst-

case scenario emissions thresholds. CalEEMod was used to estimate the on-site and off-site construction emissions. The LSTs were developed to analyze the significance of potential air quality impacts of a project to sensitive receptors (i.e. schools, single family residences, etc.) and provide screening tables for small projects (one, two, or five acres). Projects are evaluated based on geographic location and distance from the sensitive receptor (25, 50, 100, 200, or 500 meters from the site).

For the purposes of a CEQA analysis, the SCAQMD considers a sensitive receptor to be a receptor such as a residence, hospital, convalescent facility or anywhere that it is possible for an individual to remain for 24 hours. Additionally, schools, playgrounds, childcare centers, and athletic facilities can also be considered as sensitive receptors. Commercial and industrial facilities are not included in the definition of sensitive receptor because employees do not typically remain on-site for a full 24 hours, but are usually present for shorter periods of time, such as eight hours.

The Project Site is approximately 4.0 acres. For a conservative, worst-case analysis, the "5-acre" LSTs were applied, as larger sites correspond to higher screening thresholds. The nearest sensitive receptor is a motel located approximately 100 meters southeast of the Site, so LSTs were evaluated at this distance. The Proposed Project's construction and operational emissions with the appropriate LST are presented in Table 6 "Localized Significant Threshold".

Table 6
Localized Significance Thresholds
(Pounds Per Day)

Source	NO_x	CO	PM_{10}		$PM_{2.5}$	
Construction Emissions (Max. from Tables 2, 3)	38.0	29.2	0.9		5.1	
Operational Emissions (Max. Total from Tables 4, 5)[1]	1.8	4.6	0.2		0.2	
Highest Value (lbs/day)	**38.0**	**29.2**	**0.9**	**0.2**	**5.1**	**0.2**
LST Threshold	378	5,188	65*	17†	16*	5†
Greater Than Threshold	**No**	**No**	**No**	**No**	**No**	**No**

Sources: CalEEMod.2022 Summer and Winter Emissions; SCAQMD Final Localized Significance Threshold Methodology; SCAQMD Mass Rate Look-up Tables for a 5-acre site in SRA No. 34 Central San Bernardino Valley, distance of 25 meters.
Note: PM10 and PM2.5 emissions are separated into construction and operational thresholds in accordance with the SCAQMD Mass Rate LST Look-up Tables.
* Construction emissions LST
† Operational emissions LST
Per LST Methodology, mobile source emissions do not need to be included except for land use emissions and onsite vehicle emissions. It is estimated that approximately 10 percent of mobile emissions will occur on the Project Site.

As shown in Table 6, both construction and operational emissions are well below the applicable thresholds. As such, the potential for adverse health effects is minimal. Therefore, a Health Risk Assessment (HRA) is not required for the Proposed Project. Therefore, no significant adverse air quality impacts are identified or anticipated, and no mitigation measures are required.

WATER QUALITY

A Hydrology Study was prepared for the Proposed Project dated August 16, 2023, revised July 22, 2024 by Land Development Design Company, LLC (LDDC), the results are summarized herein (Appendix E). The Proposed Project would disturb approximately four (4) acres and would therefore be subject to the National Pollutant Discharge Elimination System (NPDES) permit. The State of California is authorized to administer various aspects of the NPDES. Construction activities covered under the State's General Construction permit include the removal of vegetation, grading, excavating, or any other activity that causes the disturbance of one acre or more. The General Construction permit requires recipients to reduce or eliminate non-storm water discharges into stormwater systems, and to develop and implement a SWPPP. The SWPPP is based on the principles of Best Management Practices (BMPs) to control and abate pollutants. The SWPPP must include BMPs to prevent Project-related pollutants from impacting surface waters.

The RWQCB has issued an area wide NPDES Storm Water Permit for the County of San Bernardino, the San Bernardino County Flood Control District and the unincorporated areas of San Bernardino County. The implementation of NPDES permits ensures that the State and Federal mandatory standards for the maintenance of clean water are met.

The State of California is authorized to administer various aspects of the National Pollutant Discharge Elimination System (NPDES). Construction activities covered under the State's General Construction permit include removal of vegetation, grading, excavating, or any other activity that causes the disturbance of one acre or more. Since the Proposed Project would disturb approximately 4.0 acres, it is subject to the NPDES permit requirements. Pursuant to Fontana Municipal Code (FMC) Section 23-516, *Compliance with Mandated Best Management Practices*, operation of the Proposed Project would be required to comply with applicable BMPs that may include waste storage areas to reduce pollution introduction, outdoor material storage areas to reduce pollution introduction, finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement, use of efficient irrigation systems and landscape design, water conservation, smart controllers, and source control. Overall, upon compliance with FMC Chapter 23, Article 9, Preventing Discharge of Pollutants into Storm Drains, and implementation of the BMPs, project construction and operations would not result in any significant effects relating to water quality. Therefore, impacts regarding water quality are considered less than significant.

As demonstrated above, approval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality and therefore Criteria (d) is met.

Criterion (e) *The site can be adequately served by all required utilities and public services.*

The City of Fontana Public Works Department provides wastewater and stormwater collection services and oversees solid waste collection services (contracted to Burrtec), and the Fontana Water Company provides water services to the Project Site. Southern California Edison and Southern California Gas Company would provide electricity and natural gas services, respectively. Additionally, the project would be served by the Fontana Fire Protection District for fire protection services, and the Fontana Police Department for police protection services.

The Project Site is located within the service area of the Fontana Water Company (FWC) as a division of the San Gabriel Valley Water Company. The Proposed Project would include

connection to existing FWC water mains along Hilton Drive. The Proposed Project would be served by the City of Fontana for sewer service; existing service lines are located in Hilton Drive. Thus, the site would be adequately served by all required utilities and services and the project would meet Criterion (e) requirements.

The following analysis considers whether exceptions to the Class 32 Categorical Exemption apply:

Exception (a) A categorical exemption shall not be used for a project under Classes 3, 4, 5, 6, and 11, if the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.

The City is proposing a categorical exemption under Class 32 and not Classes 3, 4, 5, 6, or 11. Therefore, Exception (a) would not apply to the project.

Exception (b) A categorical exemption shall not be used for a project when the cumulative impact of successive projects of the same type in the same place, over time is significant.

For this Exception, that disallows a categorical exemption to be used for a project when the cumulative impact of successive projects "of the same type in the same place over time" has a narrower definition than the broad definition of cumulative impacts as defined and applied elsewhere in CEQA practice. Further in *Robinson v. City & County of San Francisco* (2012) 208 Cal.App.4th 950, 958, the court held that the phrase "in the same place" should be interpreted to refer to the area where the environmental impact will occur and that the affected area will depend on the nature of the environmental impact.

The project involves the development of two industrial warehouses. The Project Site is located within a developed area of the City's west end area consisting predominately industrial uses. Based on the analysis herein, the project would not considerably contribute to any significant impacts. As such, project impacts are not cumulatively considerable, and Exception Criterion (b) would not apply to the project.

Exception (c) A categorical exemption shall not be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances.

This exception applies only when both unusual circumstances and a significant impact as a result of those unusual circumstances are shown. (*Berkeley Hillside Preservation v City of Berkeley "Berkeley Hillside*" (2015) 60 Cal.4th 1086, 1104) As the Supreme Court explained in *Berkeley Hillside*, the City's determination whether this exception applies involves two distinct questions: (1) whether the project presents unusual circumstances, and (2) if the project presents unusual circumstances, whether there is a reasonable possibility that a significant environmental impact will result from those unusual circumstances. (60 Cal.4th at 1098.) The City considers the second prong of this two-part test only if it first finds that some circumstance of the project is unusual. If the City finds that the project does not present unusual circumstances, the exception is inapplicable, and the agency need not reach the second prong of the two-part test.

Here, the City's determination whether the proposed project presents unusual circumstances involves a factual inquiry under which the City weighs the relevant evidence to determine if those circumstances are unusual in comparison with other projects in the CEQA Guidelines Section 15332. The Proposed Project would not be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances and involves construction activities typical for other similar projects in the City that have been approved pursuant to the CEQA Guidelines section 15332 exemption. An example of a similar project approved by the City pursuant to the CEQA Guidelines Section 15332 exemption is the warehouse project (MCN22-057), which was approved by the Fontana Planning Commission on December 20, 2022.

The summer and winter season operational and construction emissions are below SCAQMD thresholds. The Proposed Project would not exceed any SCAQMD thresholds for criteria pollutants. Additionally, the Proposed Project's localized emissions are not anticipated to exceed Localized Significance Thresholds because emissions would be temporary, limited in intensity, and would occur over a short duration. Construction and operational activities would comply with applicable air quality regulations and incorporate standard best management practices, which would minimize pollutant concentrations near the Project site. Additionally, the distance to nearby sensitive receptors and prevailing dispersion conditions would reduce the potential for localized air quality impacts. Therefore, localized emissions would remain below significance thresholds.

The Project Site is located within the developed western area of the City and is mostly surrounded by urban land uses. There are no sensitive natural communities on the Project Site. No endangered, rare, or threatened species, as defined in CEQA Guidelines Section 15380, are expected to inhabit the site. The site is not within the designated critical habitat of any species. As such, the Project Site has no value as habitat for endangered, rare, or threatened species. With implementation of the Conditions of Approval, impacts to biological resources would be less than significant.

The existing noise levels range between 62.9 and 65.6 dBA CNEL and existing plus project construction noise levels would range between 63.2 and 65.7 dBA CNEL. Project construction traffic would result in a less than 1 dB increase along both roadways and would not exceed the applicable FICON noise increase thresholds. Impacts would be less than significant and no mitigation measures are required. The Proposed Project is considered an allowed use in accordance with the General Plan and West End Specific Plan standards. The proposed warehouses show compatibility with the surrounding industrial developments. Therefore, anticipated warehouses noise associated with the project is not expected to exceed the City's noise standards and would not introduce a new substantial noise source compared to existing conditions. Impacts would be less than significant.

The Proposed Project satisfies the City-established vehicle miles traveled (VMT) screening criteria for projects generating less than 500 daily trip. The Proposed Project is forecast to generate approximately 99 daily vehicle trips, including 9 vehicle trips during the AM peak hour and 11 vehicle trips during the PM peak hour which equates to approximately 150 daily PCE trips, including 13 PCE trips during the AM peak hour and 15 PCE trips during the PM peak hour.. Therefore, based on the City's guidelines, the project would be screened out from a VMT analysis based on the daily trip thresholds and is anticipated to have a less than significant VMT impact. As such, there is no evidence that the Proposed Project will, result in a significant effect on the environment.

Exception (d) A categorical exemption shall not be used for a project which may result in damage to scenic resources, including but not limited to, trees, historic buildings, rock outcroppings, or similar resources, within a highway officially designated as a State scenic highway.

Based on the San Bernardino Countywide Map: NR-3 Scenic Routes & Highways, there are no scenic highways near the Project Site or within the City of Fontana.[6] The closest officially designated or eligible State scenic highway is Lytle Creek Canyon Drive located approximately 6.0 miles to the north in Rancho Cucamonga, San Bernadino County. Given the distance of the Project Site to Lytle Creek Canyon Drive and intervening topography, vegetation, and structures, the project would not be visible. As such, the Proposed Project would have no impact on scenic resources within a State scenic highway and Exception (d) would not apply.

Exception (e) A categorical exemption shall not be used for a project located on a site which is included on any list complied pursuant to Section 65962.5 of the Government Code.

Government Code Section 65962.5 requires the Department of Toxic Substance Control and State Water Resources Control Board to compile and update a regulatory site listing (per the criteria of the Section). The California Department of Health Services is also required to compile and update, as appropriate, a list of all public drinking water wells that contain detectable levels of organic contaminants and that are subject to water analysis pursuant to Health and Safety Code Section 116395. Section 65962.5 requires the local enforcement agency, as designated pursuant to Section 18051 of Title 14 of the CCR, to compile, as appropriate, a list of all solid waste disposal facilities from which there is a known migration of hazardous waste. The Project Site is not currently listed pursuant to Government Code Section 65962.5 (Cortese List).[7] As such, Exception (e) would not apply.

Exception (f) A categorical exemption shall not be used for a project which may cause a substantial adverse change in the significance of a historical resource.

A Cultural Resources Report dated March 2022 were prepared for the Proposed Project by LSA Associates. (Appendix F). The findings are summarized herein.

According to LSA, the cultural resources records search was completed for the project area by the South Central Coastal Information Center (SCCIC) located at California State University, Fullerton. It included a review of all recorded historic and prehistoric archaeological sites within one mile of the project. Data from the SCCIC indicate there have been 23 cultural resource studies previously conducted within one mile of the proposed project, three of which included the entirety of the project area. Although no cultural resources are documented within the project area, 21 built environment resources are recorded within one mile. The nearest is approximately 100 feet south of the project. Only one of the resources is listed in the BERD (36-015392). No prehistoric resources are documented within a mile.

A cultural resources records search, additional research, and a field survey were conducted for the project area. No cultural resources are documented within the project parcel and none was

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6 San Bernardino Countywide Map:NR-3 Scenic Routes & Highways. Accessed July 25, 2025.

7 California Environmental Protection Agency, *Cortese Listing*, https://calepa.ca.gov/sitecleanup/corteselist/, accessed July 25, 2025.

identified by the survey. No prehistoric resources were documented within a mile, and sensitivity for in situ undocumented subsurface resources is low. Therefore, no further investigation or archaeological monitoring is recommended. However, it is recommended that archaeological monitoring consistent with the City of Fontana's standard condition for cultural resources be implemented. Below is the City of Fontana's standard condition for cultural resources monitoring:

1. Upon discovery of any tribal cultural or archaeological resources, cease construction activities in the immediate vicinity of the find until the find can be assessed. All tribal cultural and archaeological resources unearthed by project construction activities shall be evaluated by the qualified archaeologist and tribal monitor/consultant. If the resources are Native American in origin, interested Tribes (as a result of correspondence with area Tribes) shall coordinate with the landowner regarding treatment and curation of these resources. Typically, the Tribe will request preservation in place or recovery for educational purposes. Work may continue on other parts of the project while evaluation takes place.

Preservation in place shall be the preferred manner of treatment. If preservation in place is not feasible, treatment may include implementation of archaeological data recovery excavation to remove the resource along the subsequent laboratory processing and analysis. All Tribal Cultural Resources shall be returned to the Tribe. Any historic archaeological material that is not Native American in origin shall be curated at a public, non-profit institution with a research interest in the materials, if such an institution agrees to accept the material. If no institution accepts the archaeological material, they shall be offered to the Tribe or a local school or historical society in the area for educational purposes.

Archaeological and Native American monitoring and excavation during construction projects shall be consistent with current professional standards. All feasible care to avoid any unnecessary disturbance, physical modification, or separation of human remains and associated funerary objects shall be taken. Principal personnel shall meet the Secretary of the Interior standards for archaeology and have a minimum of 10 years' experience as a principal investigator working with Native American archaeological sites in southern California. The Qualified Archaeologist shall ensure that all other personnel are appropriately trained and qualified.

As such, Exception (f) would not apply.

CONCLUSION

As detailed above, construction and operations of the Project meets the five criteria required stipulated in CEQA Guidelines Section 15332 to qualify for a Class 32 CE.

REFERENCES

Gandini Group, Inc., Hilton Industrial Facility Project Traffic Memorandum, December 9, 2025

Gandini Group, Inc., Hilton Industrial Facility Project Focused Noise Impact Analysis, December 23, 2025

LSA Associates, Inc., Cultural Resources Report for the Hilton Industrial Facility Business Park Project, March 2022

Land Development Design Company, LLC., Hydrology Study for Lot 2. Tract 13643 APN1110-151-03 Memorandum, February August 16,2023, revised July 22, 2024

California Environmental Protection Agency, *Cortese Listing*, https://calepa.ca.gov/sitecleanup/corteselist/, accessed July 2025.

California Regional Water Quality Control Board Los Angeles Region, *Order R8-2010-0036 (NPDES Permit No. CAS618036), January 29, 2010*, https://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/orders/2010/10_036_sbc_ms4_permit_01_29_10.pdf, accessed July 20 2025.

City of Fontana, *City of Fontana General Plan Land Use Map*, https://www.fontanaca.gov/DocumentCenter/View/44297, accessed July 2025.

City of Fontana, *City of Fontana Zoning District Map*, https://www.fontanaca.gov/DocumentCenter/View/30623/Zoning-District-Map, July 2025.

City of Fontana, *Fontana Forward General Plan Update 2015-2035*, November 13, 2018.

City of Fontana, *Fontana Forward General Plan Update 2015-2035 Draft Environmental Impact Report*, June 2018.

City of Fontana, *Fontana Forward General Plan Update 2015-2045*, *Land Use, Zoning, and Urban Design Element*, updated July 23, 2023

City of Fontana, *Form Based Code Districts*, https://www.fontanaca.gov/DocumentCenter/View/32043/All-Form-Based-Code-Districts, September 10, 2019.

Jennings Environmental , LLC Biological Resources Assessment for Hilton Drive Industrial Project, September 10, 2025

Lilburn Corporation, *CalEEMod Detailed Report*, July 2025.

San Bernardino Countywide Plan Maps, Natural Resources- NR-3 Scenic Routes & Highways, accessed July 2025.

APPENDICES

Appendix A Biological Resources Assessment Letter

Appendix B Traffic Memorandum

Appendix C Noise Impact Analysis

Appendix D CalEEMod Detailed Report

Appendix E Hydrology Study

Appendix F Cultural Resources Study

APPENDIX A
BIOLOGICAL RESOURCES ASSESSMENT LETTER

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September 10, 2025

Lilburn Corporation
Attn: Cheryl Tubbs
1905 Business Center Drive
San Bernardino, CA 92408

RE: BIOLOGICAL RESOURCES ASSESSMENT LETTER REPORT FOR THE HILTON DRIVE INDUSTRIAL PROJECT IN THE CITY OF FONTANA, SAN BERNARDINO COUNTY, CALIFORNIA

Dear Ms. Tubbs,

Jennings Environmental was retained by Lilburn Corporation (Lilburn) to conduct a Biological Resources Assessment of the proposed Hilton Drive Industrial Project (Project). The survey identified vegetation communities, the potential for the occurrence of special status species, or habitats that could support special status wildlife species, and recorded all plants and animals observed or detected within the Project boundary. This biological resources assessment is designed to address the potential effects of the proposed project on designated critical habitats and/or any species currently listed or formally proposed for listing as endangered or threatened under the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA) or species designated as sensitive by the California Department of Fish and Wildlife (CDFW) or the California Native Plant Society (CNPS). Information contained in this document is in accordance with accepted scientific and technical standards that are consistent with the requirements of the United States Fish and Wildlife Service (USFWS) and (CDFW).

Project Description and Location

The proposed Project is to develop the 3.37-acre site with two industrial buildings. Both buildings will have office space, warehouse space, and trucking bays. Additional improvements include parking, landscaping, and lighting.

The Project is generally located in Section 2, Township 1 South, Range 6 West, and is depicted in the *Fontana* U.S. Geological Survey's (USGS) 7.5-minute topographic map. More specifically, the project is located within Assessor Parcel Number (APN) 1110-151-03, within the City of Fontana, San Bernardino County, California. The site is bordered by commercial and industrial uses on all sides, with a Southern California Edison office and storage yard to the west.

Methods

Prior to performing the updated field survey, existing documentation relevant to the Project site was reviewed. The most recent records of the California Natural Diversity Database (CNDDB) managed by CDFW (CDFW 2025), the USFWS Critical Habitat Mapper (USFWS 2025), and the California Native

Plant Society's Electronic Inventory (CNPSEI) of Rare and Endangered Vascular Plants of California (CNPS 2024) were reviewed for the following quadrangles containing and surrounding the Project site: *Fontana, Devore, Guasti, and Cucamonga Peak* USGS 7.5-minute quadrangles. The *Devore, Guasti, and Cucamonga Peak* quads were included in this search due to the site's proximity to their borders. These databases contain records of reported occurrences of rare, federal- or state-listed endangered or threatened species, California Species of Concern (SSC), or otherwise special status species or habitats that may occur within or in the immediate vicinity of the Project site.

Jennings biologist, Gene Jennings, conducted the general reconnaissance survey within the Project site to identify the potential for the occurrence of special status species, vegetation communities, or habitats that could support special status wildlife species. The surveys were conducted on foot, throughout the Project site between 0730 and 0830 hours on September 10, 2025. Weather conditions during the survey included temperatures ranging from 62 – 64 degrees Fahrenheit, with cloudy skies, no precipitation, and 0 to 2 miles per hour winds. Photographs of the Project site were taken to document existing conditions and are included in Attachment B.

Results

Habitat and Wildlife

The habitat on-site consists of disturbed ruderal vegetation and bare gravel ground. The site showed signs of previous development, concrete pads. Additionally, the site is highly disturbed, and soils consist of imported fill material, likely from the surrounding developed sites. The site is also being maintained through weed abatement (mowing or weed whacking) as evidenced by the minimal amount of vegetation on-site and dried, broken plant parts. Plant species observed on site are: tumbleweed (*Salsola tragus*), lemon gum (*Corymbia citriodora*), telegraphweed (*Heterotheca grandiflora*), dove weed (*Croton setiger*), Mediterranean mustard (*Hirschfeldia incana*), desert poplar (Populus euphratica), and flatspine burragweed (*Ambrosia acanthicarpa*). None of these plants are documented as rare using the CNPS California Rare Plant Rank (CRPR) of 1 or 2.

Animal species observed or otherwise detected on or in the vicinity of the project site during the surveys included: mourning dove (*Zenaida macroura*), common raven (*Corvus corax*), Anna's hummingbird (*Calypte anna*), house finch (*Haemorhous mexicanus*), and house sparrow (*Passer domesticus*). None of the animal species documented on-site are considered rare, endangered, or threatened.

The Project site is located within a largely developed portion of the City of Fontana. As mentioned above, the site is continually maintained, and portions were previously developed. As such the site offers no habitat for any listed species.

CNDDB Results

According to the CNDDB, CNPSEI, and other relevant literature and databases, 87 sensitive or rare species, 18 of which are listed as threatened or endangered, and 5 sensitive habitats, have been documented in the *Fontana, Devore, Guasti, and Cucamonga Peak* quads. This list of sensitive species and habitats includes any State and/or federally-listed threatened or endangered species, CDFW-designated Species of Special Concern (SSC), and otherwise Special Animals. "Special Animals" is a general term that refers to all of the taxa the CNDDB is interested in tracking, regardless of their legal or protection status. This list is also referred to as the list of "species at risk" or "special status species." The CDFW considers the taxa on this list to be those of greatest conservation need.

An analysis of the likelihood of the occurrence of all CNDDB-sensitive species documented in the *Fontana, Devore, Guasti, and Cucamonga Peak* quads is provided in Table 1, in Attachment C. This analysis takes into account species range as well as documentation within the vicinity of the project area and includes the habitat requirements for each species and the potential for their occurrence on the site, based on required habitat elements and range relative to the current site conditions. According to the databases, no sensitive habitat, including USFWS-designated critical habitat, occurs within or adjacent to the project site.

Designated Critical Habitat and San Bernardino County Biotic Resources Overlay

The site is not located within or adjacent to any USFWS-designated Critical Habitat. No further action is required.

The site is within the identified boundary for burrowing owl on the San Bernardino County Biotic Resources Overlay. See below for findings related to this species, based on the completed habitat assessment.

Special Status Species Background

Burrowing owl (BUOW) {*Athene cunicularia*} [State – Candidate Endangered]

The BUOW is a state and federal SSC. This owl is a mottled, brownish, sand-colored, dove-sized raptor, with large, yellow eyes, a rounded head lacking ear tufts, white eyebrows, and long legs compared to other owl species. It is a ground-dwelling owl typically found in arid prairies, fields, and open areas where vegetation is sparse and low to the ground. The BUOW is heavily dependent upon the presence of mammal burrows, with ground squirrel burrows being a common choice, in its habitat to provide shelter from predators, and inclement weather, and to provide a nesting place. They are also known to make use of human-created structures, such as cement culverts and pipes, for burrows.

BUOW spends a great deal of time standing on dirt mounds at the entrance to a burrow or perched on a fence post or other low-to-the-ground perch from which they hunt for prey. BUOW frequently hunt by hovering in place above the ground and dropping on their prey from above. They feed primarily on insects such as grasshoppers, June beetles, and moths, but will also take small rodents, birds, and reptiles. They are active during the day and night but are considered a crepuscular owl; generally observed in the early morning hours or at twilight. The breeding season for BUOW is February 1 through August 31. Up to 11, but typically 7 to 9, eggs are laid in a burrow, abandoned pipe, or other subterranean hollows where incubation is complete in 28-30 days. Young BUOW fledges in 44 days. The BUOW is considered a migratory species in portions of its range, which includes western North America from Canada to Mexico, and east to Texas and Louisiana. BUOW populations in California are considered to be sedentary or locally migratory.

Throughout its range, the BUOW is vulnerable to habitat loss, predation, vehicular collisions, and destruction of burrow sites, and the poisoning of ground squirrels. BUOW has disappeared from significant portions of their range in the last 15 years. The BUOW is listed under the California Endangered Species Act as a candidate species. The BUOW is a migratory bird protected by the international treaty under the Migratory Bird Treaty Act of 1918 and by State law under the California Fish and Game Code (CDFG Code #3513 & #3503.5).

***Findings**:* The conditions present on-site are not suitable for BUOW. California ground squirrels, a burrow surrogate species, were not observed on-site. No evidence of BUOW was found in the survey area. No burrows of appropriate size, aspect, or shape were located and no BUOW pellets, feathers, or whitewash were found. No burrowing owl individuals were observed. Additionally, the site does not contain friable soils, as evidence of gravel and cobble fill was found on-site. These factors preclude this species from the site. Therefore, no further surveys or mitigation measures are required or recommended.

Conclusions and Recommendations

Based on the literature review and personal observations made in the immediate vicinity, no rare, State and/or federally-listed threatened or endangered species are documented/or expected to occur within the Project site. Additionally, no plant species with the CNPS California Rare Plant Rank (CRPR) of 1 or 2 were observed on-site or documented to occur on-site in the relevant databases. No other sensitive species were observed within the project area or buffer area.

The Project Site is highly disturbed. The habitat on-site is ruderal/disturbed vegetation with gravel surfaces. The site offers no suitable habitat for any rare sensitive species including listed species. Therefore, no further surveys are required.

Nesting Birds

Although the site is highly disturbed, there is some habitat within the Project site and adjacent area that is suitable for nesting birds in general. In general, the following condition of approval should be implemented prior to construction.

> Nesting bird season generally extends from February 1 through September 15 in southern California and specifically, March 15 through August 31 for migratory passerine birds. To avoid impacts to nesting birds (common and special status) during the nesting season, a qualified Avian Biologist will conduct pre-construction Nesting Bird Surveys (NBS) prior to Project-related disturbance to nestable vegetation to identify any active nests. If no active nests are found, no further action will be required. If an active nest is found, the biologist will set appropriate no-work buffers around the nest which will be based on the nesting species, its sensitivity to disturbance, nesting stage, and expected types, intensity, and duration of the disturbance. The nests and buffer zones shall be field-checked weekly by a qualified biological monitor. The approved no-work buffer zone shall be clearly marked in the field, within which no disturbance activity shall commence until the qualified biologist has determined the young birds have successfully fledged and the nest is inactive.

Certification

I hereby certify that the statements furnished herein, and in the attached exhibits present data and information required for this analysis to the best of my ability, and the facts, statements, and information presented are true and correct to the best of my knowledge and belief. This report was prepared in accordance with professional requirements and standards. Fieldwork conducted for this assessment was performed by me. I certify that I have not signed a non-disclosure or consultant confidentiality agreement with the project proponent and that I have no financial interest in the project.

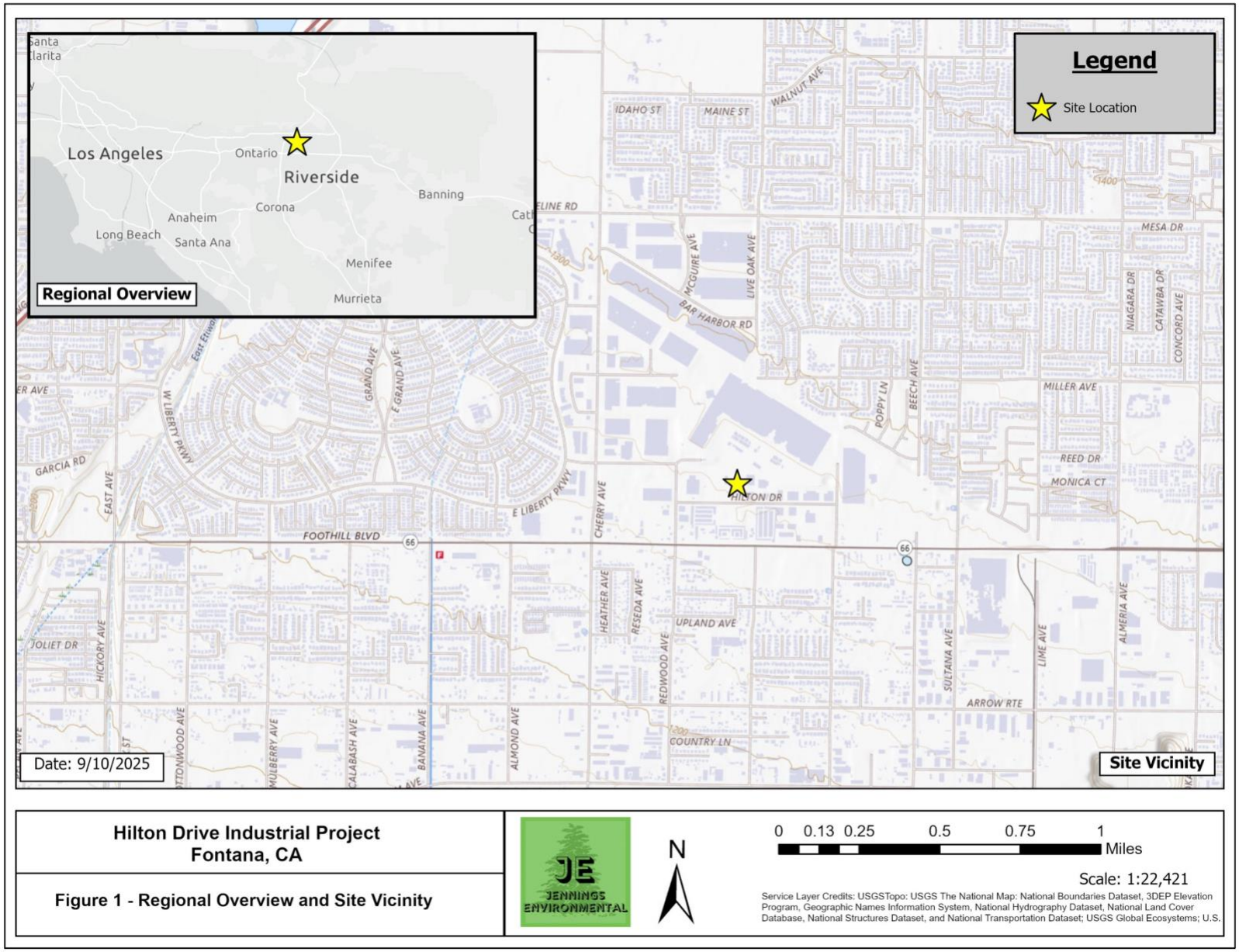
Please do not hesitate to contact me at 909-534-4547 should you have any questions or require further information.
Sincerely,

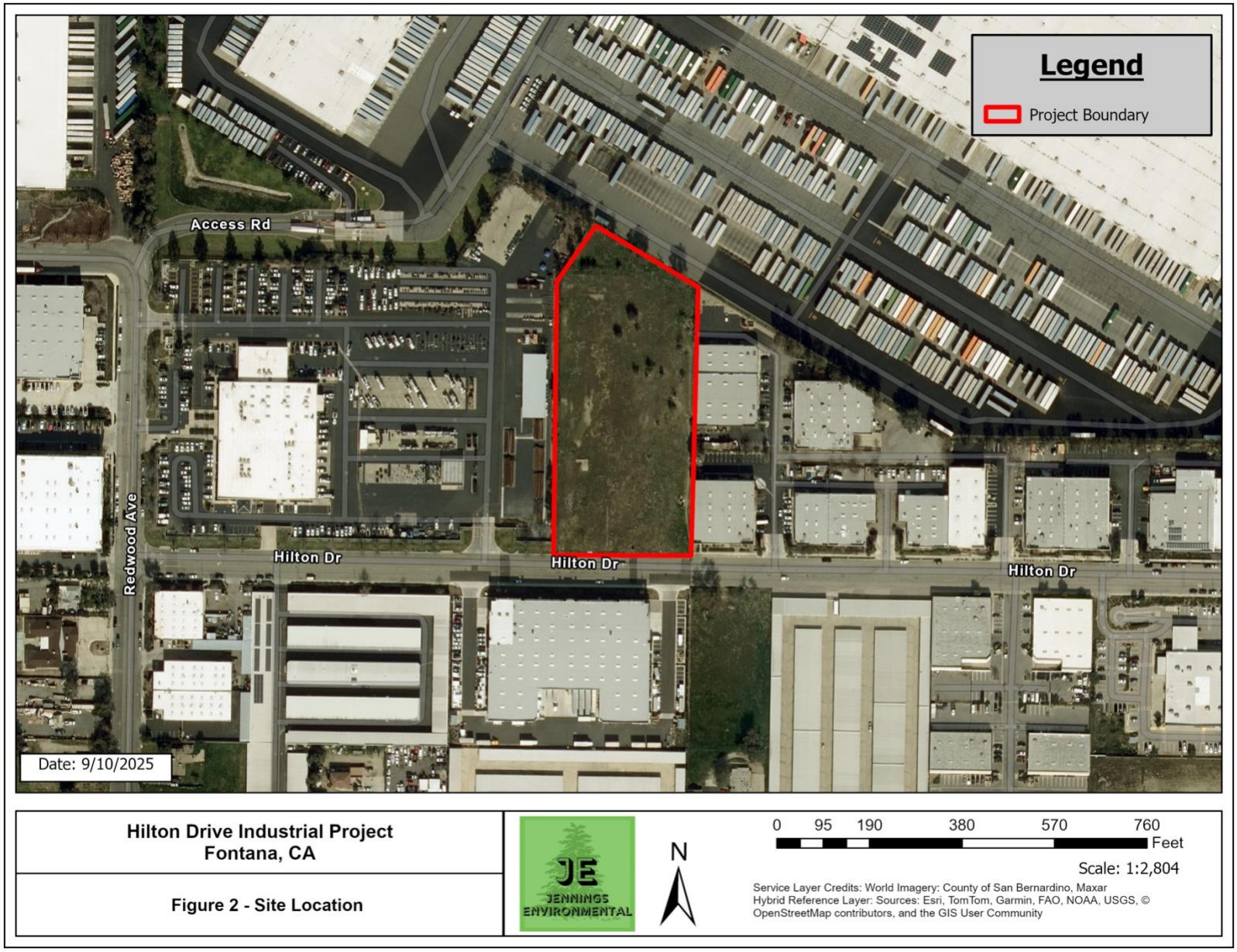
Gene Jennings
Principal/Regulatory Specialist

Attachments:

Attachment A – Figures
Attachment B – Site Photos
Attachment C – Table 1

Attachment A - Figures


Legend
Site Location
Regional Overview
Los Angeles
Ontario
Riverside
Banning
Corona
Anaheim
Long Beach
Santa Ana
Menifee
Murrieta
Date: 9/10/2025
Site Vicinity
Hilton Drive Industrial Project
Fontana, CA
Figure 1 - Regional Overview and Site Vicinity
JE
JENNINGS ENVIRONMENTAL
N
0 0.13 0.25 0.5 0.75 1
Miles
Scale: 1:22,421
Service Layer Credits: USGSTopo: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S.


Legend
Project Boundary
Access Rd
Redwood Ave
Hilton Dr
Hilton Dr
Hilton Dr
Date: 9/10/2025
Hilton Drive Industrial Project
Fontana, CA
Figure 2 - Site Location
JE
JENNINGS ENVIRONMENTAL
N
0 95 190 380 570 760
Feet
Scale: 1:2,804
Service Layer Credits: World Imagery: County of San Bernardino, Maxar
Hybrid Reference Layer: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Attachment B - Photos

	Photo 1 – Southwest corner of Project site, facing northeast.
	Photo 2 – Center of western edge of Project site, facing east.

	Photo 3 – Center of eastern edge of Project site, facing west.
	Photo 4 – Center of eastern edge of Project site, facing northwest.

Attachment C – Table 1

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Agelaius tricolor	tricolored blackbird	None, Threatened	G1G2, S2, CDFW-SSC	Highly colonial species, most numerous in Central Valley and vicinity. Largely endemic to California. Requires open water, protected nesting substrate, and foraging area with insect prey within a few km of the colony.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Ambrosia monogyra	singlewhorl burrobrush	None, None	G5, S2, 2B.2	Chaparral, Sonoran desert scrub. Sandy soils. 5-475 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Anniella stebbinsi	Southern California legless lizard	None, None	G3, S3, CDFW-SSC	Generally south of the Transverse Range, extending to northwestern Baja California. Occurs in sandy or loose loamy soils under sparse vegetation. Disjunct populations in the Tehachapi and Piute Mountains in Kern County. Variety of habitats; generally in moist, loose soil. They prefer soils with a high moisture content.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Arctostaphylos glandulosa ssp. gabrielensis	San Gabriel manzanita	None, None	G5T3, S3, 1B.2	Chaparral. Rocky outcrops; can be dominant shrub where it occurs. 960-2015 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Arenaria paludicola	marsh sandwort	Endangered, Endangered	G1, S1, 1B.1	Marshes and swamps. Growing up through dense mats of Typha, Juncus, Scirpus, etc. in freshwater marsh. Sandy soil. 3-170 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Arizona elegans occidentalis	California glossy snake	None, None	G5T2, S2, CDFW-SSC	Patchily distributed from the eastern portion of San Francisco Bay, southern San Joaquin Valley, and the Coast, Transverse, and Peninsular ranges, south to Baja California. Generalist reported from a range of scrub and grassland habitats, often with loose or sandy soils.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Artemisiospiza belli belli	Bell's sparrow	None, None	G5T2T3, S3, CDFW-WL	Nests in chaparral dominated by fairly dense stands of chamise. Found in coastal sage scrub in south of range. Nest located on the ground beneath a shrub or in a shrub 6-18 inches above ground. Territories about 50 yds apart.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Asplenium vespertinum	western spleenwort	None, None	G3?, S4, 4.2	Chaparral, Cismontane woodland, Coastal scrub	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Athene cunicularia	burrowing owl	None, Candidate Endangered	G4, S2, CDFW-SSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Batrachoseps gabrieli	San Gabriel slender salamander	None, None	G2G3, S2S3	Known only from the San Gabriel Mtns. Found under rocks, wood, and fern fronds, and on soil at the base of talus slopes. Most active on the surface in winter and early spring.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Bombus crotchii	Crotch's bumble bee	None, Candidate Endangered	G2, S2	Coastal California east to the Sierra-Cascade crest and south into Mexico. Food plant genera include Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia, and Eriogonum.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Bombus pensylvanicus	American bumble bee	None, None	G3G4, S2	Long-tongued; forages on a wide variety of flowers including vetches (Vicia), clovers (Trifolium), thistles (Cirsium), sunflowers (Helianthus), etc. Nests above ground under long grass or underground. Queens overwinter in rotten wood or underground.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
California Walnut Woodland	California Walnut Woodland	None, None	G2, S2.1	Cismontane woodland	This habitat type is **absent** from the Project site.
Calochortus catalinae	Catalina mariposa lily	None, None	G3G4, S3S4, 4.2	Chaparral, Cismontane woodland, Coastal scrub, Valley and foothill grassland	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Calochortus plummerae	Plummer's mariposa-lily	None, None	G4, S4, 4.2	Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest. Occurs on rocky and sandy sites, usually of granitic or alluvial material. Can be very common after fire. 60-2500 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Calochortus weedii var. intermedius	intermediate mariposa-lily	None, None	G3G4T3, S3, 1B.2	Coastal scrub, chaparral, valley and foothill grassland. Dry, rocky calcareous slopes and rock outcrops. 60-1575 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Catostomus santaanae	Santa Ana sucker	Threatened, None	G1, S1, CDFW-SSC	Endemic to Los Angeles Basin south coastal streams. Habitat generalists, but prefer sand-rubble-boulder bottoms, cool, clear water, and algae.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Chaetodipus fallax fallax	northwestern San Diego pocket mouse	None, None	G5T3T4, S3S4	Coastal scrub, chaparral, grasslands, sagebrush, etc. in western San Diego, Riverside, San Bernardino, and Los Angeles Counties, inclusive of Orange County. Sandy, herbaceous areas, usually in association with rocks or coarse gravel.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Chaetodipus fallax pallidus	pallid San Diego pocket mouse	None, None	G5T3T4, S3S4	Desert border areas of San Diego, Riverside, San Bernardino, and Los Angeles counties in desert wash, desert scrub, desert succulent scrub, pinyon-juniper, etc. Sandy, herbaceous areas, usually in association with rocks or coarse gravel.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Chloropyron maritimum ssp. maritimum	salt marsh bird's-beak	Endangered, Endangered	G4?T1, S1, 1B.2	Marshes and swamps, coastal dunes. Limited to the higher zones of salt marsh habitat. 0-10 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Chorizanthe parryi var. parryi	Parry's spineflower	None, None	G3T2, S2, 1B.1	Coastal scrub, chaparral, cismontane woodland, valley and foothill grassland. Dry slopes and flats; sometimes at interface of 2 vegetation types, such as chaparral and oak woodland. Dry, sandy soils. 90-1220 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Chorizanthe xanti var. leucotheca	white-bracted spineflower	None, None	G4T3, S3, 1B.2	Mojavean desert scrub, pinyon and juniper woodland, coastal scrub (alluvial fans). Sandy or gravelly places. 365-1830 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Cicindela tranquebarica viridissima	greenest tiger beetle	None, None	G5T1, S1	Inhabits the woodlands adjacent to the Santa Ana River basin. Usually found in open spots between trees.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Cladium californicum	California saw-grass	None, None	G4, S2, 2B.2	Meadows and seeps, marshes and swamps (alkaline or freshwater). Freshwater or alkaline moist habitats. -40-2150 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Claytonia peirsonii ssp. peirsonii	Peirson's spring beauty	None, None	G2G3T2, S2, 1B.2	Upper montane coniferous forest, subalpine coniferous forest. Granitic scree slopes, often with a sandy or fine soil component and granitic cobbles. 1510-2745 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Coastal and Valley Freshwater Marsh	Coastal and Valley Freshwater Marsh	None, None	G3, S2.1	Marsh & swamp | Wetland	This habitat type is **absent** from the Project site.
Deinandra paniculata	paniculate tarplant	None, None	G4, S4, 4.2	Coastal scrub, Valley and foothill grassland, Vernal pools	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Diplacus johnstonii	Johnston's monkeyflower	None, None	G4, S4, 4.3	Lower montane coniferous forest (disturbed areas, gravelly, roadsides, rocky, scree)	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Dipodomys merriami parvus	San Bernardino kangaroo rat	Endangered, Endangered	G5T1, S1, CDFW-SSC	Alluvial scrub vegetation on sandy loam substrates characteristic of alluvial fans and flood plains. Needs early to intermediate seral stages.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Dipodomys stephensi	Stephens' kangaroo rat	Threatened, Threatened	G2, S3	Primarily annual and perennial grasslands, but also occurs in coastal scrub and sagebrush with sparse canopy cover. Prefers buckwheat, chamise, brome grass and filaree. Will burrow into firm soil.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Dodecahema leptoceras	slender-horned spineflower	Endangered, Endangered	G1, S1, 1B.1	Chaparral, cismontane woodland, coastal scrub (alluvial fan sage scrub). Flood deposited terraces and washes; associates include Encelia, Dalea, Lepidospartum, etc. Sandy soils. 200-765 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Eriastrum densifolium ssp. sanctorum	Santa Ana River woollystar	Endangered, Endangered	G4T1, S1, 1B.1	Coastal scrub, chaparral. In sandy soils on river floodplains or terraced fluvial deposits. 180-705 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Eriogonum microthecum var. alpinum	alpine slender buckwheat	None, None	G5T3, S3, 4.3	Alpine dwarf scrub, Great Basin scrub	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Eriogonum microthecum var. johnstonii	Johnston's buckwheat	None, None	G5T2, S2, 1B.3	Subalpine coniferous forest, upper montane coniferous forest. Slopes and ridges on granite or limestone. 1795-2865 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Eriogonum umbellatum var. minus	alpine sulfur-flowered buckwheat	None, None	G5T4, S4, 4.3	Subalpine coniferous forest, Upper montane coniferous forest	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Eriophyllum lanatum var. obovatum	southern Sierra woolly sunflower	None, None	G5T4, S4, 4.3	Lower montane coniferous forest, Upper montane coniferous forest	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Eugnosta busckana	Busck's gallmoth	None, None	G1G3, S2S3	Coastal southern California. Tiny micro-moth (1 cm) with larva forming galls on host plant Encelia californica (California brittlebush). Adult flight period is during winter, generally from November to February, and have been reported at UV lights and porch lights.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Eumops perotis californicus	western mastiff bat	None, None	G4G5T4, S3S4, CDFW-SSC	Many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, chaparral, etc. Roosts in crevices in cliff faces, high buildings, trees and tunnels.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Fritillaria pinetorum	pine fritillary	None, None	G4, S4, 4.3	Chaparral, Lower montane coniferous forest, Pinyon and juniper woodland, Subalpine coniferous forest, Upper montane coniferous forest	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Galium angustifolium ssp. gabrielense	San Antonio Canyon bedstraw	None, None	G5T3, S3, 4.3	Chaparral, Lower montane coniferous forest	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Galium jepsonii	Jepson's bedstraw	None, None	G3, S3, 4.3	Lower montane coniferous forest, Upper montane coniferous forest	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Galium johnstonii	Johnston's bedstraw	None, None	G4, S4, 4.3	Chaparral, Lower montane coniferous forest, Pinyon and juniper woodland, Riparian woodland	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Gila orcuttii	arroyo chub	None, None	G1, S2, CDFW-SSC	Native to streams from Malibu Creek to San Luis Rey River basin. Introduced into streams in Santa Clara, Ventura, Santa Ynez, Mojave and San Diego river basins. Slow water stream sections with mud or sand bottoms. Feeds heavily on aquatic vegetation and associated invertebrates.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Heuchera caespitosa	urn-flowered alumroot	None, None	G3, S3, 4.3	Cismontane woodland, Lower montane coniferous forest, Riparian forest (montane), Upper montane coniferous forest	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Horkelia cuneata var. puberula	mesa horkelia	None, None	G4T1, S1, 1B.1	Chaparral, cismontane woodland, coastal scrub. Sandy or gravelly sites. 15-1645 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Juglans californica	Southern California black walnut	None, None	G4, S4, 4.2	Chaparral, Cismontane woodland, Coastal scrub, Riparian woodland	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Juncus duranii	Duran's rush	None, None	G3, S3, 4.3	Lower montane coniferous forest, Meadows and seeps, Upper montane coniferous forest	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Lasiurus xanthinus	western yellow bat	None, None	G4G5, S3, CDFW-SSC	Found in valley foothill riparian, desert riparian, desert wash, and palm oasis habitats. Roosts in trees, particularly palms. Forages over water and among trees.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Laterallus jamaicensis coturniculus	California black rail	None, Threatened	G3T1, S2, CDFW-FP	Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Lepechinia fragrans	fragrant pitcher sage	None, None	G3, S3, 4.2	Chaparral	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Lepidium virginicum var. robinsonii	Robinson's pepper-grass	None, None	G5T3, S3, 4.3	Chaparral, coastal scrub. Dry soils, shrubland. 4-1435 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Lepus californicus bennettii	San Diego black-tailed jackrabbit	None, None	G5T3T4, S3S4	Intermediate canopy stages of shrub habitats and open shrub / herbaceous and tree / herbaceous edges. Coastal sage scrub habitats in Southern California.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Lilium humboldtii ssp. ocellatum	ocellated Humboldt lily	None, None	G4T4?, S4?, 4.2	Chaparral, Cismontane woodland, Coastal scrub, Lower montane coniferous forest, Riparian woodland	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Lilium parryi	lemon lily	None, None	G3, S3, 1B.2	Lower montane coniferous forest, meadows and seeps, riparian forest, upper montane coniferous forest. Wet, mountainous terrain; generally in forested areas; on shady edges of streams, in open boggy meadows and seeps. 625-2930 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Linanthus concinnus	San Gabriel linanthus	None, None	G2, S2, 1B.2	Lower montane coniferous forest, upper montane coniferous forest, chaparral. Dry rocky slopes, often in Jeffrey pine/canyon oak forest. 1310-2560 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Lycium parishii	Parish's desert-thorn	None, None	G4, S1, 2B.3	Coastal scrub, Sonoran desert scrub. -3-570 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Malacothamnus parishii	Parish's bushmallow	None, None	GXQ, SX, 1A	Chaparral, coastal sage scrub. In a wash. 305-455 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Monardella australis ssp. jokerstii	Jokerst's monardella	None, None	G4T1?, S1?, 1B.1	Lower montane coniferous forest, chapparal. Steep scree or talus slopes between breccia. Secondary alluvial benches along drainages and washes. 210-1740 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Monardella pringlei	Pringle's monardella	None, None	GX, SX, 1A	Coastal scrub. Sandy hills. 300-400 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Monardella saxicola	rock monardella	None, None	G3, S3, 4.2	Chaparral, Closed-cone coniferous forest, Lower montane coniferous forest	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Muhlenbergia californica	California muhly	None, None	G4, S4, 4.3	Coastal scrub, chaparral, lower montane coniferous forest, meadows and seeps. Usually found near streams or seeps. 100-2000 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Muhlenbergia utilis	aparejo grass	None, None	G4, S2S3, 2B.2	Meadows and seeps, marshes and swamps, chaparral, coastal scrub, cismontane woodland. Sometimes alkaline, sometimes serpentinite. 25-2325 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Navarretia prostrata	prostrate vernal pool navarretia	None, None	G2, S2, 1B.2	Coastal scrub, valley and foothill grassland, vernal pools, meadows and seeps. Alkaline soils in grassland, or in vernal pools. Mesic, alkaline sites. 3-1235 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Neolarra alba	white cuckoo bee	None, None	GH, SH	Known only from localities in Southern California. Cleptoparasitic in the nests of perdita bees.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Neotoma lepida intermedia	San Diego desert woodrat	None, None	G5T3T4, S3S4, CDFW-SSC	Coastal scrub of Southern California from San Diego County to San Luis Obispo County. Moderate to dense canopies preferred. They are particularly abundant in rock outcrops, rocky cliffs, and slopes.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Nyctinomops femorosaccus	pocketed free-tailed bat	None, None	G5, S3, CDFW-SSC	Variety of arid areas in Southern California; pine-juniper woodlands, desert scrub, palm oasis, desert wash, desert riparian, etc. Rocky areas with high cliffs.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Oncorhynchus mykiss irideus pop. 10	steelhead - southern California DPS	Endangered, Candidate Endangered	G5T1Q, S1,	Federal listing refers to populations from Santa Maria River south to southern extent of range (San Mateo Creek in San Diego County). Southern steelhead likely have greater physiological tolerances to warmer water and more variable conditions.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Opuntia basilaris var. brachyclada	short-joint beavertail	None, None	G5T3, S3, 1B.2	Chaparral, Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodland. Sandy soil or coarse, granitic loam. 425-2015 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Oreonana vestita	woolly mountain-parsley	None, None	G3, S3, 1B.3	Subalpine coniferous forest, upper montane coniferous forest, lower montane coniferous forest. High ridges; on scree, talus, or gravel. 800-3370 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Ovis canadensis nelsoni	desert bighorn sheep	None, None	G4T3, S3, CDFW-FP	Widely distributed from the White Mtns in Mono Co. to the Chocolate Mts in Imperial Co. Open, rocky, steep areas with available water and herbaceous forage.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Perognathus longimembris brevinasus	Los Angeles pocket mouse	None, None	G5T2, S1S2, CDFW-SSC	Lower elevation grasslands and coastal sage communities in and around the Los Angeles Basin. Open ground with fine, sandy soils. May not dig extensive burrows, hiding under weeds and dead leaves instead.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Phacelia mohavensis	Mojave phacelia	None, None	G4Q, S4, 4.3	Cismontane woodland, Lower montane coniferous forest, Meadows and seeps, Pinyon and juniper woodland	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Phacelia stellaris	Brand's star phacelia	None, None	G1, S1, 1B.1	Coastal scrub, coastal dunes. Open areas. 3-370 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Phrynosoma blainvillii	coast horned lizard	None, None	G4, S4, CDFW-SSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Polioptila californica californica	coastal California gnatcatcher	Threatened, None	G4G5T3Q, S2, CDFW-SSC	Obligate, permanent resident of coastal sage scrub below 2500 ft in Southern California. Low, coastal sage scrub in arid washes, on mesas and slopes. Not all areas classified as coastal sage scrub are occupied.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Pseudognaphalium leucocephalum	white rabbit-tobacco	None, None	G4, S2, 2B.2	Riparian woodland, cismontane woodland, coastal scrub, chaparral. Sandy, gravelly sites. 35-515 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Quercus durata var. gabrielensis	San Gabriel oak	None, None	G4T3, S3, 4.2	Chaparral, Cismontane woodland	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Rana muscosa	southern mountain yellow-legged frog	Endangered, Endangered	G1, S2, CDFW-WL	Disjunct populations known from southern Sierras (northern DPS) and San Gabriel, San Bernardino, and San Jacinto Mtns (southern DPS). Found at 1,000 to 12,000 ft in lakes and creeks that stem from springs and snowmelt. May overwinter under frozen lakes. Often encountered within a few feet of water. Tadpoles may require 2 - 4 yrs to complete their aquatic development.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Rhaphiomidas terminatus abdominalis	Delhi Sands flower-loving fly	Endangered, None	G1T1, S1	Found only in areas of the Delhi Sands formation in southwestern San Bernardino and northwestern Riverside counties. Requires fine, sandy soils, often with wholly or partly consolidated dunes and sparse vegetation. Oviposition req. shade.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Rhinichthys gabrielino	Santa Ana speckled dace	Proposed Threatened, None	G5T1, S1, CDFW-SSC	Headwaters of the Santa Ana and San Gabriel rivers. May be extirpated from the Los Angeles River system. Requires permanent flowing streams with summer water temps of 17-20 C. Usually inhabits shallow cobble and gravel riffles.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Riversidian Alluvial Fan Sage Scrub	Riversidian Alluvial Fan Sage Scrub	None, None	G1, S1.1	Coastal scrub	This habitat type is **absent** from the Project site.
Sagittaria sanfordii	Sanford's arrowhead	None, None	G3, S3, 1B.2	Marshes and swamps. In standing or slow-moving freshwater ponds, marshes, and ditches. 0-605 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Senecio aphanactis	chaparral ragwort	None, None	G3, S2, 2B.2	Chaparral, cismontane woodland, coastal scrub. Drying alkaline flats. 20-1020 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Senecio astephanus	San Gabriel ragwort	None, None	G3, S3, 4.3	Chaparral, Coastal scrub	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Southern Riparian Forest	Southern Riparian Forest	None, None	G4, S4	Riparian forest	This habitat type is **absent** from the Project site.
Southern Sycamore Alder Riparian Woodland	Southern Sycamore Alder Riparian Woodland	None, None	G4, S4	Riparian woodland	This habitat type is **absent** from the Project site.
Spea hammondii	western spadefoot	Proposed Threatened, None	G2G3, S3S4, CDFW-SSC	Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Sphenopholis obtusata	prairie wedge grass	None, None	G5, S2, 2B.2	Cismontane woodland, meadows and seeps. Open moist sites, along rivers and springs, alkaline desert seeps. 15-2625 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Streptanthus bernardinus	Laguna Mountains jewelflower	None, None	G3G4, S3S4, 4.3	Chaparral, lower montane coniferous forest. Clay or decomposed granite soils; sometimes in disturbed areas such as streamsides or roadcuts. 1440-2500 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Scientific Name	Common Name	Federal/State Status	Other Status	Habitat	Potential to Occur
Symphyotrichum defoliatum	San Bernardino aster	None, None	G2, S2, 1B.2	Meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland. Vernally mesic grassland or near ditches, streams and springs; disturbed areas. 3-2045 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Thamnophis hammondii	two-striped gartersnake	None, None	G4, S3S4, CDFW-SSC	Coastal California from vicinity of Salinas to northwest Baja California. From sea to about 7,000 ft elevation. Highly aquatic, found in or near permanent fresh water. Often along streams with rocky beds and riparian growth.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Viola pinetorum ssp. grisea	grey-leaved violet	None, None	G4G5T3, S3, 1B.2	Subalpine coniferous forest, upper montane coniferous forest, meadows and seeps. Dry mountain peaks and slopes. 1580-3700 m.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.
Vireo bellii pusillus	least Bell's vireo	Endangered, Endangered	G5T2, S3	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft. Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	Suitable habitat for this species does not occur on site. As such, this species is considered **absent** from the Project site.

Coding and Terms

E = Endangered T = Threatened C = Candidate FP = Fully Protected WL = Watch List SSC = Species of Special Concern R = Rare

State Species of Special Concern: An administrative designation given to vertebrate species that appear to be vulnerable to extinction because of declining populations, limited acreages, and/or continuing threats. Raptor and owls are protected under section 3502.5 of the California Fish and Game code: "It is unlawful to take, possess or destroy any birds in the orders Falconiformes or Strigiformes or to take, possess or destroy the nest or eggs of any such bird."

State Fully Protected: The classification of Fully Protected was the State's initial effort in the 1960's to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, mammals, amphibians and reptiles. Fully Protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock.

Global Rankings (Species or Natural Community Level):

G1 = Critically Imperiled – At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2 = Imperiled – At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3 = Vulnerable – At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4 = Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5 = Secure – Common; widespread and abundant.
? = Uncertainty in the exact status of an element (could move up or down one direction from current rank)

Subspecies Level: Taxa which are subspecies or varieties receive a taxon rank (T-rank**)** attached to their G-rank. Where the G-rank reflects the condition of the entire species, the T-rank reflects the global situation of just the subspecies. For example: the Point Reyes mountain beaver, *Aplodontia rufa* ssp. *phaea* is ranked G5T2. The G-rank refers to the whole species range i.e., *Aplodontia rufa*. The T-rank refers only to the global condition of ssp. *phaea*.

State Ranking:

S1 = Critically Imperiled – Critically imperiled in the State because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the State.
S2 = Imperiled – Imperiled in the State because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the State.
S3 = Vulnerable – Vulnerable in the State due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the State.
S4 = Apparently Secure – Uncommon but not rare in the State; some cause for long-term concern due to declines or other factors.
S5 = Secure – Common, widespread, and abundant in the State.

California Rare Plant Rankings (CNPS List):

1A = Plants presumed extirpated in California and either rare or extinct elsewhere.
1B = Plants rare, threatened, or endangered in California and elsewhere.
2A = Plants presumed extirpated in California, but common elsewhere.
2B = Plants rare, threatened, or endangered in California, but more common elsewhere.
3 = Plants about which more information is needed; a review list.
4 = Plants of limited distribution; a watch list.

Threat Ranks:

.1 = Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 = Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
.3 = Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

APPENDIX B
TRAFFIC MEMORANDUM

TECHNICAL MEMORANDUM

TO: Ms. Cheryl Tubbs | LILBURN CORPORATION

FROM: Perrie Ilercil, Senior Engineer | GANDDINI GROUP, INC.

DATE: December 9, 2025

SUBJECT: Hilton Industrial Facility Project (EST24-00008) Transportation Screening Assessment
GGI Project No. 19866

Ganddini Group, Inc. is pleased to provide this Transportation Screening Assessment for the Hilton Industrial Facility project in the City of Fontana. The purpose of this memorandum is to determine if the preparation of a traffic impact analysis with level of service (LOS) analysis or vehicle miles traveled (VMT) analysis is necessary based on the transportation study guidelines and screening criteria established by the City of Fontana. We trust the findings of this analysis will aid the City of Fontana in assessing the project.

PROJECT DESCRIPTION

The 4.01-acre project site (APN: 1110-151-03) is located on the northside of Hilton Drive approximately 950 feet east of Redwood Avenue in the City of Fontana, California. The project site is currently vacant and zoned industrial in the West End Specific Plan.

The proposed project involves the development of two warehouse buildings with a total of 71,985 square feet. Vehicle access for the project site is proposed via two driveways onto Hilton Drive. The proposed site plan is shown in Attachment A

TRIP GENERATION

Table 1 shows the proposed project trips based on trip generation rates obtained from the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (12th Edition, 2025) for Land Use Code 150 (Warehouse).

Truck Trips

The project industrial trip generation was also calculated in terms of Passenger Car Equivalent (PCE) trips. The percentage of truck trips was obtained from the ITE *Trip Generation Manual* (12th Edition, 2025). The truck mix by axle type was determined based on recommendations for non-cold storage warehouse from the *Warehouse Truck Trip Study Results and Usage*, by South Coast Air Quality Management District, July 17, 2014. Truck trips were converted to PCE trips based on the City of Fontana equivalent factors of 2.0 for 2-axle light-duty trucks, 2.5 for 3-axle medium-duty trucks, and 3.0 for 4+-axle heavy-duty trucks.

Project Trips

As shown in Table 1, the proposed project is forecast to approximately 99 daily vehicle trips, including 9 vehicle trips during the AM peak hour and 11 vehicle trips during the PM peak hour which equates to

approximately 150 daily PCE trips, including 13 PCE trips during the AM peak hour and 15 PCE trips during the PM peak hour.

CRITERIA FOR THE PREPARATION OF TRAFFIC IMPACT ANALYSES

The project has been assessed to determine if the preparation of a traffic impact analysis with level of service (LOS) analysis and vehicle miles traveled (VMT) analysis is necessary based on the criteria established as specified in the *City of Fontana Transportation Impact Analysis (TIA) Guidelines for Vehicle Miles Traveled (VMT) and Level of Service Assessment (LOS) (October 2020)* ["City TIA Guidelines"].

Level of Service Screening Criteria (General Plan Conformity)

As specified in the City TIA Guidelines, the requirement to prepare a transportation impact study with level of service (LOS) analysis should be based on one or more of the following criteria:

- If a project is forecast to exceed the Congestion Management Program (CMP) threshold of 250 two-way peak hour trips, a traffic impact analysis will be required.
- If a project is forecast to generate between 100 and 249 two-way peak hour trips, a traffic impact analysis will be required, but the extent of the analysis will be lesser.
- If a project generated between 50 and 100 two-way peak hour trips, a focused traffic analysis will be required.
- If a project generates less than 50 peak hour trips, a traffic analysis report shall not be required, and a trip generation memo will be considered sufficient unless the City has specific concerns related to project access and interaction with adjacent intersections.

The project would generate and contribute fewer than 50 peak hour trips to any intersection of two streets designated as Collector or higher on the City's General Plan circulation system. The project does not propose any deviation from the City's TIA Guidelines or design standards. Subject to verification by the City Traffic Engineer, the project does not appear to contribute to unique existing or proposed traffic conditions in the project vicinity to warrant further evaluation. Therefore, the project does not warrant the preparation of a transportation impact study with LOS analysis based on the City-established screening criteria and LOS impacts may be presumed to be negligible.

Vehicle Miles Traveled Screening Criteria (CEQA)

The vehicle miles traveled (VMT) screening assessment has been prepared in accordance with City TIA Guidelines, which were developed based on guidance from the Office of Planning and Research (OPR) *Technical Advisory on Evaluating Transportation Impacts in CEQA* (State of California, December 2018) ["OPR Technical Advisory"]. In general terms, VMT quantifies the amount and distance of automobile travel attributable to a project or region. The OPR Technical Advisory provides technical considerations regarding methodologies and thresholds with a focus on office, residential, and retail developments as these projects tend to have the greatest influence on VMT.

The City TIA Guidelines identify screening criteria for certain types of projects that typically reduce VMT and may be presumed to result in a less than significant VMT impact. To qualify for VMT screening, the project need only satisfy one of the following screening criteria:

- Projects located within a Transit Priority Area (TPA)
  - Projects located within one-half mile radius of a major transit stop[1] or high-quality transit corridor[2]
- Projects located within a low VMT area
  - Site location can be verified with the web-based or map-based VMT Screening Tool[3]
- Project Type Screening
  - Local-serving retail (less than 50,000 square feet)
  - Projects consisting of land uses which by their nature are local-serving
- Project Net Daily trips less than 500 ADT
  - Projects consisting of land uses which by their nature are local-serving
  - Projects which generate less than net new 500 daily vehicle trips (ADT)

TPA Screening

Projects located within a TPA, defined as within one-half mile of a major transit stop or high-quality transit corridor, may be presumed to result in a less than significant VMT impact absent substantial evidence to the contrary. The City TIA Guidelines note that this screening criteria may not apply if the project has a floor area ratio (FAR) less than 0.75, the project provides more parking than required by the city, the project is inconsistent with applicable Sustainable Communities Strategy (SCS), or the project constructs a smaller number of moderate or high-income residential units than the existing number of affordable residential units.

Based on a review of the San Bernardino County Transportation Authority (SBCTA) VMT Screening Tool, the proposed project is located within a TPA, is consistent with SCS and parking standards and does not displace residential units; however, the project is below the FAR threshold of 0.75. Therefore, the TPA screening criteria is not met.

Low VMT Area Screening

As prescribed in the City TIA Guidelines, the SBCTA VMT Screening Tool was used to assess low VMT area screening for the project. The VMT Screening Tool was developed using the County travel forecasting model to measure VMT performance for individual jurisdictions and for individual traffic analysis zones (TAZs) within the County transportation region. TAZs are geographic polygons similar to census block groups used to represent areas of homogenous travel behavior. Total daily VMT per service population was estimated for each TAZ. This presumption may not be appropriate if the project land uses would alter the existing built environment in such a way as to increase the rate or length of vehicle trips.

Based on the VMT Screening Tool results for the project site, located within TAZ 53716401, the baseline year (2025) VMT per service population for the project TAZ is equal to 53.3 VMT per service population, which is not less than the City-established threshold based on 15 percent below the San Bernardino County regional average baseline (39.0 VMT). Therefore, the project does not satisfy the City-established screening criteria for projects located in a low VMT area.

[1] A major transit stop is defined as an existing rail transit station, ferry terminal with bus or rail service, or the intersection of two or more major bus routes with 20-minute or less headways during the peak commute hours (Pub. Resources Code, § 21064.3 and AB2553).

[2] Fixed route bus service with less than 15-minute headways during the peak commute hours (Pub. Resources Code, § 21155).

[3] The SBCTA VMT Screening Tool was developed from the San Bernardino Transportation Analysis Model (SBTAM) travel forecasting model to measure VMT performance for individual jurisdictions and for individual traffic analysis zones (TAZs).

Project Type Screening

The City TIA Guidelines identify the several types of projects that may be presumed to have a less than significant VMT impact as they are local serving and thus can be expected to reduce VMT or they are small enough to have a negligible impact:

- Projects consisting of local serving retail (less than 50,000)
  - Supermarket
  - Restaurant/café/bar
  - Coffee/donut shop
  - Dry cleaners
  - Barbershop
  - Hair/nails salon
  - Walk-in medical clinic
  - Urgent care
  - Auto repair/tire shop
  - Gyms/health club
  - Dance/yoga/fitness/material arts studio

- Projects consisting of land uses which by their nature are local-serving
  - Local-serving K-12 schools
  - Local parks
  - Day care centers
  - Local-serving gas stations
  - Local-serving banks
  - Local-serving hotels (e.g., non-destination hotels)
  - Student housing projects on or adjacent to college campuses
  - Local-serving assembly uses (places of worship, community organizations)
  - Community institutions (public libraries, fires stations, local government)
  - Local-serving community colleges that are consistent with the assumptions noted in the RTP/SCS
  - Affordable or supportive housing
  - Assisted living facilities
  - Senior housing (as defined by HUD)

The project does not consist of any of the specified local land use services; therefore, the proposed project does not satisfy the City-established screening criteria for local essential service projects.

Projects with net daily trips less than 500 ADT

Based on a review of greenhouse emissions produced by several types of projects, the City determined that 500 trips would not to cause a less than significant impact under CEQA.:

- Projects generating with less than 500[4] daily vehicle trips (ADT)
  - Single family residential – 52 Dwelling Units or fewer
  - Multi-family residential – 68 Dwelling Units or fewer
  - General Office – 51,000 square feet of less
  - Light Industrial – 100,000 square feet or less

[4] This threshold was determined not to exceed 3.000MTCO2e per year as outlined in Appendix B of the City TIA Guidelines.

- Warehousing – 287,000 square feet or less
- High-Cube Fulfillment Center Warehouse – 357,000 square feet or less

The project consists of 71,985 square feet of warehouse which generates less than 500 daily trips. Therefore, this screening criteria is met, and the project may be presumed to result in a less than significant VMT impact.

ACTIVE TRANSPORTATION AND PUBLIC TRANSIT ANALYSIS

Existing Conditions

The project site is located on the north side of Hilton Drive approximately 950 feet east of Redwood Avenue. The City of Fontana *General Plan Community Mobility and Circulation Element approved and adopted July 23, 2023*; shows Hilton Drive is classified as a Collector Street (2+ lanes on up to an 80-foot roadway section). On-street parking is not restricted along the project frontage. There are no designated bike facilities currently on Hilton Drive; however, there is an existing Class I bike trail north of the site along the Pacific Electric Trail, and there are proposed Class II bike lanes on Foothill Avenue south of the project site and Cherry Avenue west of the project site. Sidewalks are not currently provided along the project frontage; however, there are existing sidewalks to the east and south of the project site. There are no designated transit routes on Hilton Drive; however, Route 66 runs along Foothill Boulevard south of the project site.

Project Conditions

This analysis also assumes the project shall comply with the following conditions as part of the City of Fontana standard development review process to ensure adequate geometric design and emergency access:

- Site-adjacent roadways shall be constructed or repaired at their ultimate half-section width, including landscaping and parkway improvements in conjunction with development, or as otherwise required by the City of Fontana.

- All on-site and off-site roadway design, signing/striping, and traffic control improvements relating to the proposed project shall be submitted to the City for review and constructed following applicable State/Federal engineering standards to the satisfaction of the City of Fontana.

- The final grading, landscaping, and street improvement plans shall demonstrate that applicable sight distance requirements are met.

- The project shall comply with the City of Fontana municipal parking requirements which will be reviewed as a part of the standard development review process.

- Final project plans shall demonstrate adequate emergency vehicle access and circulation to the satisfaction of the City of Fontana Public Works and Fire Departments.

- A construction worksite traffic control plan shall comply with applicable engineering standards outlined in the California *Manual of Uniform Traffic Control Devices* and shall be submitted to the City for review and approval before the issuance of a grading permit or start of construction. The plan shall identify any roadway, sidewalk, bike route, or bus stop closures and detours as well as haul routes and hours of operation. All construction-related trips shall be restricted to off-peak hours to the extent possible.

The project does not propose any post-construction changes to off-site roadways; therefore, the project

would not conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities. Additionally, the proposed project would be consistent with the City's *Active Transportation Plan* by providing a sidewalk along the project's frontage for greater pedestrian connectivity.

CONCLUSION

The proposed project is forecast to generate approximately 150 daily PCE trips, including 13 PCE trips during the AM peak hour and 15 PCE trips during the PM peak hour.

The proposed project satisfies the City-established LOS screening criteria for projects generating fewer than 50 peak hour trips. Therefore, the proposed project does not warrant the preparation of a transportation impact study with LOS analysis based on the City-established LOS screening criteria.

The proposed project satisfies the City-established vehicle miles traveled (VMT) screening criteria for projects generating less than 500 daily trips. Therefore, preparation of a transportation impact study with VMT analysis is not warranted, and the project may be presumed to result in a less than significant VMT impact.

It has been a pleasure to assist you with this project. Should you have any questions or comments, please contact Perrie Ilercil at (714) 795-3100 ext. 103 or perrie@ganddini.com.

Table 1
Project Trip Generation

Land Use: Warehouse
Size: 71.985 TSF

TRIP GENERATION RATES PER TSF[1]								
		AM Peak Hour			PM Peak Hour			
Vehicle Type	Source[2]	In	Out	Rate	In	Out	Rate	Daily Rate
All Vehicles	ITE 150	77%	23%	0.120	28%	72%	0.150	1.380
Trucks Only	ITE 150	52%	48%	0.020	53%	47%	0.020	0.430
Passenger Car (83.3% AM, 86.7% PM, 68.8% Daily)		0.077	0.023	0.100	0.036	0.094	0.130	0.950
Truck (16.7% AM, 13.3% PM, 31.2% Daily)		0.010	0.010	0.020	0.011	0.009	0.020	0.430
Truck Mix:	SCAQMD							
2-Axle Trucks (16.7%)		0.002	0.002	0.004	0.002	0.002	0.004	0.072
3-Axle Trucks (20.7%)		0.002	0.002	0.004	0.002	0.002	0.004	0.089
4+ Axle Trucks (62.6%)		0.007	0.006	0.013	0.007	0.006	0.013	0.269

VEHICLE TRIPS GENERATED							
	AM Peak Hour			PM Peak Hour			
Vehicle Type	In	Out	Total	In	Out	Total	Daily
Passenger Car	6	2	8	3	7	10	68
Trucks							
2-Axle Trucks	0.1	0.2	0.3	0.2	0.1	0.3	5
3-Axle Trucks	0.1	0.2	0.3	0.2	0.1	0.3	6
4+ Axle Trucks	0.5	0.4	0.9	0.5	0.4	0.9	19
Subtotal	1	0	1	0	1	1	31
Total Vehicle Trips Generated	**7**	**2**	**9**	**3**	**8**	**11**	**99**

PCE[3] TRIPS GENERATED								
Vehicle Type	PCE Factor[4]	AM Peak Hour			PM Peak Hour			Daily
		In	Out	Total	In	Out	Total	
Passenger Car	1.0	6	2	8	3	7	10	68
Trucks								
2-Axle Trucks	2.0	0	1	1	0	1	1	10
3-Axle Trucks	2.5	0	1	1	1	0	1	15
4+ Axle Trucks	3.0	2	1	3	2	1	3	57
Subtotal		2	3	5	3	2	5	82
Total PCE Trips Generated		**8**	**5**	**13**	**6**	**9**	**15**	**150**

Notes:
1. TSF = Thousand Square Feet
2. ITE = Institute of Transportation Engineers *Trip Generation Manual* (12th Edition, 2025); ### = ITE Land Use Code.
   SCAQMD = South Coast Air Quality Management District recommendations for non-cold storage high-cube warehouse.
3. PCE = Passenger Car Equivalent
4. PCE = passenger car equivalent. PCE factors are based on the City of Fontana Traffic Impact Analysis (TIA) Guidelines for Vehicle Miles Traveled (VMT) and Level of Service Assessment (LOS) (October 2020), "Analysis Process Section"

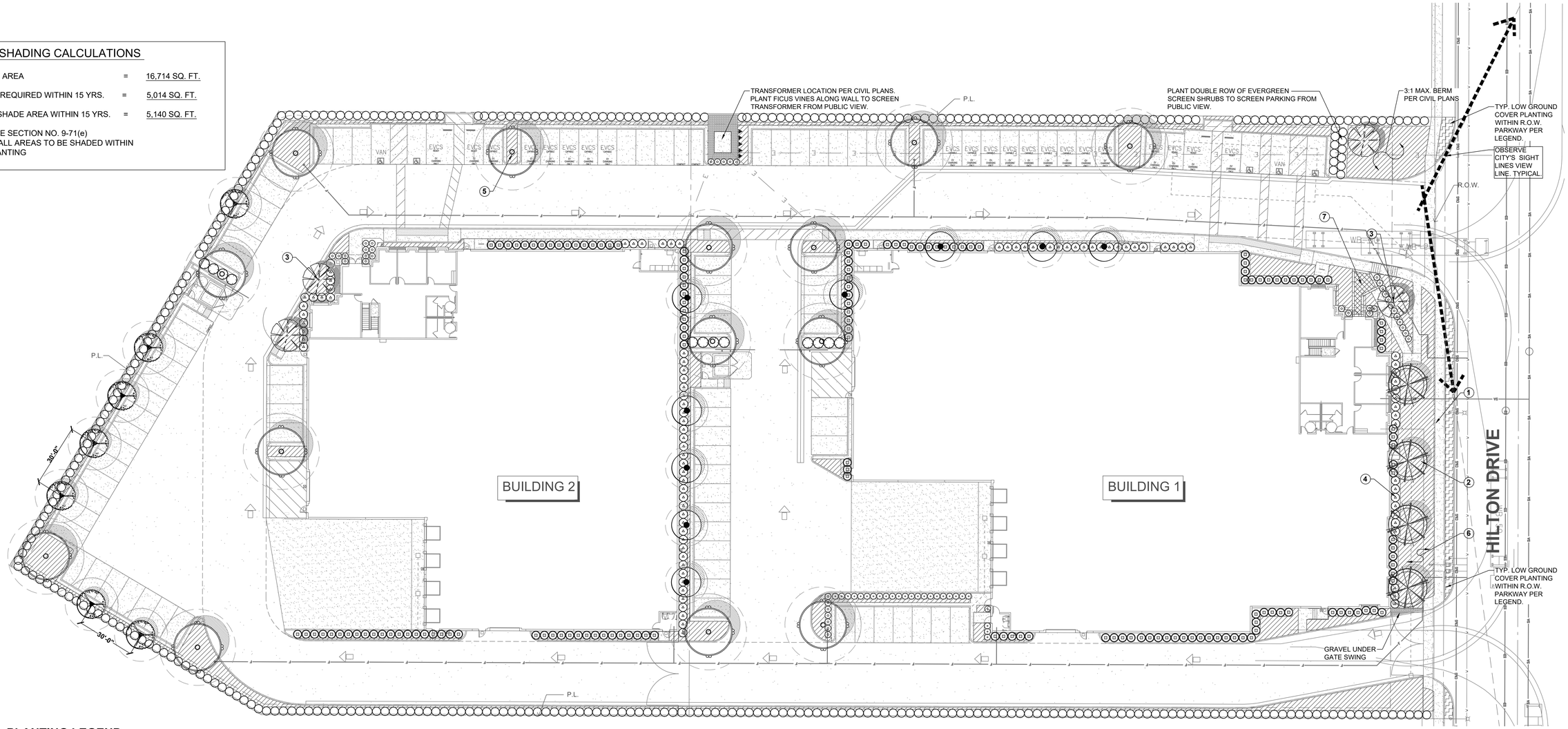
ATTACHMENT A

SITE PLAN

PARKING LOT SHADING CALCULATIONS

TOTAL PARKING LOT AREA	=	16,714 SQ. FT.
TOTAL SHADE AREA REQUIRED WITHIN 15 YRS.	=	5,014 SQ. FT.
TOTAL PROJECTED SHADE AREA WITHIN 15 YRS.	=	5,140 SQ. FT.

PER MUNICIPAL CODE SECTION NO. 9-71(e)
30% OF PARKING STALL AREAS TO BE SHADED WITHIN 15 YEARS AFTER PLANTING



PLANTING LEGEND

TREES

SYMBOL	TREE NAME	QTY.	WUCOLS
	*NEW STREET TREE ALONG HILTON DRIVE PODOCARPUS GRACILIOR, FERN PINE 24" BOX SIZE.	4	L
	SMALL ACCENT TREE LAGERSTROEMIA I. 'WATERMELON RED', CRAPE MYRTLE 24" BOX SIZE.	4	L
	NEW PARKING LOT SHADE TREE ULMUS PARVIFOLIA 'TRUE GREEN', EVERGREEN ELM 24" BOX SIZE.	14	L
	VERTICAL TREE ALONG BUILDING/ SECONDARY PARKING LOT TREE TRISTANIA LAURINA, WATER GUM TREE 15 GAL. SIZE. ALT: PODOCARPUS GRACILIOR, FERN PINE	9	L
	EVERGREEN SCREEN TREE PINUS ELDARICA, MONDELL PINE 36" BOX SIZE.	7	L

TOTAL # OF TREES = 38 TREES

*NOTE: PROPOSED STREET TREES SHALL BE CONSISTANT WITH EXISTING TREES ALONG HILTON DR. TO BE CONFIRMED IN THE FIELD.

VINE

SYMBOL	VINE NAME	QTY.	WUCOLS
▶	FICUS PUMILA, CREEPING FIG 5 GAL. SIZE @ 3'-0" O.C.	5	L

	SHRUBS SHRUBS SHALL BE CHOSEN FROM THE FOLLOWING LIST:	WUCOLS
	XYLOSMA CONGESTUM, SHINY LEAF XYLOSMA 5 GAL. SIZE	L
	LEUCOPHYLLUM FRUTESCENS, TEXAS RANGER 5 GAL. SIZE	L
	WESTRINGIA FRUTICOSA, COAST ROSEMARY 5 GAL. SIZE	L
	ROSMARINUS 'TUSCAN BLUE', TUSCAN BLUE ROSEMARY 5 GAL. SIZE	L
	BUXUS JAPONICA, JAPANESE BOXWOOD 5 GAL. SIZE	L

	GROUND COVER/SHRUB MASSES GROUND COVER AND SHRUB MASSES SHALL BE CHOSEN FROM THE FOLLOWING LIST:	WUCOLS
	SENECIO MANDRALISCAE, BLUE CHALKSTICKS 1 GAL. SIZE @ 24" O.C.	L
	ROSMARINUS O. 'PROSTRATUS', CREEPING ROSEMARY 1 GAL. SIZE @ 30" O.C.	L
	SALVIA GREGGII, AUTUMN SAGE 1 GAL. SIZE @ 36" O.C.	L
	MUHLENBERGIA RIGENS, DEER GRASS 1 GAL. SIZE @ 42" O.C.	L
	BACCHARIS PILULARIS, COYOTE BUSH 1 GAL. SIZE @ 42" O.C.	L
	TYP. LOW GROUND COVER PLANTING WITH PUBLIC R.O.W. (PARKWAY) SUGGEST LANTANA DWARF YELLOW.	L

DESIGN KEY NOTES:

1. NEW SIDEWALK PER CIVIL DWGS.
2. NEW STREET TREE ALONG HILTON DRIVE (MATCH EXISTING)
3. SMALL ACCENT TREE AT PROJECT FOCAL AREAS PER LEGEND
4. TYP. FOUNDATION SHRUB PER LEGEND
5. BROAD CANOPY PARKING LOT SHADE TREE PER LEGEND
6. DROUGHT TOLERANT GROUND COVER AND SHRUB PLANTING PER LEGEND
7. ENHANCED PAVING AT BUILDING ENTRY. INTEGRAL COLORED CONC.

CONCEPTUAL PLAN NOTE:
THIS IS A CONCEPTUAL LANDSCAPE PLAN. IT IS BASED ON PRELIMINARY INFORMATION WHICH IS NOT FULLY VERIFIED AND MAY BE INCOMPLETE. IT IS MEANT AS A COMPARATIVE AID IN EXAMINING ALTERNATE DEVELOPMENT STRATEGIES AND ANY QUANTITIES INDICATED ARE SUBJECT TO REVISION AS MORE RELIABLE INFORMATION BECOMES AVAILABLE.

IRRIGATION NOTE:
THE PROJECT WILL BE EQUIPPED WITH A LOW FLOW IRRIGATION SYSTEM CONSISTING OF ET WEATHER BASED SMART CONTROLLER, LOW FLOW ROTORS, BUBBLER AND/ OR DRIP SYSTEMS USED THROUGHOUT. THE IRRIGATION WATER EFFICIENCY WILL MEET OR SURPASS THE CURRENT STATE MANDATED AB-1881 WATER ORDINANCE. PER MUNICIPAL CODE SECTION NO. 9-71(d) ALL LANDSCAPING AREAS WILL BE PROPERLY IRRIGATED FOR THE LIFE OF THE FACILITY TO ALLOW FOR PLANTS AND TREES TO MAINTAIN GROWTH.

PLANTING NOTE:
PER MUNICIPAL CODE SECTION NO. 9-71(c) ALL LANDSCAPING WILL BE DROUGHT TOLERANT, AND TO THE EXTENT FEASIBLE, SPECIES WITH LOW BIOGENIC EMISSIONS. PALM TREES WILL NOT BE UTILIZED.

GENERAL NOTES:
- SLOPES GREATER THAN 3:1 SHALL BE STABILIZED WITH EROSION CONTROL GROUND COVER PER LEGEND, AND MULCH MATERIAL WITH 'BINDER' MATERIAL SHALL BE APPLIED FOR EROSION CONTROL.
- ROCK RIP-RAP MATERIAL SHALL BE INSTALLED WHERE DRAIN LINES CONNECT TO INFILTRATION AREAS.
- ALL UTILITY EQUIPMENT SUCH AS BACKFLOW UNITS, TRANSFORMERS, FIRE DETECTOR CHECKS AND FIRE CHECK VALVES WILL BE SCREENED WITH EVERGREEN PLANT MATERIAL ONCE FINAL LOCATIONS HAVE BEEN DETERMINED.

PRELIMINARY WATER USE CALCULATIONS

ETO FOR FONTANA AREA = 55.6

MAWA (210,969 GALLONS) = 55.6 X 0.62 X 0.45 X 19,560
MAWA (ANNUAL GALLONS ALLOWED) =ETO X 0.62 X ETAF X AREA

AVERAGE DAILY IRRIGATION WATER USE = 303,423

LANDSCAPE DATA

TOTAL LANDSCAPE AREA = 19,560 SQ. FT.

REQUIRED TREE QUANTITY MATRIX

- TOTAL NUMBER OF PARKING STALLS = 104 STALLS
- TOTAL NUMBER OF TREES REQUIRED AT 1 TREE PER 4 STALLS 106 / 4 = 26 TREES
- TOTAL NUMBER OF TREES PROVIDED = 27 TREES

WUCOLS PLANT FACTOR

THIS PROJECT IS LOCATED IN 'WUCOLS' REGION '4-SOUTH INLAND VALLEY'.

H = HIGH WATER NEEDS
M = MODERATE WATER NEEDS
L = LOW WATER NEEDS
VL= VERY LOW WATER NEEDS

BASED UPON PROJECT TREE INVENTORY CONDUCTED BY CITY'S CERTIFIED ARBORIST, THE TALLY OF REPLACEMENT TREES REQUIRED PURSUANT TO FONTANA MUNICIPAL CODE CHAPTER 28, ARTICLE III, SECTION 28-67 IS **THIRTY-EIGHT 15-GALLON CONTAINER TREES.**

NUMBER OF 15-GALLON TREES PROVIDED ON-SITE = 38 TREES.

CONCEPTUAL LANDSCAPE PLAN
HILTON INDUSTRIAL FACILITY

FONTANA, CA
APN: 2

NORTH
0' 20' 40' 60' 80'
SCALE: 1" = 20'-0"

FEBRUARY 12, 2025

L-1

RODARTE
LANDSCAPE ARCHITECTURE

HILTON LANE, LLC
P.O. BOX 54903
IRVINE, CA 92619
CONTACT: DOUG MCCAN

APPENDIX C
NOISE IMPACT ANALYSIS

HILTON INDUSTRIAL FACILITY PROJECT FOCUSED NOISE IMPACT ANALYSIS

City of Fontana

December 23, 2025

gandini

Traffic Engineering ● Transportation Planning ● Parking ● Noise & Vibration
Air Quality ● Global Climate Change ● Health Risk Assessment

HILTON INDUSTRIAL FACILITY PROJECT
FOCUSED NOISE IMPACT ANALYSIS

City of Fontana

December 23, 2025

prepared by
Roma Stromberg INCE, MS

GANDDINI GROUP INC.
555 Parkcenter Drive, Suite 225
Santa Ana, California 92705
(714) 795-3100 | www.ganddini.com

Project No. 19866

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EXECUTIVE SUMMARY

The purpose of this report is to provide an assessment of the noise impacts resulting from construction of the proposed project and to identify mitigation measures that may be necessary to reduce those impacts.

The 4.01-acre project site (APN: 1110-151-03) is located on the northside of Hilton Drive approximately 950 feet east of Redwood Avenue in the City of Fontana, California. The project site is currently vacant and zoned industrial in the West End Specific Plan.

The proposed project involves the development of two warehouse buildings with a total of 71,985 square feet. Vehicle access for the project site is proposed via two driveways onto Hilton Drive.

Project Construction Impacts

Project construction noise levels at nearby sensitive receptors were calculated using the FTA methodology and it was determined that project construction noise levels will not exceed the FTA 90 dBA $L_{eq\ (8\text{-}hour)}$ construction noise standard for impacts to residential land uses. This impact would be less than significant.

1. INTRODUCTION

This section describes the purpose of this study and the proposed project.

PURPOSE AND OBJECTIVES

The purpose of this report is to provide an assessment of the noise impacts resulting from construction of the proposed project and to identify mitigation measures that may be necessary to reduce those impacts. The noise issues related to the proposed land use and development have been evaluated in light of applicable federal, state and local policies, including those of the City of Fontana in the context of the California Environmental Quality Act (CEQA).

Although this is a technical report, effort has been made to write the report clearly and concisely. A list of acronyms and glossary are provided in Appendix A and Appendix B of this report to assist the reader with technical terms related to noise and vibration analysis.

PROJECT LOCATION

The 4.01-acre project site (APN: 1110-151-03) is located on the northside of Hilton Drive approximately 950 feet east of Redwood Avenue in the City of Fontana, California (See Figure 1). The project site is currently vacant and zoned industrial in the West End Specific Plan.

PROJECT DESCRIPTION

The proposed project involves the development of two warehouse buildings with a total of 71,985 square feet. Vehicle access for the project site is proposed via two driveways onto Hilton Drive. The proposed site plan is shown on Figure 2.

Figure 1
Project Location Map

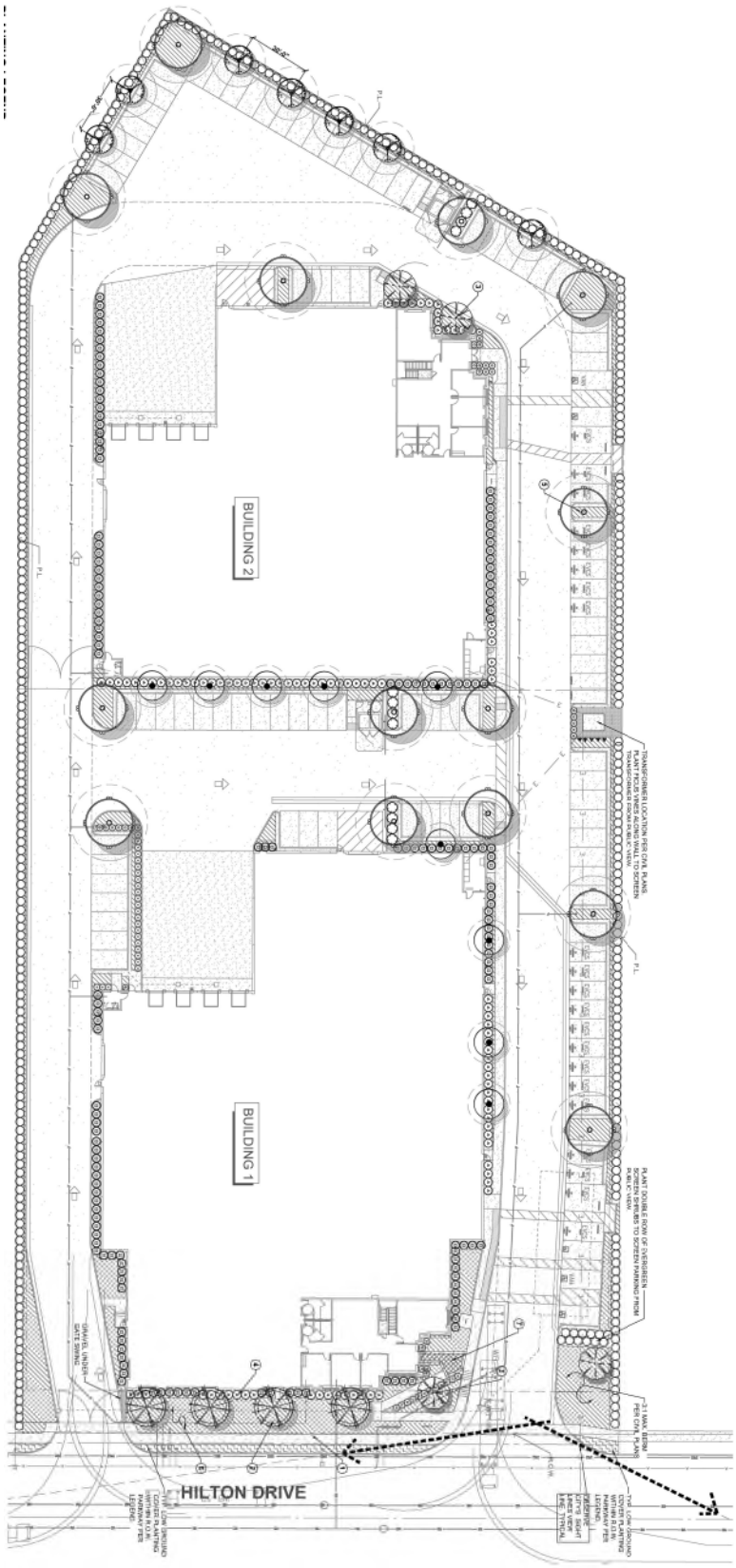


Figure 2
Site Plan

2. NOISE FUNDAMENTALS

Sound is a pressure wave created by a moving or vibrating source that travels through an elastic medium such as air. Noise is defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in extreme circumstances, hearing impairment.

Commonly used noise terms are presented in Appendix B. The unit of measurement used to describe a noise level is the decibel (dB). The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, the "A-weighted" noise scale, which weights the frequencies to which humans are sensitive, is used for measurements. Noise levels using A-weighted measurements are written dB(A) or dBA.

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source as well as ground absorption, atmospheric effects and refraction, and shielding by natural and manmade features. Sound from point sources, such as air conditioning condensers, radiates uniformly outward as it travels away from the source in a spherical pattern. The noise drop-off rate associated with this geometric spreading is 6 dBA per each doubling of the distance (dBA/DD). Transportation noise sources such as roadways are typically analyzed as line sources, since at any given moment the receiver may be impacted by noise from multiple vehicles at various locations along the roadway. Because of the geometry of a line source, the noise drop-off rate associated with the geometric spreading of a line source is 3 dBA/DD.

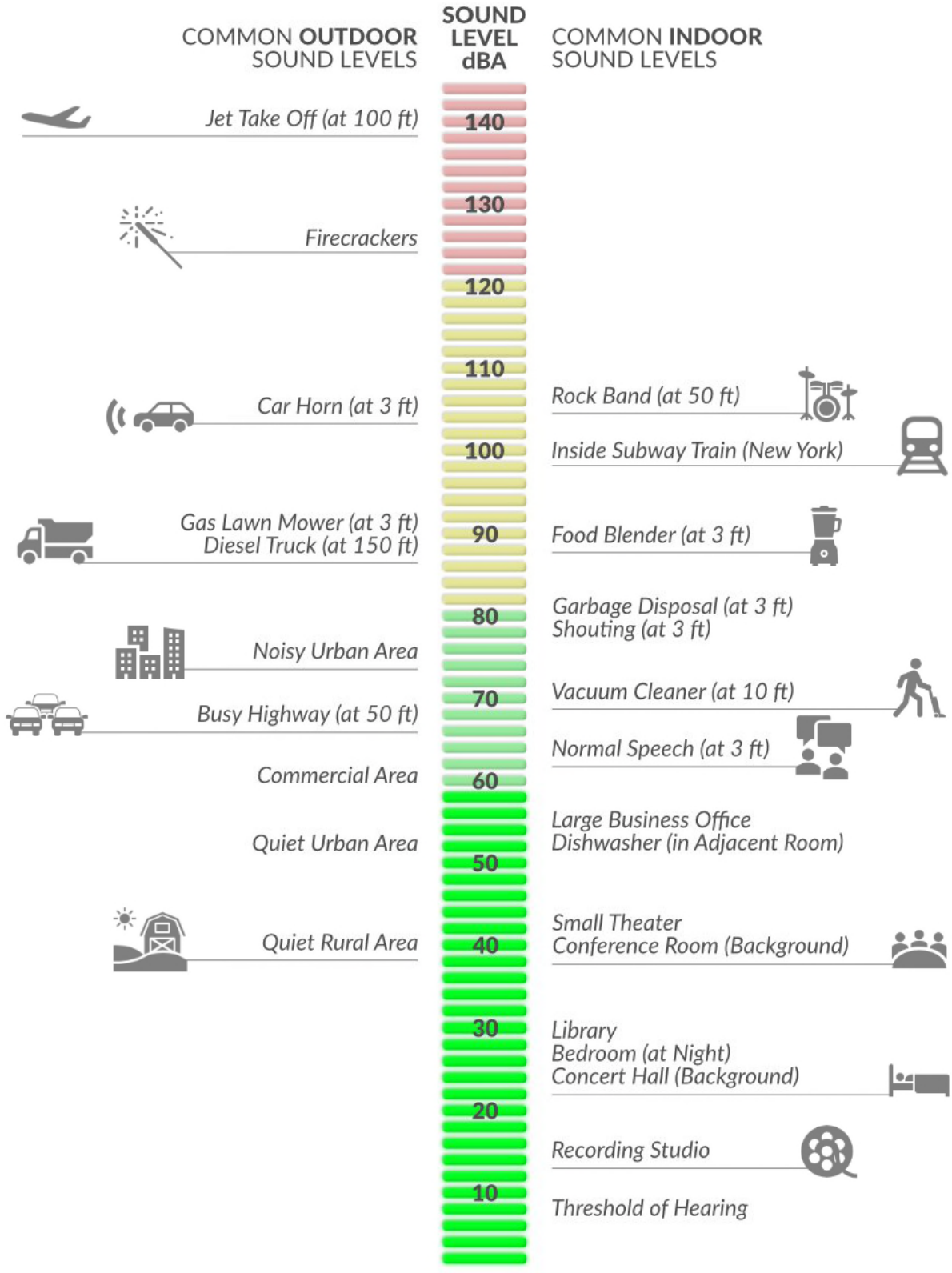
Decibels are measured on a logarithmic scale, which quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as a doubled traffic volume, would increase the noise levels by 3 dBA; halving of the energy would result in a 3 dBA decrease.

Figure 3 shows the relationship of various noise levels to commonly experienced noise events.

Average noise levels over a period of minutes or hours are usually expressed as dBA L_{eq}, or the equivalent noise level for that period of time. For example, $L_{eq(8\text{-}hr)}$ would represent an 8-hour average. When no period is specified, a one-hour average is assumed.

Noise standards for transportation noise source/land use compatibility are stated in terms of the Community Noise Equivalent Level (CNEL) and the Day-Night Average Noise Level (DNL). CNEL is a 24-hour weighted average measure of community noise. CNEL is obtained by adding five decibels to sound levels in the evening (7:00 PM to 10:00 PM), and by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the evening and nighttime hours. DNL is a very similar 24-hour average measure that weights only the nighttime hours.

It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA; that a change of 5 dBA is readily perceptible, and that an increase (decrease) of 10 dBA sounds twice (half) as loud. This definition is recommended by the California Department of Transportation's Technical Noise Supplement to the Traffic Noise Analysis Protocol (2013).



© Ganddini Group, Inc.
Based on Policy & Guidance from Federal Aviation Administration

Figure 3
A-Weighted Comparative Sound Levels

3. REGULATORY SETTING

CITY OF FONTANA MUNICIPAL CODE

Section 18-63 Scope, enumeration of prohibited noises.

a. This article shall apply to loud, excessive, impulsive, or intrusive interior and exterior sound or noise that annoys or disturbs persons of ordinary sensibilities emanating from any type of property or source within the city.

b. The following acts, which create loud, excessive, impulsive, or intrusive sound or noise that annoys or disturbs persons of ordinary sensibilities from a distance of 50 feet or more from the edge of the property, structure or unit in which the source is located, are declared to be in violation of this article, but such enumeration shall not be deemed to be exclusive, namely:

- Construction or repairing of buildings or structures. The erection (including excavating), demolition, alteration or repair of any building or structure other than between the hours of 7:00 AM and 6:00 PM on weekdays and between the hours of 8:00 a.m. and 5:00 p.m. on Saturdays, except in case of urgent necessity in the interest of public health and safety, and then only with a permit from the building inspector, which permit may be granted for a period not to exceed three days or less while the emergency continues and which permit may be renewed for periods of three days or less while the emergency continues. If the building inspector should determine that the public health and safety will not be impaired by the erection, demolition, alteration or repair of any building or structure or the excavation of streets and highways within the hours of 6:00 PM and 7:00 AM, and if he shall further determine that loss or inconvenience would result to any party in interest, he may grant permission for such work to be done on weekdays within the hours of 6:00 PM and 7:00 AM, upon application being made at the time the permit for the work is awarded or during the progress of the work.

FEDERAL TRANSIT ADMINISTRATION

IN THE ABSENCE OF LOCAL QUANTITATIVE CONSTRUCTION NOISE THRESHOLDS, THE FEDERAL TRANSIT ADMINISTRATION (FTA) PROVIDES GUIDELINES (FTA 2018) THAT CAN BE CONSIDERED REASONABLE CRITERIA FOR CONSTRUCTION NOISE ASSESSMENT. FTA CONSTRUCTION NOISE STANDARDS ARE PROVIDED IN FEDERAL INTERAGENCY COMMITTEE (FICON)

The Federal Interagency Committee on Noise (FICON) developed guidance (1992) to be used for the assessment of project-generated permanent increases in noise levels that consider the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (Leq). FICON standards as applied to increases due to construction noise would result in a significant impact if:

- Existing noise levels are below 60 dBA, and the project results in a 5 dBA or greater increase; or
- Existing noise levels range between 60 and 65 dBA, a the project results in a 3 dBA or greater increase; or
- Existing noise levels exceed 65 dBA, and the project results in an increase of 1.5 dBA or greater..

Table 1.

FEDERAL INTERAGENCY COMMITTEE (FICON)

The Federal Interagency Committee on Noise (FICON) developed guidance (1992) to be used for the assessment of project-generated permanent increases in noise levels that consider the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (Leq). FICON standards as applied to increases due to construction noise would result in a significant impact if:

- Existing noise levels are below 60 dBA, and the project results in a 5 dBA or greater increase; or
- Existing noise levels range between 60 and 65 dBA, a the project results in a 3 dBA or greater increase; or
- Existing noise levels exceed 65 dBA, and the project results in an increase of 1.5 dBA or greater..

Table 1
Detailed Analysis Construction Noise Criteria

Land Use	$L_{eq,equip(8\ hr)}$, dBA	
	Day	Night
Residential	80	70
Commercial	85	85
Industrial	90	90

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, 2018.

4. ANALYTICAL METHODOLOGY AND MODEL PARAMETERS

This section discusses the analysis methodologies used to assess noise impacts.

CONSTRUCTION NOISE MODELING

Construction noise will vary depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work.

Construction noise associated with the proposed project was calculated at the sensitive receptor locations utilizing methodology presented in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018) together with several key construction parameters, including: distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site. Distances to receptors were based on the acoustical center of the project site.

The equipment used to calculate the construction noise levels for each phase were based on the assumptions provided in the CalEEMod modeling. Sound emission levels associated with typical construction equipment as well as typical usage factors are provided in. Construction noise worksheets are provided in Appendix C.

VEHICLE NOISE MODELING

Noise associated with existing traffic volumes and existing plus project construction volumes was modeled using spreadsheets that use the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) formulas. The FHWA model arrives at the predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Key model parameters and REMEL adjustments are presented below:

- Roadway classification (e.g., freeway, major arterial, arterial, secondary, collector, etc.),
- Roadway active width (distance between the center of the outer most travel lanes on each side of
- the roadway),
- Average Daily Traffic (ADT) Volumes, Travel Speeds, Percentages of automobiles, medium trucks and
- heavy trucks,
- Roadway grade and angle of view,
- Site conditions (e.g., soft vs. hard), and
- Percentage of total ADT which flows each hour throughout a 24-hour period.

Traffic noise levels were calculated at the right-of-way based on distance from the centerline of the analyzed roadway. The modeling is theoretical and does not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Therefore, the modeled noise levels are shown for comparative purposes only to show the difference between with and without project conditions. Traffic noise calculation worksheets are included in Appendix D.

Table 2 (1 of 2)
CA/T Equipment Noise Emissions and Acoustical Usage Factor Database

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Spec. Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50ft (dBA, slow)	No. of Actual Data Samples (Count)
All Other Equipment > 5 HP	No	50	85	-N/A-	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Bar Bender	No	20	80	-N/A-	0
Blasting	Yes	-N/A-	94	-N/A-	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	-N/A-	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Forklift[2,3]	No	50	n/a	61	n/a
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	-N/A-	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydr. Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	-N/A-	0
Impact Pile Driver	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarafier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	50	85	77	9
Paving Equipment	No	50	85	77	9
Pneumatic Tools	No	50	85	85	90

Table 2 (2 of 2)
CA/T Equipment Noise Emissions and Acoustical Usage Factor Database

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Spec. Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50ft (dBA, slow)	No. of Actual Data Samples (Count)
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/chipping gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Shears (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	-N/A-	0
Tractor	No	40	84	-N/A-	0
Vacuum Excavator (Vac-truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder/Torch	No	40	73	74	5

Notes:

(1) Source: FHWA Roadway Construction Noise Model User's Guide January 2006.

(2) Warehouse & Forklift Noise Exposure - NoiseTesting.info Carl Stautins, November 4, 2014 http://www.noisetesting.info/blog/carl-strautins/page-3/

(3) Data provided Leq as measured at the operator. Sound Level at 50 feet is calculated using Inverse Square Law.

5. CONSTRUCTION NOISE IMPACTS

CONSTRUCTION NOISE - ONSITE

The City of Fontana has set restrictions to control noise impacts associated with the construction of the proposed project. According to Section 18-63[b][7] of the city's Municipal Code, Construction or repairing of buildings or structures, construction activity is limited: between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 8:00 a.m. and 5:00 p.m. on Saturdays except in the case of urgent necessity. Project construction noise levels are, therefore, considered exempt from municipal regulation if activities occur within the hours specified in the City of Fontana Municipal Code, Section 18-63[7] of 7:00 a.m. to 6:00 p.m. on weekdays and between the hours of 8:00 a.m. to 5:00 p.m. on Saturdays. However, neither the General Plan nor the Municipal Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers for CEQA analysis purposes. Therefore, a numerical construction threshold based on Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual is used for analysis of daytime construction impacts, as discussed below. According to the FTA, local noise ordinances are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise.

AS SHOWN IN FEDERAL INTERAGENCY COMMITTEE (FICON)

The Federal Interagency Committee on Noise (FICON) developed guidance (1992) to be used for the assessment of project-generated permanent increases in noise levels that consider the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (Leq). FICON standards as applied to increases due to construction noise would result in a significant impact if:

- Existing noise levels are below 60 dBA, and the project results in a 5 dBA or greater increase; or
- Existing noise levels range between 60 and 65 dBA, a the project results in a 3 dBA or greater increase; or
- Existing noise levels exceed 65 dBA, and the project results in an increase of 1.5 dBA or greater..

Table 1, the FTA considers a daytime exterior construction noise level of 80 dBA $L_{eq(8\text{-}hour)}$ for noise sensitive residential land uses, 85 dBA $L_{eq(8\text{-}hour)}$ for commercial uses, and 90 dBA $L_{eq(8\text{-}hour)}$ for industrial uses. Construction noise would affect adjacent light industrial/warehouse land uses. Therefore, the proposed project would result in a significant impact if it:

- Results in noise levels that exceed 90 dBA $L_{eq\ (8\text{-}hour)}$ at the property line of an existing industrial land use.

Project construction noise levels at nearby sensitive receptors were calculated using the FTA methodology. Construction noise modeling worksheets for each phase are provided in Appendix C. Modeled construction noise levels reach up to 70.7 dBA L_{eq} at the property line shared with the industrial warehouse land use to the north, up to 68.5 dBA L_{eq} at the property line shared with the industrial land use to the south, and up to 77.9 dBA L_{eq} at the industrial properties located to the east and west. Project construction noise levels will not exceed the FTA 90 dBA $L_{eq\ (8\text{-}hour)}$ construction noise standard for impacts to residential land uses. This impact would be less than significant.

CONSTRUCTION NOISE - OFFSITE

Project construction would generate up to 31 employee trips and 12 truck trips per day traveling to and from the project site via Hilton Avenue, Redwood Avenue and Hemlock Avenue to Foothill Boulevard where project trips would result in negligible increases in ambient noise levels. There are existing residential land uses along Redwood Avenue and Hemlock Avenue that would be exposed to these trips. Existing noise levels and existing plus project construction noise levels were calculated using FHWA methodology and then compared to the FICON increase thresholds presented in Section 3 of this report. Spreadsheets and noise existing noise measurements are provided in Appendix D.

As shown in Table 3, existing noise levels range between 62.9 and 65.6 dBA CNEL and existing plus project construction noise levels would range between 63.2 and 65.7 dBA CNEL. Project construction traffic would result in a less than 1 dB increase along both roadways and would not exceed the applicable FICON noise increase thresholds. Impacts would be less than significant and no mitigation measures are required.

Table 3
Increase in Existing Noise Levels Associated with Project Generated Construction Vehicles

Roadway	dBA, CNEL				
	Existing Noise Level[1]	Existing Plus Project	Increase	Applicable Threhsold[2]	Exceeds Threshold?
Hemlock Ave	62.9	63.2	0.3	3	No
Redwood Ave	65.6	65.7	0.1	1.5	No

Notes:

1. Measured Existing Noise Levels (Appendix D). The measured Leq was converted to CNEL.

2. FICON Thresholds as presented in Section 3.

6. REFERENCES

Fontana, City of

Municipal Code 1863(b)(2)

2018 Fontana Forward General Plan Update 2015-2035 Draft Environmental Impact Report. June 8.

2018 Fontana Forward General Plan Update 2015-2035. November 13.

Lilburn Corporation

2025 Hilton Industrial Facility CalEEMod Construction Modeling Output

U.S. Federal Transit Administration (FTA)

2018 Transit Noise and Vibration Impact Assessment Manual. Typical Construction Equipment Vibration Emissions.

U.S. Department of Transportation

2006 FHWA Roadway Construction Noise Model User's Guide. January.

APPENDICES

Appendix A List of Acronyms
Appendix B Definitions of Acoustical Terms
Appendix C Construction Noise Model Worksheets
Appendix D FHWA Construction Vehicle Noise Worksheets

APPENDIX A

LIST OF ACRONYMS

Term	Definition
ADT	Average Daily Traffic
ANSI	American National Standard Institute
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
D/E/N	Day / Evening / Night
dB	Decibel
dBA or dB(A)	Decibel "A-Weighted"
dBA/DD	Decibel per Double Distance
dBA L_{eq}	Average Noise Level over a Period of Time
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
L_{02},L_{08},L_{50},L_{90}	A-weighted Noise Levels at 2 percent, 8 percent, 50 percent, and 90 percent, respectively, of the time period
DNL	Day-Night Average Noise Level
$L_{eq(x)}$	Equivalent Noise Level for '"x" period of time
L_{eq}	Equivalent Noise Level
L_{max}	Maximum Level of Noise (measured using a sound level meter)
L_{min}	Minimum Level of Noise (measured using a sound level meter)
Lp	Sound Pressure Level
LOS C	Level of Service C
Lw	Sound Power Level
OPR	California Governor's Office of Planning and Research
PPV	Peak Particle Velocities
RCNM	Road Construction Noise Model
REMEL	Reference Energy Mean Emission Level
RMS	Root Mean Square

APPENDIX B

DEFINITIONS OF ACOUSTICAL TERMS

Term	Definition
Ambient Noise Level	The all-encompassing noise environment associated with a given environment, at a specified time, usually a composite of sound from many sources, at many directions, near and far, in which usually no particular sound is dominant.
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear.
CNEL	Community Noise Equivalent Level. CNEL is a weighted 24-hour noise level that is obtained by adding five decibels to sound levels in the evening (7:00 PM to 10:00 PM), and by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the evening and nighttime hours.
Decibel, dB	A logarithmic unit of noise level measurement that relates the energy of a noise source to that of a constant reference level; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
DNL, Ldn	Day Night Level. The DNL, or Ldn is a weighted 24-hour noise level that is obtained by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the nighttime hours.
Equivalent Continuous Noise Level, L_{eq}	A level of steady state sound that in a stated time period, and a stated location, has the same A-weighted sound energy as the time-varying sound.
Fast/Slow Meter Response	The fast and slow meter responses are different settings on a sound level meter. The fast response setting takes a measurement every 100 milliseconds, while a slow setting takes one every second.
Frequency, Hertz	In a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., the number of cycles per second).
L_{02}, L_{08}, L_{50}, L_{90}	The A-weighted noise levels that are equaled or exceeded by a fluctuating sound level, 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period, respectively.
L_{max}, L_{min}	Lmax is the RMS (root mean squared) maximum level of a noise source or environment measured on a sound level meter, during a designated time interval, using fast meter response. Lmin is the minimum level.
Offensive/ Offending/Intrusive Noise	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of sound depends on its amplitude, duration, frequency, and time of occurrence, and tonal information content as well as the prevailing ambient noise level.
Root Mean Square (RMS)	A measure of the magnitude of a varying noise source quantity. The name derives from the calculation of the square root of the mean of the squares of the values. It can be calculated from either a series of lone values or a continuous varying function.

APPENDIX C

CONSTRUCTION NOISE MODEL WORKSHEETS

Receptor - Warehouse Land Use to the North

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Site Preparation									
Rubber Tired Dozers	3	82	323	40	1.20	-16.2	0.8	65.8	66.6
Tractors/Loaders/Backhoes	4	84	323	40	1.60	-16.2	2.0	67.8	69.8
								Log Sum	69.8
Grading									
Excavator	1	85	323	40	0.40	-16.2	-4.0	68.8	64.8
Graders	1	85	323	40	0.40	-16.2	-4.0	68.8	64.8
Rubber Tired Dozers	1	82	323	40	0.40	-16.2	-4.0	65.8	61.8
Tractors/Loaders/Backhoes	3	84	323	40	1.20	-16.2	0.8	67.8	68.6
								Log Sum	70.7
Building Construction									
Cranes	1	81	323	16	0.16	-16.2	-8.0	64.8	56.8
Forklifts[2]	3	48	323	40	1.20	-16.2	0.8	31.8	32.6
Generator Sets	1	81	323	50	0.50	-16.2	-3.0	64.8	61.8
Tractors/Loaders/Backhoes	1	84	323	40	0.40	-16.2	-4.0	67.8	63.8
Welders	1	73	323	40	0.40	-16.2	-4.0	56.8	52.8
								Log Sum	66.6
Paving									
Tractors/Loaders/Backhoes	1	84	323	40	0.40	-16.2	-4.0	67.8	63.8
Pavers	1	77	323	50	0.50	-16.2	-3.0	60.8	57.8
Paving Equipment	2	77	323	50	1.00	-16.2	0.0	60.8	60.8
Rollers	2	80	323	20	0.40	-16.2	-4.0	63.8	59.8
Cement and Mortar Mixers	2	80	323	20	0.40	-16.2	-4.0	63.8	59.8
								Log Sum	64.4
Architectural Coating									
Air Compressors	1	78	323	40	0.40	-16.2	-4.0	61.8	57.8
								Log Sum	57.8

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

Light Industrial Land Use to the South

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Site Preparation									
Rubber Tired Dozers	3	82	415	40	1.20	-18.4	0.8	63.6	64.4
Tractors/Loaders/Backhoes	4	84	415	40	1.60	-18.4	2.0	65.6	67.7
								Log Sum	67.7
Grading									
Excavator	1	85	415	40	0.40	-18.4	-4.0	66.6	62.6
Graders	1	85	415	40	0.40	-18.4	-4.0	66.6	62.6
Rubber Tired Dozers	1	82	415	40	0.40	-18.4	-4.0	63.6	59.6
Tractors/Loaders/Backhoes	3	84	415	40	1.20	-18.4	0.8	65.6	66.4
								Log Sum	68.5
Building Construction									
Cranes	1	81	415	16	0.16	-18.4	-8.0	62.6	54.7
Forklifts[2]	3	48	415	40	1.20	-18.4	0.8	29.6	30.4
Generator Sets	1	81	415	50	0.50	-18.4	-3.0	62.6	59.6
Tractors/Loaders/Backhoes	1	84	415	40	0.40	-18.4	-4.0	65.6	61.6
Welders	1	73	415	40	0.40	-18.4	-4.0	54.6	50.6
								Log Sum	64.4
Paving									
Tractors/Loaders/Backhoes	1	84	415	40	0.40	-18.4	-4.0	65.6	61.6
Pavers	1	77	415	50	0.50	-18.4	-3.0	58.6	55.6
Paving Equipment	2	77	415	50	1.00	-18.4	0.0	58.6	58.6
Rollers	2	80	415	20	0.40	-18.4	-4.0	61.6	57.6
Cement and Mortar Mixers	2	80	415	20	0.40	-18.4	-4.0	61.6	57.6
								Log Sum	62.2
Architectural Coating									
Air Compressors	1	78	415	40	0.40	-18.4	-4.0	59.6	55.6
								Log Sum	55.6

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

Receptor - Light Industrial Land Uses to the East and West

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Site Preparation									
Rubber Tired Dozers	3	82	141	40	1.20	-9.0	0.8	73.0	73.8
Tractors/Loaders/Backhoes	4	84	141	40	1.60	-9.0	2.0	75.0	77.0
								Log Sum	77.0
Grading									
Excavator	1	85	141	40	0.40	-9.0	-4.0	76.0	72.0
Graders	1	85	141	40	0.40	-9.0	-4.0	76.0	72.0
Rubber Tired Dozers	1	82	141	40	0.40	-9.0	-4.0	73.0	69.0
Tractors/Loaders/Backhoes	3	84	141	40	1.20	-9.0	0.8	75.0	75.8
								Log Sum	77.9
Building Construction									
Cranes	1	81	141	16	0.16	-9.0	-8.0	72.0	64.0
Forklifts[2]	3	48	141	40	1.20	-9.0	0.8	39.0	39.8
Generator Sets	1	81	141	50	0.50	-9.0	-3.0	72.0	69.0
Tractors/Loaders/Backhoes	1	84	141	40	0.40	-9.0	-4.0	75.0	71.0
Welders	1	73	141	40	0.40	-9.0	-4.0	64.0	60.0
								Log Sum	73.8
Paving									
Tractors/Loaders/Backhoes	1	84	141	40	0.40	-9.0	-4.0	75.0	71.0
Pavers	1	77	141	50	0.50	-9.0	-3.0	68.0	65.0
Paving Equipment	2	77	141	50	1.00	-9.0	0.0	68.0	68.0
Rollers	2	80	141	20	0.40	-9.0	-4.0	71.0	67.0
Cement and Mortar Mixers	2	80	141	20	0.40	-9.0	-4.0	71.0	67.0
								Log Sum	71.6
Architectural Coating									
Air Compressors	1	78	141	40	0.40	-9.0	-4.0	69.0	65.0
								Log Sum	65.0

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

APPENDIX D

FHWA CONSTRUCTION VEHICLE NOISE WORKSHEETS

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Hilton Ave Industrial**

Road: **Hemlock Ave**

Segment: **Hilton Avenue to Foothill Boulevard**

	DAYTIME			EVENING			NIGHTTIME			ADT	124.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	30.00
INPUT PARAMETERS											
Vehicles per hour	7.85	0.18	11.53	5.23	0.04	1.44	1.30	0.03	1.92	% A	98
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	129
ADJUSTMENTS											
Flow	3.20	-13.31	4.87	1.43	-19.67	-4.16	-4.62	-21.22	-2.91		
Distance	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	62.89
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	62.18
LEQ	45.46	38.67	62.07	43.69	32.31	53.03	37.64	30.76	54.28	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	62.18		EVENING LEQ	53.54		NIGHT LEQ	54.39		Use hour?	no
										GRADE dB	0.00
		CNEL	**62.89**								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Hilton Ave Industrial**

Road: **Hemlock Ave**

Segment: **Hilton Avenue to Foothill Boulevard**

	DAYTIME			EVENING			NIGHTTIME			ADT	167.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	30.00
INPUT PARAMETERS											
Vehicles per hour	9.85	0.18	12.40	6.56	0.04	1.55	1.63	0.03	2.06	% A	91.33
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.49
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	102.97
ADJUSTMENTS											
Flow	4.19	-13.31	5.19	2.42	-19.67	-3.85	-3.63	-21.22	-2.60		
Distance	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	63.22
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	62.51
LEQ	46.45	38.67	62.38	44.68	32.31	53.34	38.63	30.76	54.59	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	62.51		EVENING LEQ	53.93		NIGHT LEQ	54.72		Use hour?	no
										GRADE dB	0.00
		CNEL	**63.22**								

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Hilton Ave Industrial**

Road: **Redwood Ave**

Segment: **Hilton Avenue to Foothill Boulevard**

	DAYTIME			EVENING			NIGHTTIME			ADT	232.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	30.00
INPUT PARAMETERS											
Vehicles per hour	14.68	0.33	21.57	9.78	0.08	2.69	2.43	0.05	3.59	% A	98
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	129
ADJUSTMENTS											
Flow	5.92	-10.59	7.59	4.16	-16.95	-1.44	-1.90	-18.50	-0.19		
Distance	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	65.61
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	64.90
LEQ	48.18	41.39	64.79	46.41	35.03	55.75	40.36	33.48	57.00	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	64.90		EVENING LEQ	56.26		NIGHT LEQ	57.11		Use hour?	no
										GRADE dB	0.00
		CNEL	**65.61**								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Hilton Ave Industrial**

Road: **Redwood Ave**

Segment: **Hilton Avenue to Foothill Boulevard**

	DAYTIME			EVENING			NIGHTTIME			ADT	275.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	30.00
INPUT PARAMETERS											
Vehicles per hour	2.00	0.33	22.44	1.33	0.08	2.80	0.33	0.05	3.74	% A	11.27
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.69
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	113.19
ADJUSTMENTS											
Flow	-2.73	-10.59	7.76	-4.50	-16.95	-1.27	-10.55	-18.50	-0.02		
Distance	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	65.69
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	64.99
LEQ	39.53	41.39	64.96	37.76	35.03	55.92	31.71	33.48	57.17	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	64.99		EVENING LEQ	56.02		NIGHT LEQ	57.20		Use hour?	no
										GRADE dB	0.00
		CNEL	**65.69**								

Noise Measurement
Field Data

Project Name: Hilton Industrial Facility, City of Fontana **Date:** November 20, 2025

Project #: 19866

Noise Measurement #: STNM2 Run Time 15 minutes **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 8025 Hemlock Avenue, Fontana, CA 92336

Site Description (Type of Existing Land Use and any other notable features): Project Site: Eastern sidewalk outside apparent multifamily trailer park.

Adjacent: Hemlock Ave running N-S just W of STNM2, Foothill Blvd running E-W, 460' S of STNM2. DMV with outside announcing system 390' W of STNM2.

Weather: Overcast. Sunset: 4:43 PM **Settings:** SLOW FAST

Temperature: 58 deg F **Wind:** 4 mph **Humidity:** 64% **Terrain:** Flat

Start Time: 2:03 PM **End Time:** 2:18 PM **Run Time:**

Leq: 62.2 dB

Lmax 78.7 dB

L2 72.1 dB

L8 65.4 dB

L25 59.0 dB

L50 54.7 dB

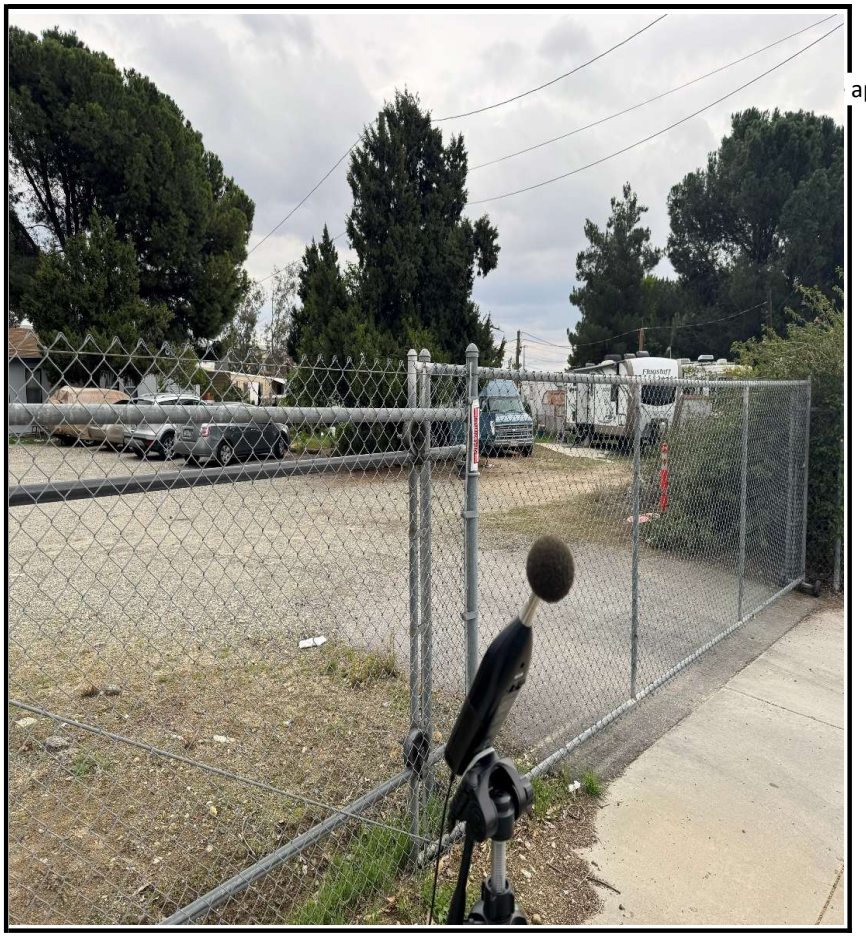
Primary Noise Source: Traffic noise from the 33 vehicles passing STNM2 microphone travelling N-S on Hemlock Ave.

Secondary Noise Sources: Traffic noise from traffic travelling E-W on Foothill Blvd. DMV building has an outside " Now serving... " PA anouncing system. Distant train horns.

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CAL 250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CAL 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	7/31/2024	**FACTORY CALIBRATION DATE:**	7/10/2024
FIELD CALIBRATION DATE:	11/20/2025		

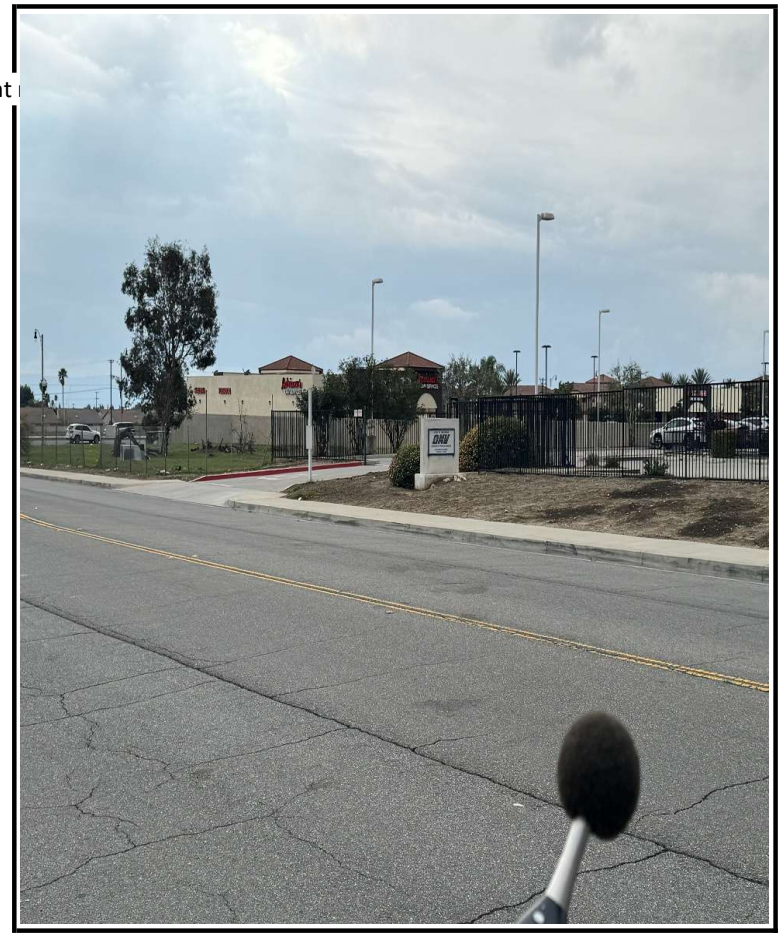
Noise Measurement
Field Data

PHOTOS:



STNM2 looking SE from Hemlock Avenue sidewalk towards entry/exit way to multifamily trailor park 8025 Hemlock Avenue, Fontana.

apparent



STNM2 looking SW across Hemlock Avenue towards entry/exit to parking lot of building 8026 Hemlock Avenue, Fontana.

Measurement Report

Report Summary

Meter's File Name	LxT_Data.666.s	Computer's File Name	LxT_0003099-20251120 140338-LxT_Data.666.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM2 34° 6'28.28"N 117°28'31.60"W
Job Description	15 minute noise measurement		
Note	Ganddini Project #19866 Hilton Industrial Facility, City of Fontana		
Start Time	2025-11-20 14:03:38	Duration	0:15:00.0
End Time	2025-11-20 14:18:38	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	62.2 dB		
LAE	91.7 dB	SEA	--- dB
EA	164.3 µPa²h	LAFTM5	67.1 dB
EA8	5.3 mPa²h		
EA40	26.3 mPa²h		
LA_{peak}	91.8 dB	2025-11-20 14:06:00	
LAS_{max}	78.7 dB	2025-11-20 14:12:35	
LAS_{min}	45.5 dB	2025-11-20 14:16:58	
LA_{eq}	62.2 dB		
LC_{eq}	70.8 dB	LC_{eq} - LA_{eq}	8.7 dB
LAI_{eq}	64.4 dB	LAI_{eq} - LA_{eq}	2.3 dB

Exceedances	Count	Duration
LAS > 65.0 dB	11	0:01:24.1
LAS > 85.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight
	--- dB	--- dB	0.0 dB

	LDEN	LDay	LEve	LNight
	--- dB	--- dB	--- dB	--- dB

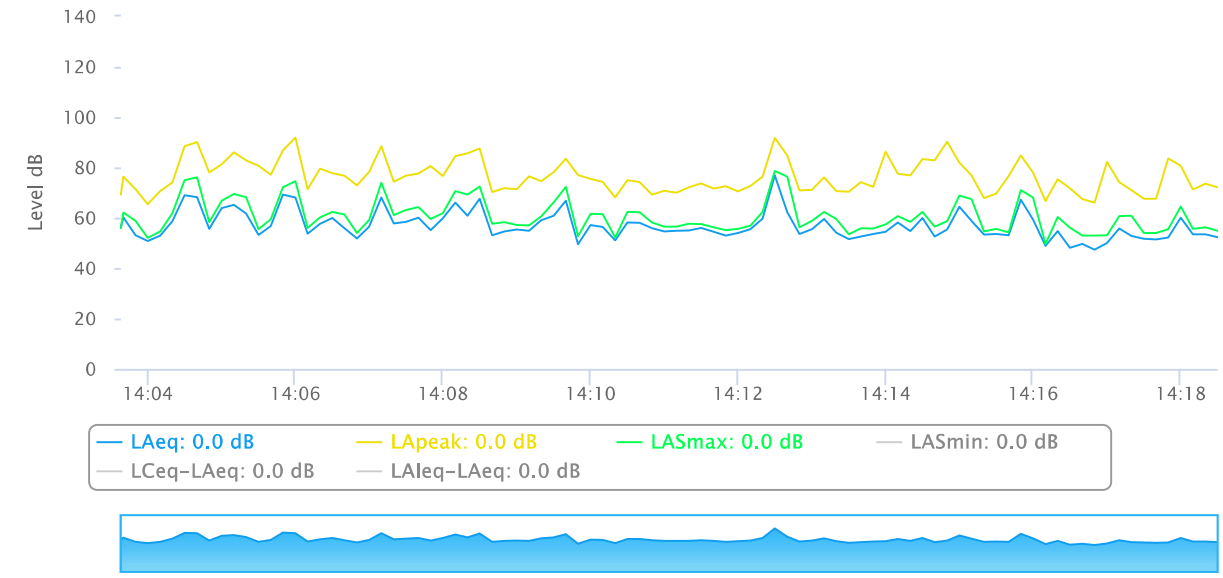
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	62.2 dB		70.8 dB		--- dB	
$L_{S(max)}$	78.7 dB	2025-11-20 14:12:35	--- dB		--- dB	
$L_{S(min)}$	45.5 dB	2025-11-20 14:16:58	--- dB		--- dB	
$L_{Peak(max)}$	91.8 dB	2025-11-20 14:06:00	--- dB		--- dB	

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

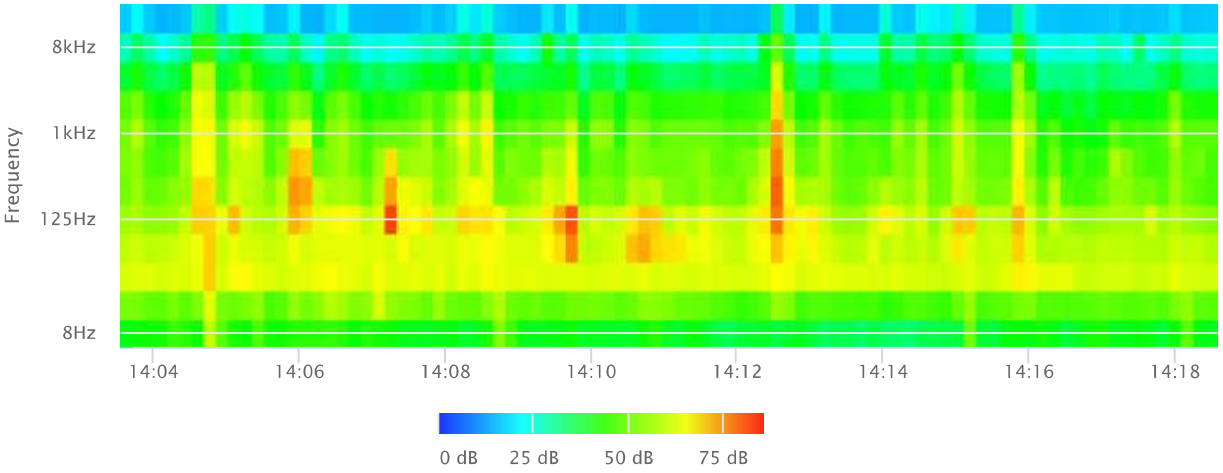
Statistics

LAS 2.0	72.1 dB
LAS 8.0	65.4 dB
LAS 25.0	59.0 dB
LAS 50.0	54.7 dB
LAS 66.6	53.2 dB
LAS 90.0	50.5 dB

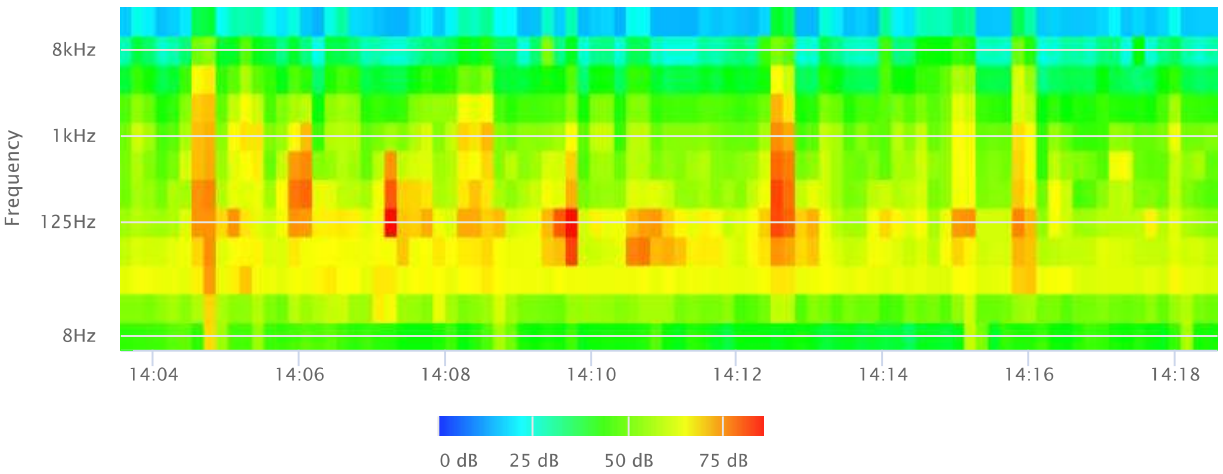
Time History



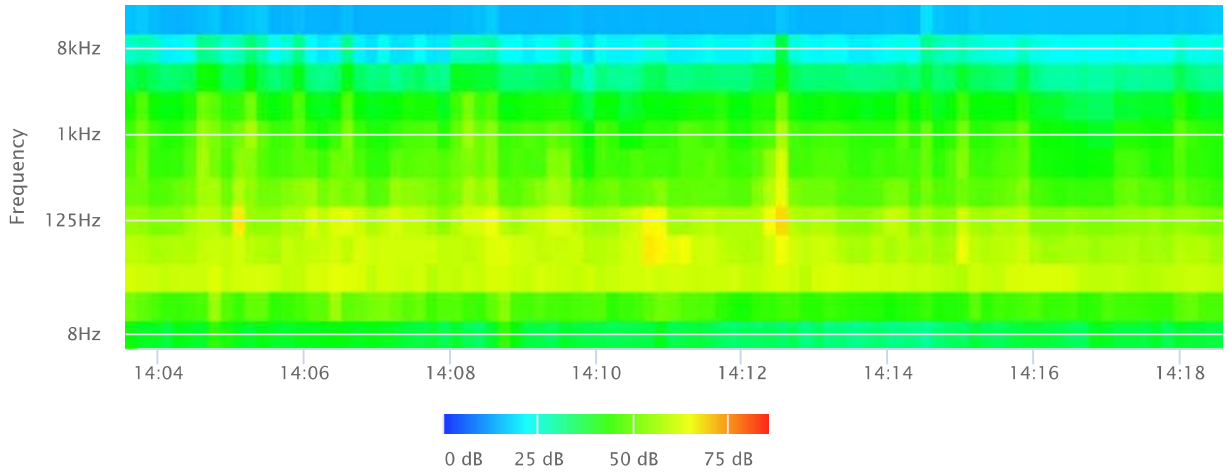
OBA 1/1 Leq



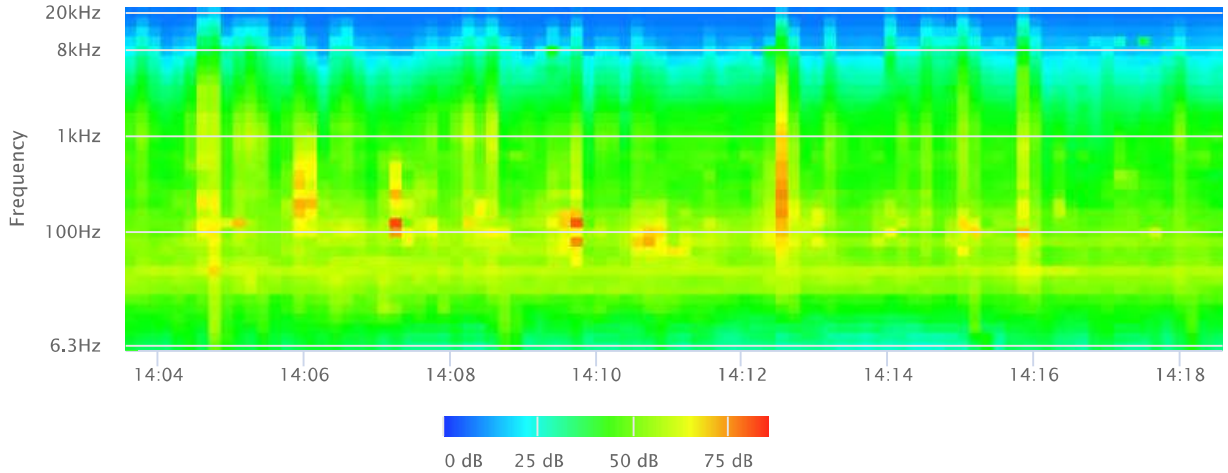
OBA 1/1 Lmax



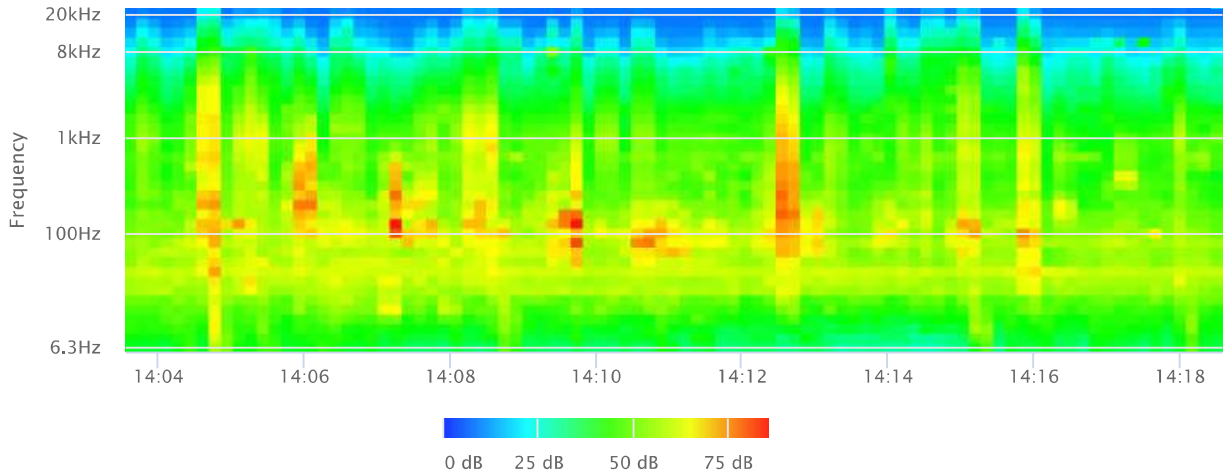
OBA 1/1 Lmin



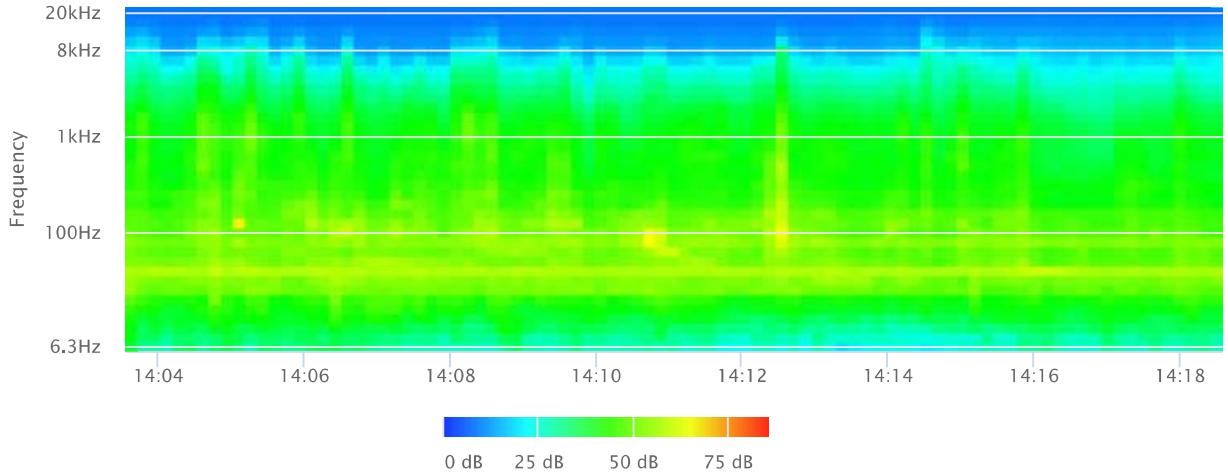
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
14:04
14:06
14:08
14:10
14:12
14:14
14:16
14:18
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: Hilton Industrial Facility, City of Fontana **Date:** November 20, 2025

Project #: 19866

Noise Measurement #: STNM4 Run Time 15 minutes **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 8080 Redwood Avenue, Fontana, CA 92336

Site Description (Type of Existing Land Use and any other notable features): Project Site: Western edge of N-S bound Redwood Ave (no sidewalk) outside residence 8080 Redwood Ave. Adjacent: Foothill Blvd running E-W, 240' S of STNM4. Mixture of businesse & older residences in area.

Weather: Overcast. Sunset: 4:43 PM **Settings:** SLOW FAST

Temperature: 58 deg F **Wind:** 4 mph **Humidity:** 64% **Terrain:** Flat

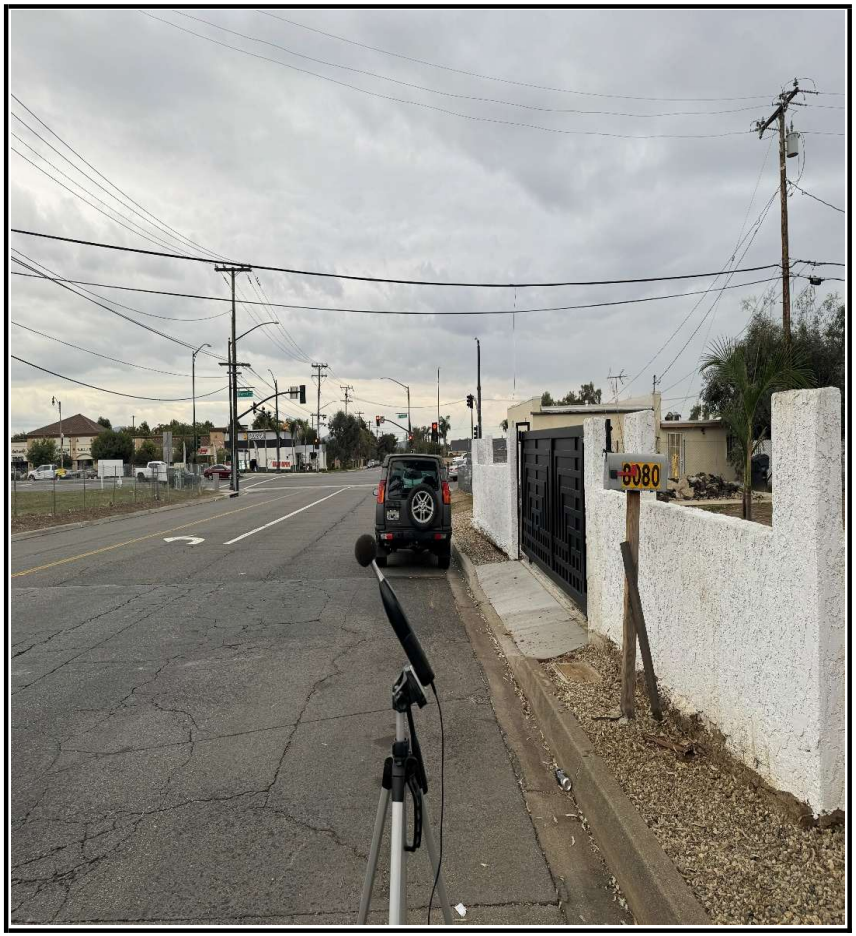
Start Time: 3:13 PM **End Time:** 3:28 PM **Run Time:**

Leq:	64.9	dB	**Primary Noise Source:** Traffic noise from 36 vehicles passing STNM4 microphone, travelling N-S along
Lmax	79.7	dB	Redwood Ave. Traffic noise from Foothill Blvd running E-W , 240' S of STNM4.
L2	73.9	dB	**Secondary Noise Sources:** Bird song, leaf rustle fom 4mph breeze. Some residential ambiance. Distant
L8	69.9	dB	train horns. Overhead commercial airtraffic (Ontario Airport 9 miles WSW)
L25	64.3	dB	
L50	59.3	dB	

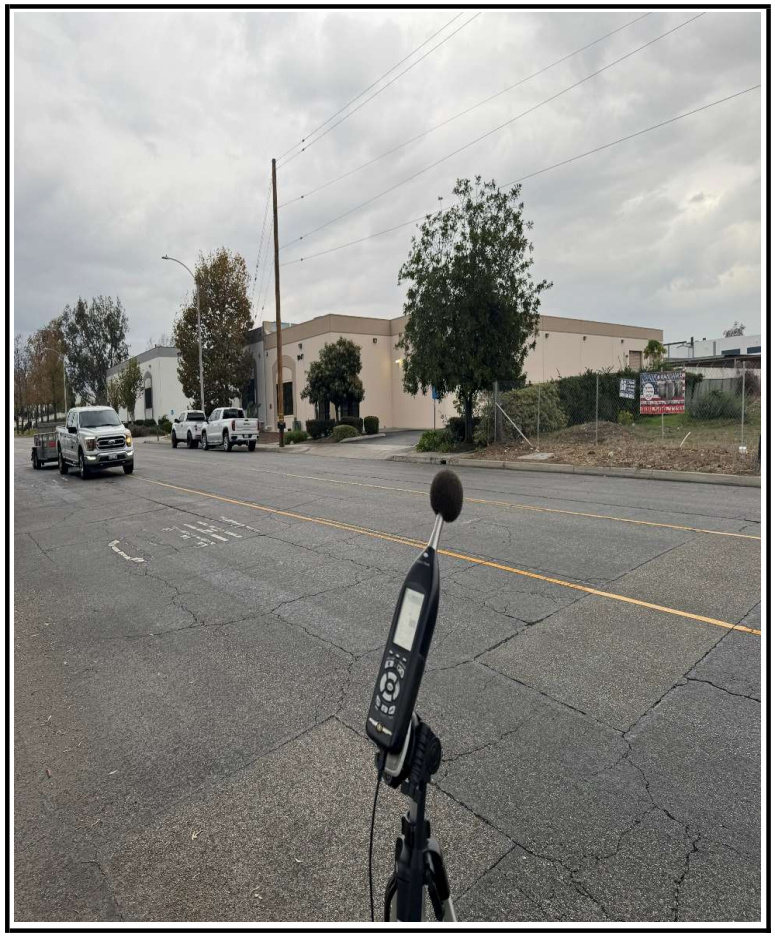
NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CAL 250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CAL 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	7/31/2024	**FACTORY CALIBRATION DATE:**	7/10/2024
FIELD CALIBRATION DATE:	11/20/2025		

Noise Measurement
Field Data

PHOTOS:



STNM4 looking S towards Redwood Avenue & Foothill Boulevard (traffic lights 240' S), residence 8080 Redwood Avenue, Fontana on the right.



STNM4 looking NE across Redwood Avenue towards building 8047 Redwood Avenue (left) & the remains (demolished) of what use to be residence 8055 Redwood Avenue, Fontana (right).

Measurement Report

Report Summary

Meter's File Name	LxT_Data.668.s	Computer's File Name	LxT_0003099-20251120 151346-LxT_Data.668.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM4 34° 6'26.50"N 117°29'3.71"W
Job Description	15 minute noise measurement		
Note	Ganddini Project #19866 Hilton Industrial Facility, City of Fontana		
Start Time	2025-11-20 15:13:46	Duration	0:15:00.0
End Time	2025-11-20 15:28:46	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	64.9 dB		
LAE	94.4 dB	SEA	--- dB
EA	308.5 µPa²h	LAFTM5	70.7 dB
EA8	9.9 mPa²h		
EA40	49.4 mPa²h		
LA_{peak}	103.1 dB	2025-11-20 15:16:27	
LAS_{max}	79.7 dB	2025-11-20 15:16:28	
LAS_{min}	47.8 dB	2025-11-20 15:18:20	
LA_{eq}	64.9 dB		
LC_{eq}	75.2 dB	LC_{eq} - LA_{eq}	10.3 dB
LAI_{eq}	68.6 dB	LAI_{eq} - LA_{eq}	3.7 dB

Exceedances	Count	Duration
LAS > 65.0 dB	32	0:03:53.4
LAS > 85.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight
	--- dB	--- dB	0.0 dB

	LDEN	LDay	LEve	LNight
	--- dB	--- dB	--- dB	--- dB

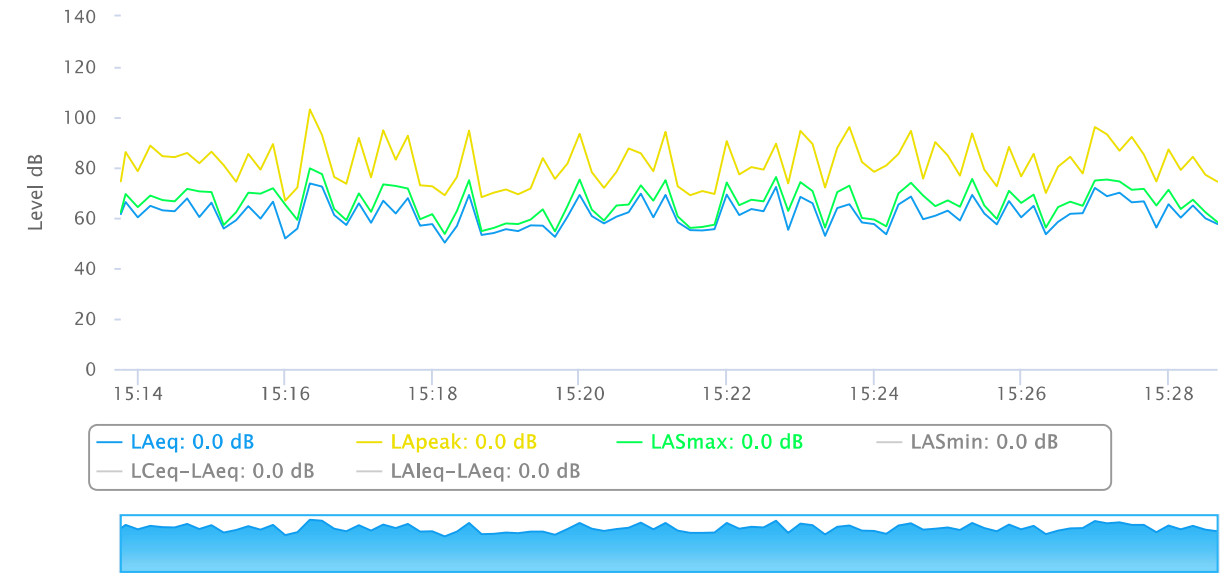
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	64.9 dB		75.2 dB		--- dB	
$Ls_{(max)}$	79.7 dB	2025-11-20 15:16:28	--- dB		--- dB	
$LS_{(min)}$	47.8 dB	2025-11-20 15:18:20	--- dB		--- dB	
$L_{Peak(max)}$	103.1 dB	2025-11-20 15:16:27	--- dB		--- dB	

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

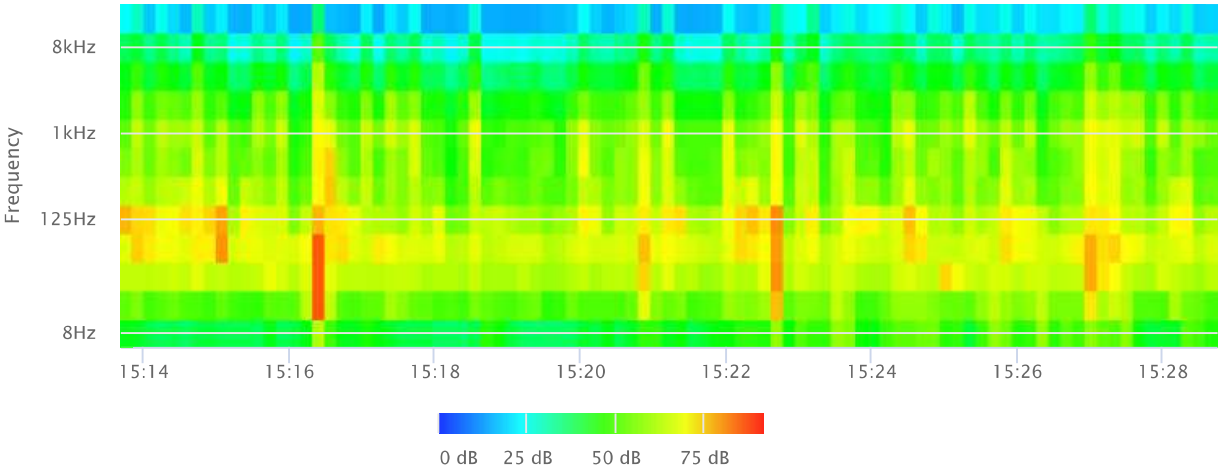
Statistics

LAS 2.0	73.9 dB
LAS 8.0	69.9 dB
LAS 25.0	64.3 dB
LAS 50.0	59.3 dB
LAS 66.6	57.3 dB
LAS 90.0	53.6 dB

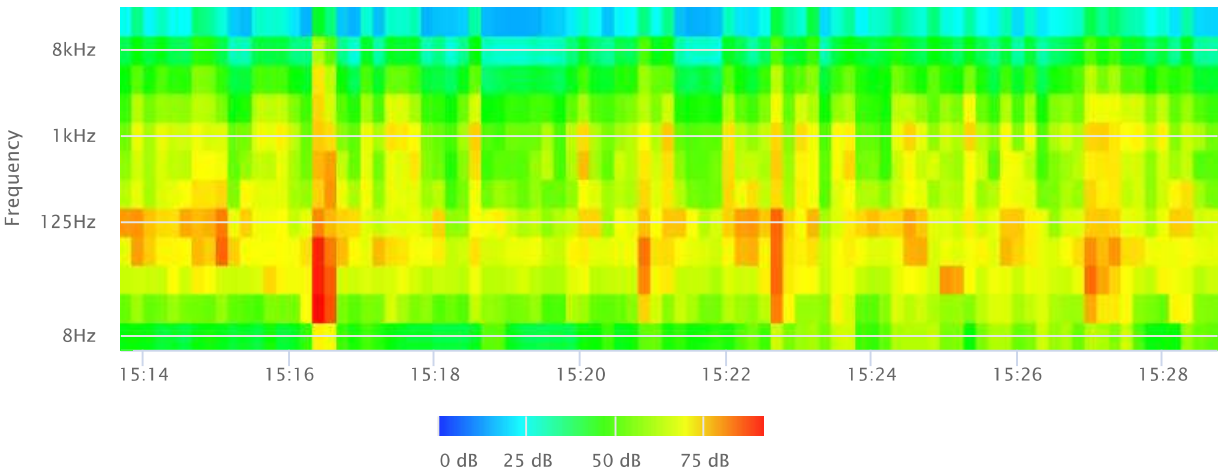
Time History



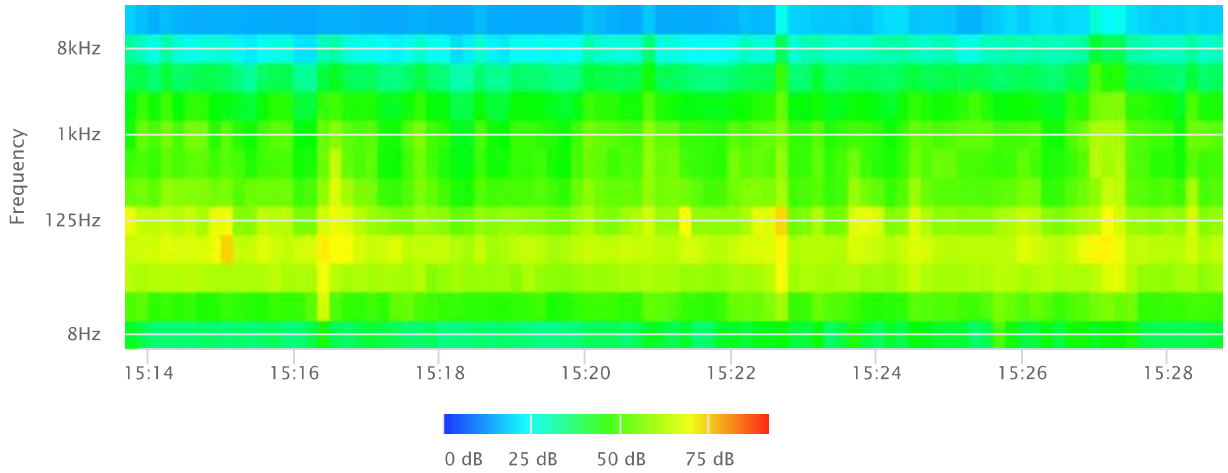
OBA 1/1 Leq



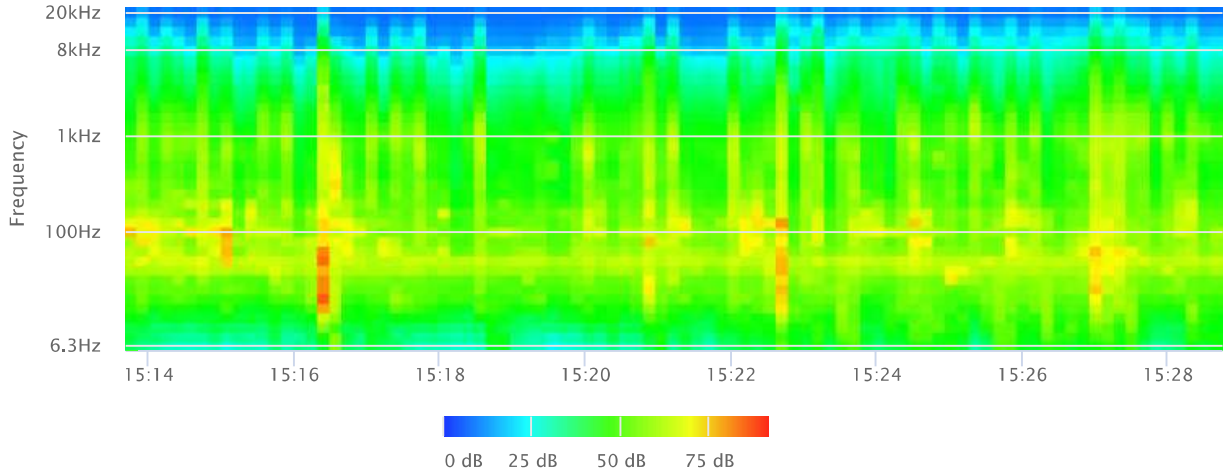
OBA 1/1 Lmax



OBA 1/1 Lmin



OBA 1/3 Leq



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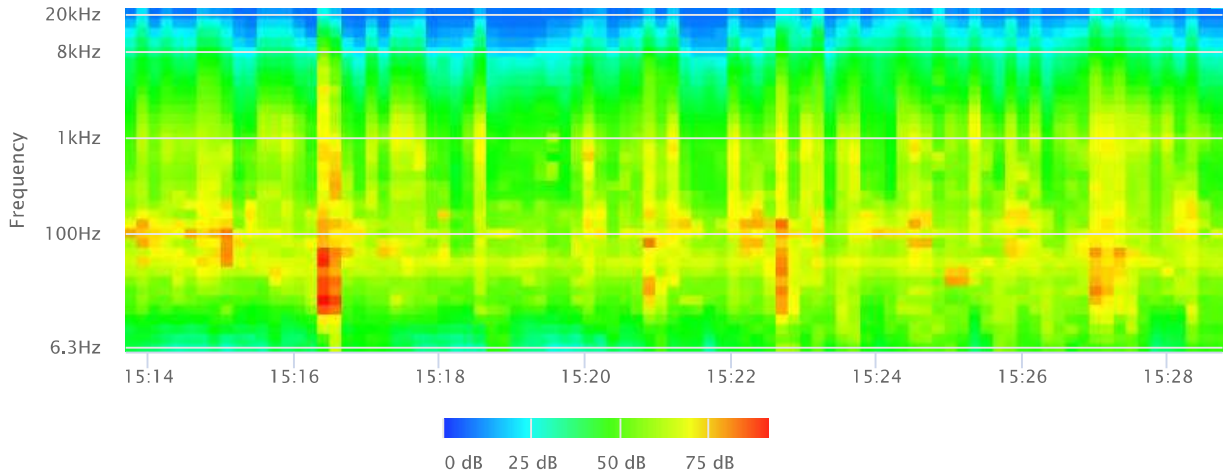

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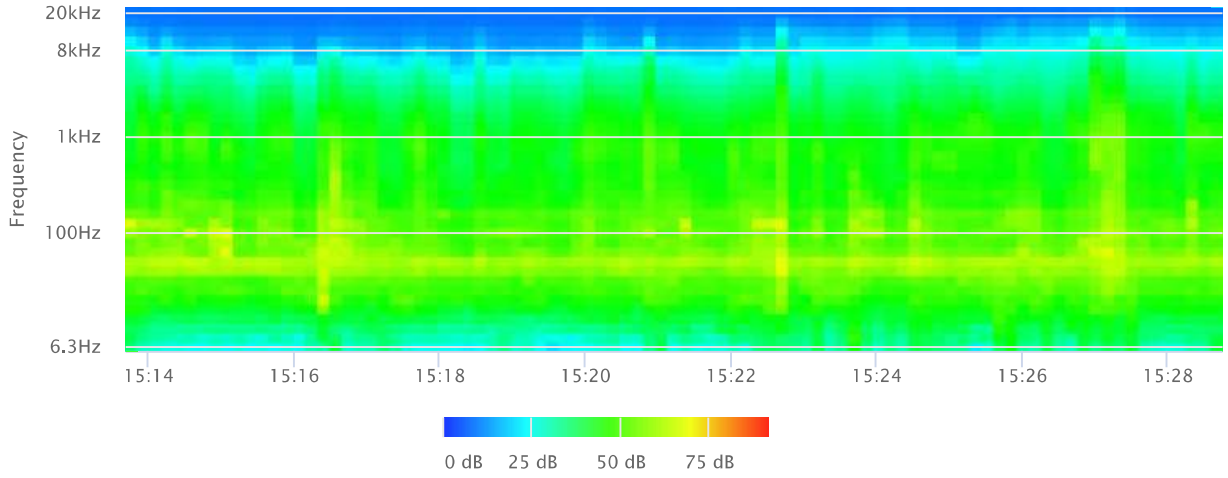
20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
15:14
15:16
15:18
15:20
15:22
15:24
15:26
15:28
0 dB
25 dB
50 dB
75 dB

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APPENDIX D
CALEEMOD DETAILED REPORT

Hilton Warehouses Detailed Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Hilton Warehouses
Construction Start Date	1/1/2026
Operational Year	2026
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.80
Precipitation (days)	6.40
Location	34.10931147833928, -117.4809929555013
County	San Bernardino-South Coast
City	Fontana
Air District	South Coast AQMD
Air Basin	South Coast
TAZ	5304
EDFZ	10
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas
App Version	2022.1.1.29

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
General Light Industry	73.5	1000sqft	4.00	73,550	19,560	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.46	1.21	10.4	15.4	0.03	0.38	0.51	0.89	0.35	0.12	0.48	—	3,189	3,189	0.14	0.09	2.42	3,222
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	38.1	38.0	29.2	29.8	0.05	1.24	7.89	9.14	1.14	3.99	5.14	—	5,519	5,519	0.22	0.09	0.06	5,540
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.94	1.93	7.17	10.1	0.02	0.27	0.49	0.75	0.25	0.16	0.41	—	2,099	2,099	0.09	0.06	0.66	2,119
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.35	0.35	1.31	1.83	< 0.005	0.05	0.09	0.14	0.05	0.03	0.07	—	347	347	0.01	0.01	0.11	351

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	1.46	1.21	10.4	15.4	0.03	0.38	0.51	0.89	0.35	0.12	0.48	—	3,189	3,189	0.14	0.09	2.42	3,222

Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	3.82	3.21	29.2	29.8	0.05	1.24	7.89	9.14	1.14	3.99	5.14	—	5,519	5,519	0.22	0.09	0.06	5,540
2027	38.1	38.0	9.91	14.7	0.03	0.34	0.51	0.85	0.32	0.12	0.44	—	3,139	3,139	0.13	0.09	0.06	3,169
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	1.00	0.83	7.17	10.1	0.02	0.27	0.49	0.75	0.25	0.16	0.41	—	2,099	2,099	0.09	0.06	0.66	2,119
2027	1.94	1.93	0.48	0.76	< 0.005	0.02	0.02	0.04	0.02	0.01	0.02	—	132	132	< 0.005	< 0.005	0.04	133
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.18	0.15	1.31	1.83	< 0.005	0.05	0.09	0.14	0.05	0.03	0.07	—	347	347	0.01	0.01	0.11	351
2027	0.35	0.35	0.09	0.14	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	21.9	21.9	< 0.005	< 0.005	0.01	22.1

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.42	2.33	0.88	3.92	0.01	0.07	< 0.005	0.07	0.07	< 0.005	0.07	81.7	2,223	2,305	8.42	0.09	19.2	2,562
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.85	1.81	0.85	0.72	0.01	0.06	< 0.005	0.07	0.06	< 0.005	0.07	81.7	2,210	2,292	8.42	0.09	19.1	2,548
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.24	2.17	0.87	2.91	0.01	0.07	< 0.005	0.07	0.07	< 0.005	0.07	81.7	2,219	2,301	8.42	0.09	19.2	2,558
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.41	0.40	0.16	0.53	< 0.005	0.01	< 0.005	0.01	0.01	< 0.005	0.01	13.5	367	381	1.39	0.02	3.17	423

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.61	5.61	< 0.005	< 0.005	0.03	5.82
Area	2.33	2.29	0.03	3.20	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	13.2	13.2	< 0.005	< 0.005	—	13.2
Energy	0.09	0.05	0.85	0.71	0.01	0.06	—	0.06	0.06	—	0.06	—	2,033	2,033	0.15	0.01	—	2,040
Water	—	—	—	—	—	—	—	—	—	—	—	32.6	171	204	3.35	0.08	—	312
Waste	—	—	—	—	—	—	—	—	—	—	—	49.2	0.00	49.2	4.91	0.00	—	172
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19.1	19.1
Total	2.42	2.33	0.88	3.92	0.01	0.07	< 0.005	0.07	0.07	< 0.005	0.07	81.7	2,223	2,305	8.42	0.09	19.2	2,562
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.54	5.54	< 0.005	< 0.005	< 0.005	5.73
Area	1.76	1.76	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.09	0.05	0.85	0.71	0.01	0.06	—	0.06	0.06	—	0.06	—	2,033	2,033	0.15	0.01	—	2,040
Water	—	—	—	—	—	—	—	—	—	—	—	32.6	171	204	3.35	0.08	—	312
Waste	—	—	—	—	—	—	—	—	—	—	—	49.2	0.00	49.2	4.91	0.00	—	172
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19.1	19.1
Total	1.85	1.81	0.85	0.72	0.01	0.06	< 0.005	0.07	0.06	< 0.005	0.07	81.7	2,210	2,292	8.42	0.09	19.1	2,548
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.55	5.55	< 0.005	< 0.005	0.01	5.75
Area	2.15	2.12	0.02	2.19	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	9.01	9.01	< 0.005	< 0.005	—	9.04
Energy	0.09	0.05	0.85	0.71	0.01	0.06	—	0.06	0.06	—	0.06	—	2,033	2,033	0.15	0.01	—	2,040
Water	—	—	—	—	—	—	—	—	—	—	—	32.6	171	204	3.35	0.08	—	312
Waste	—	—	—	—	—	—	—	—	—	—	—	49.2	0.00	49.2	4.91	0.00	—	172

Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19.1	19.1
Total	2.24	2.17	0.87	2.91	0.01	0.07	< 0.005	0.07	0.07	< 0.005	0.07	81.7	2,219	2,301	8.42	0.09	19.2	2,558
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.92	0.92	< 0.005	< 0.005	< 0.005	0.95
Area	0.39	0.39	< 0.005	0.40	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.49	1.49	< 0.005	< 0.005	—	1.50
Energy	0.02	0.01	0.15	0.13	< 0.005	0.01	—	0.01	0.01	—	0.01	—	337	337	0.03	< 0.005	—	338
Water	—	—	—	—	—	—	—	—	—	—	—	5.40	28.3	33.7	0.56	0.01	—	51.6
Waste	—	—	—	—	—	—	—	—	—	—	—	8.14	0.00	8.14	0.81	0.00	—	28.5
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.17	3.17
Total	0.41	0.40	0.16	0.53	< 0.005	0.01	< 0.005	0.01	0.01	< 0.005	0.01	13.5	367	381	1.39	0.02	3.17	423

3. Construction Emissions Details

3.1. Site Preparation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.74	3.14	29.2	28.8	0.05	1.24	—	1.24	1.14	—	1.14	—	5,298	5,298	0.21	0.04	—	5,316
Dust From Material Movement	—	—	—	—	—	—	7.67	7.67	—	3.94	3.94	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.04	0.40	0.39	< 0.005	0.02	—	0.02	0.02	—	0.02	—	72.6	72.6	< 0.005	< 0.005	—	72.8
Dust From Material Movement	—	—	—	—	—	—	0.11	0.11	—	0.05	0.05	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.07	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	12.0	12.0	< 0.005	< 0.005	—	12.1
Dust From Material Movement	—	—	—	—	—	—	0.02	0.02	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.07	0.08	0.95	0.00	0.00	0.23	0.23	0.00	0.05	0.05	—	222	222	< 0.005	0.01	0.02	224
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	3.08	3.08	< 0.005	< 0.005	< 0.005	3.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.51	0.51	< 0.005	< 0.005	< 0.005	0.52
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.3. Grading (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.96	1.65	15.0	17.4	0.03	0.65	—	0.65	0.59	—	0.59	—	2,960	2,960	0.12	0.02	—	2,970
Dust From Material Movement	—	—	—	—	—	—	2.76	2.76	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road	0.04	0.04	0.33	0.38	< 0.005	0.01	—	0.01	0.01	—	0.01	—	64.9	64.9	< 0.005	< 0.005	—	65.1
Dust From Material Movement	—	—	—	—	—	—	0.06	0.06	—	0.03	0.03	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.06	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	10.7	10.7	< 0.005	< 0.005	—	10.8
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.07	0.82	0.00	0.00	0.20	0.20	0.00	0.05	0.05	—	190	190	< 0.005	0.01	0.02	192
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	4.22	4.22	< 0.005	< 0.005	0.01	4.28
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.70	0.70	< 0.005	< 0.005	< 0.005	0.71
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.28	1.07	9.85	13.0	0.02	0.38	—	0.38	0.35	—	0.35	—	2,397	2,397	0.10	0.02	—	2,405
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.28	1.07	9.85	13.0	0.02	0.38	—	0.38	0.35	—	0.35	—	2,397	2,397	0.10	0.02	—	2,405
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.79	0.66	6.09	8.02	0.01	0.23	—	0.23	0.22	—	0.22	—	1,482	1,482	0.06	0.01	—	1,488
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.12	1.11	1.46	< 0.005	0.04	—	0.04	0.04	—	0.04	—	245	245	0.01	< 0.005	—	246
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.15	0.13	0.12	2.22	0.00	0.00	0.40	0.40	0.00	0.09	0.09	—	426	426	0.02	0.01	1.46	433
Vendor	0.04	0.01	0.40	0.21	< 0.005	0.01	0.10	0.11	0.01	0.03	0.03	—	366	366	0.03	0.06	0.97	384
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.14	0.12	0.14	1.68	0.00	0.00	0.40	0.40	0.00	0.09	0.09	—	391	391	0.01	0.02	0.04	396
Vendor	0.04	0.01	0.41	0.22	< 0.005	0.01	0.10	0.11	0.01	0.03	0.03	—	366	366	0.03	0.06	0.03	383
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.09	1.09	0.00	0.00	0.25	0.25	0.00	0.06	0.06	—	245	245	< 0.005	0.01	0.39	249
Vendor	0.02	< 0.005	0.26	0.13	< 0.005	< 0.005	0.06	0.07	< 0.005	0.02	0.02	—	226	226	0.02	0.03	0.26	237
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.02	0.20	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	40.6	40.6	< 0.005	< 0.005	0.06	41.1
Vendor	< 0.005	< 0.005	0.05	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	37.4	37.4	< 0.005	0.01	0.04	39.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Building Construction (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.23	1.03	9.39	12.9	0.02	0.34	—	0.34	0.31	—	0.31	—	2,397	2,397	0.10	0.02	—	2,405
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.13	0.18	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	32.8	32.8	< 0.005	< 0.005	—	32.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.44	5.44	< 0.005	< 0.005	—	5.46
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.13	0.12	0.12	1.56	0.00	0.00	0.40	0.40	0.00	0.09	0.09	—	383	383	0.01	0.01	0.03	388
Vendor	0.03	0.01	0.40	0.21	< 0.005	0.01	0.10	0.11	0.01	0.03	0.03	—	359	359	0.03	0.05	0.02	376
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	5.32	5.32	< 0.005	< 0.005	0.01	5.39
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.92	4.92	< 0.005	< 0.005	0.01	5.15
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.88	0.88	< 0.005	< 0.005	< 0.005	0.89
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.81	0.81	< 0.005	< 0.005	< 0.005	0.85
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Paving (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.79	0.66	6.09	8.83	0.01	0.24	—	0.24	0.22	—	0.22	—	1,350	1,350	0.05	0.01	—	1,355
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.30	0.44	< 0.005	0.01	—	0.01	0.01	—	0.01	—	66.6	66.6	< 0.005	< 0.005	—	66.8
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	11.0	11.0	< 0.005	< 0.005	—	11.1
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.08	1.01	0.00	0.00	0.26	0.26	0.00	0.06	0.06	—	248	248	< 0.005	0.01	0.02	251
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	12.4	12.4	< 0.005	< 0.005	0.02	12.6
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	2.05	2.05	< 0.005	< 0.005	< 0.005	2.08
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Architectural Coating (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.11	0.83	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	37.9	37.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.04	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.58	6.58	< 0.005	< 0.005	—	6.61
Architectural Coatings	1.87	1.87	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.09	1.09	< 0.005	< 0.005	—	1.09
Architectural Coatings	0.34	0.34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.02	0.31	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	76.6	76.6	< 0.005	< 0.005	0.01	77.6
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	3.83	3.83	< 0.005	< 0.005	0.01	3.88
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.63	0.63	< 0.005	< 0.005	< 0.005	0.64
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.61	5.61	< 0.005	< 0.005	0.03	5.82
Total	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.61	5.61	< 0.005	< 0.005	0.03	5.82
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.54	5.54	< 0.005	< 0.005	< 0.005	5.73
Total	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.54	5.54	< 0.005	< 0.005	< 0.005	5.73
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.92	0.92	< 0.005	< 0.005	< 0.005	0.95
Total	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.92	0.92	< 0.005	< 0.005	< 0.005	0.95

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	1,022	1,022	0.06	0.01	—	1,026
Total	—	—	—	—	—	—	—	—	—	—	—	—	1,022	1,022	0.06	0.01	—	1,026
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	1,022	1,022	0.06	0.01	—	1,026
Total	—	—	—	—	—	—	—	—	—	—	—	—	1,022	1,022	0.06	0.01	—	1,026
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	169	169	0.01	< 0.005	—	170
Total	—	—	—	—	—	—	—	—	—	—	—	—	169	169	0.01	< 0.005	—	170

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.09	0.05	0.85	0.71	0.01	0.06	—	0.06	0.06	—	0.06	—	1,011	1,011	0.09	< 0.005	—	1,014
Total	0.09	0.05	0.85	0.71	0.01	0.06	—	0.06	0.06	—	0.06	—	1,011	1,011	0.09	< 0.005	—	1,014

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.09	0.05	0.85	0.71	0.01	0.06	—	0.06	0.06	—	0.06	—	1,011	1,011	0.09	< 0.005	—	1,014
Total	0.09	0.05	0.85	0.71	0.01	0.06	—	0.06	0.06	—	0.06	—	1,011	1,011	0.09	< 0.005	—	1,014
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.02	0.01	0.15	0.13	< 0.005	0.01	—	0.01	0.01	—	0.01	—	167	167	0.01	< 0.005	—	168
Total	0.02	0.01	0.15	0.13	< 0.005	0.01	—	0.01	0.01	—	0.01	—	167	167	0.01	< 0.005	—	168

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	1.57	1.57	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.19	0.19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.57	0.53	0.03	3.20	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	13.2	13.2	< 0.005	< 0.005	—	13.2
Total	2.33	2.29	0.03	3.20	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	13.2	13.2	< 0.005	< 0.005	—	13.2

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	1.57	1.57	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.19	0.19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	1.76	1.76	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.29	0.29	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.03	0.03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.07	0.07	< 0.005	0.40	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.49	1.49	< 0.005	< 0.005	—	1.50
Total	0.39	0.39	< 0.005	0.40	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.49	1.49	< 0.005	< 0.005	—	1.50

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

General Light Industry	—	—	—	—	—	—	—	—	—	—	—	32.6	171	204	3.35	0.08	—	312
Total	—	—	—	—	—	—	—	—	—	—	—	32.6	171	204	3.35	0.08	—	312
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	32.6	171	204	3.35	0.08	—	312
Total	—	—	—	—	—	—	—	—	—	—	—	32.6	171	204	3.35	0.08	—	312
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	5.40	28.3	33.7	0.56	0.01	—	51.6
Total	—	—	—	—	—	—	—	—	—	—	—	5.40	28.3	33.7	0.56	0.01	—	51.6

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	49.2	0.00	49.2	4.91	0.00	—	172
Total	—	—	—	—	—	—	—	—	—	—	—	49.2	0.00	49.2	4.91	0.00	—	172
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

General Light Industry	—	—	—	—	—	—	—	—	—	—	—	49.2	0.00	49.2	4.91	0.00	—	172
Total	—	—	—	—	—	—	—	—	—	—	—	49.2	0.00	49.2	4.91	0.00	—	172
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	8.14	0.00	8.14	0.81	0.00	—	28.5
Total	—	—	—	—	—	—	—	—	—	—	—	8.14	0.00	8.14	0.81	0.00	—	28.5

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19.1	19.1
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19.1	19.1
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19.1	19.1
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19.1	19.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.17	3.17

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.17	3.17

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Preparation	Site Preparation	1/30/2026	2/6/2026	5.00	5.00	—
Grading	Grading	2/7/2026	2/18/2026	5.00	8.00	—
Building Construction	Building Construction	2/19/2026	1/7/2027	5.00	230	—
Paving	Paving	1/8/2027	2/2/2027	5.00	18.0	—
Architectural Coating	Architectural Coating	2/3/2027	2/28/2027	5.00	18.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Preparation	Rubber Tired Dozers	Diesel	Average	3.00	8.00	367	0.40
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	4.00	8.00	84.0	0.37
Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Grading	Tractors/Loaders/Backhoes	Diesel	Average	3.00	8.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Building Construction	Forklifts	Diesel	Average	3.00	8.00	82.0	0.20
Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	3.00	7.00	84.0	0.37
Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45

Paving	Cement and Mortar Mixers	Diesel	Average	2.00	6.00	10.0	0.56
Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	2.00	6.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	6.00	36.0	0.38
Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Preparation	—	—	—	—
Site Preparation	Worker	17.5	18.5	LDA,LDT1,LDT2
Site Preparation	Vendor	—	10.2	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	15.0	18.5	LDA,LDT1,LDT2
Grading	Vendor	—	10.2	HHDT,MHDT
Grading	Hauling	0.00	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	30.9	18.5	LDA,LDT1,LDT2
Building Construction	Vendor	12.1	10.2	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—

Paving	Worker	20.0	18.5	LDA,LDT1,LDT2
Paving	Vendor	—	10.2	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	6.18	18.5	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	10.2	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	0.00	0.00	110,325	36,775	—

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Preparation	—	—	7.50	0.00	—
Grading	—	—	8.00	0.00	—
Paving	0.00	0.00	0.00	0.00	0.00

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
General Light Industry	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2026	0.00	532	0.03	< 0.005
2027	0.00	532	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
General Light Industry	128	128	128	46,685	1,714	1,714	1,714	625,486

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

0	0.00	110,325	36,775	—

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	250

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
General Light Industry	701,500	532	0.0330	0.0040	3,154,274

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
General Light Industry	17,008,438	314,116

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
General Light Industry	91.2	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
General Light Industry	Other commercial A/C and heat pumps	R-410A	2,088	0.30	4.00	4.00	18.0

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	21.7	annual days of extreme heat
Extreme Precipitation	5.25	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	0.00	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	2	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	2	1	1	3
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	97.0
AQ-PM	91.2
AQ-DPM	44.6
Drinking Water	66.7
Lead Risk Housing	17.7
Pesticides	0.00
Toxic Releases	70.1
Traffic	22.7
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	0.00
Haz Waste Facilities/Generators	87.1
Impaired Water Bodies	0.00
Solid Waste	0.00
Sensitive Population	—
Asthma	35.5
Cardio-vascular	74.9
Low Birth Weights	90.0

Socioeconomic Factor Indicators	—
Education	67.1
Housing	32.3
Linguistic	42.1
Poverty	46.6
Unemployment	60.6

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	73.87398948
Employed	66.08494803
Median HI	76.97934043
Education	—
Bachelor's or higher	33.61991531
High school enrollment	16.64314128
Preschool enrollment	6.954959579
Transportation	—
Auto Access	81.29090209
Active commuting	28.82073656
Social	—
2-parent households	63.10791736
Voting	37.89298088
Neighborhood	—
Alcohol availability	69.81906839
Park access	24.90696779
Retail density	29.59065828

Supermarket access	48.50506865
Tree canopy	11.20236109
Housing	—
Homeownership	87.77107661
Housing habitability	74.22045425
Low-inc homeowner severe housing cost burden	66.09778006
Low-inc renter severe housing cost burden	33.49159502
Uncrowded housing	67.80443988
Health Outcomes	—
Insured adults	47.32452201
Arthritis	87.4
Asthma ER Admissions	59.8
High Blood Pressure	83.5
Cancer (excluding skin)	80.0
Asthma	58.2
Coronary Heart Disease	90.3
Chronic Obstructive Pulmonary Disease	88.0
Diagnosed Diabetes	65.9
Life Expectancy at Birth	84.7
Cognitively Disabled	85.7
Physically Disabled	88.8
Heart Attack ER Admissions	27.3
Mental Health Not Good	56.0
Chronic Kidney Disease	79.8
Obesity	44.4
Pedestrian Injuries	39.5
Physical Health Not Good	65.0
Stroke	88.3

Health Risk Behaviors	—
Binge Drinking	15.4
Current Smoker	63.1
No Leisure Time for Physical Activity	61.9
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	45.9
Elderly	96.3
English Speaking	60.3
Foreign-born	41.2
Outdoor Workers	55.6
Climate Change Adaptive Capacity	—
Impervious Surface Cover	52.6
Traffic Density	33.7
Traffic Access	23.0
Other Indices	—
Hardship	49.3
Other Decision Support	—
2016 Voting	49.9

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	58.0
Healthy Places Index Score for Project Location (b)	51.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Per Site Plan
Construction: Construction Phases	Project Site is Vacant.
Operations: Vehicle Data	Per Project Traffic Memorandum
Operations: Fleet Mix	Project Traffic Memorandum, Table A:Project Trip Generation

APPENDIX E
HYDROLOGY STUDY

HYDROLOGY STUDY

Lot 2. Tract 13643

APN 1110-151-03
Hilton Drive.
Fontana, CA 92336

Prepared for:
George & Doug McCan
15 Orion
Irvine, CA 92603

Prepared by:
Land Development Design Company, LLC (LDDC)
2313 E. Philadelphia St., Suite F
Ontario, CA 91761
(909) 930-1466
Kevin J. Richer
E-mail: Kevin.richer@lddc.net

Date: August 16, 2023
Revised: July 22, 2024

Prepared under the supervision of:

Kevin J. Richer
RCE 43714, Exp. 3/31/25

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Appendix C
- Rational Method Output (Post-Developed)

Appendix D
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Appendix E
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- Routing Calcs

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- Soils Report
- Factor of Safety Worksheet
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- Line K Master Plan Hydrology Calcs

Discussion

The purpose of this study is to determine the hydrology impacts to the existing downstream facilities and properties and to ensure that the design mitigates increased flows to the existing facilities. The study will verify flows to the downstream facilities and will also size infrastructure onsite to address stormwater quality design per the WQMP and show that the discharged flows to Hilton Drive are below the levels designed in the Master Plan Hydrology ("Master Hydrology for Fontana West End Venture Foothill Drains- Lines A, B, D, J, K".)

The project proposes to develop a 3.94-acre site located at Hilton Drive, Lot 2 tract 13643. in the city of Fontana. The site is bounded to the north, east and west by commercial developments, and to the south by the right-of-way of Hilton Drive Site soils are Hydrologic Soil Group "A."

In its existing condition, the project site is undeveloped. The project site sheets storm water flows in a southerly direction, discharging into the right-of-way of Hilton Drive. It does not accept storm water run-on from the adjacent properties. See the Pre-Developed Hydrology Map in Appendix B. There is an existing storm drain constructed in Hilton Drive identified as Line K as shown on "Master Hydrology for Fontana West End Venture Foothill Drains- Lines A, B, D, J, K". This parcel is part of areas 991.1 & 991.2 totaling 14.0 acres.

The project proposes to develop the site for commercial use. Proposed improvements consist of two warehouse buildings with loading docks, AC pavement, concrete hardscape, landscape, concrete curbs and gutters, two catch basin inlets, and a proposed underground infiltration system. The proposed development will be 87% impervious.

The proposed site design will mimic the existing drainage patterns of the property, directing storm flows to the southerly boundary of the project site. Drainage Area A1 consists of the easterly portion of the project site Storm water sheets across proposed AC pavement and landscape to be intercepted by proposed concrete gutters. The gutters convey flows southerly to be intercepted by a proposed inlet located at the southeasterly corner of the project site. The inlet discharges flows into a proposed storm drain that conveys flows westerly and discharges into the proposed underground infiltration system located beneath the southeasterly parking area. Drainage area A2 consists of the westerly portion of the project site. Storm water sheets across proposed AC pavement and landscape to be intercepted by proposed curb gutters. The gutters convey flows southerly to be intercepted by a proposed inlet located at the southwesterly corner of the project site and discharges into an underground infiltration system. See the Post-Developed Hydrology Map in Appendix C.

The proposed underground infiltration system has been designed to store the Design Capture Volume (DCV) for the project site, and to infiltrate it into the soil within 48 hours. The design is in accordance with the 2013 Technical Guidance Document for Water Quality Management Plans of San Bernardino County. See Appendix F for the design of the proposed underground infiltration system

Rational Studies have been prepared for the pre-developed condition and post-developed condition using CivilCADD/CivilDESIGN software. The studies were prepared for the 2-year, 10-year, 25-year and 100-year storms. Per the County guidance for design of detention basins the pre-developed condition used 1-year rainfall rates for the 2-year storm, 5-year rainfall rates for the 10-year storm, 10-year rainfall rates for the 25-year storm and 25-year rainfall rates for the 100-year storm. Studies for the post-developed condition were prepared for the same storm intervals using 2-year, 10-year, 25-year and 100-year rainfall rates. This provides a conservative design for the sizing of the storage system per the County guidance. The pre-developed condition studies are shown in Appendix B; the post-developed condition studies are shown in Appendix C.

Unit hydrographs were prepared for the 3-hour and 24-hour durations for the 2-year storm, 10-year storm, 25-year storm and 100 year storm. These hydrographs were used to prepare routing calculations to show the underground infiltration system provides enough storage to ensure the overflow discharge at the southeast corner of the site does not exceed the allowable rate per the Master Plan Hydrology study. See Appendix D for result.

Appendix E includes the depth versus volume calculations for the storage and outflow rates of the underground infiltration system. The underground infiltration system consists of 8-foot diameter perforated CMP pipes, backfilled with washed rock (3/4" to 1-1/2" in diameter); said rock is wrapped with a non-woven filter fabric to prevent sediment from entering the voids of the pipe and to prevent erosion of the existing soil around the system. Details for this underground system are included in Appendix E. The storm flows start to fill the pipes and rock voids (assumed to be 40% of the overall volume). While the flows are filling the system, the flows will infiltrate into the soil at a rate of 0.41 cfs for the system. During larger storm events the system will fill and bubble out of the box inlets at the southeast corner of the site, flow through the proposed landscape plater and discharge into Cherry Avenue through a proposed underwalk drain. The routing calculations show the maximum post-developed discharge rate is below the flow that was tabled for this site per the Fontana West End Venture Master Plan Line K flows. See the table below showing the pre-developed flows, post-developed flows, allowable master plan flows and peak routed flows. Note that the time of concentration for the master plan flows is much higher than for the project site hydrology. This is a

conservative approach, since the project site pflows would be less using the higher time of concentration.

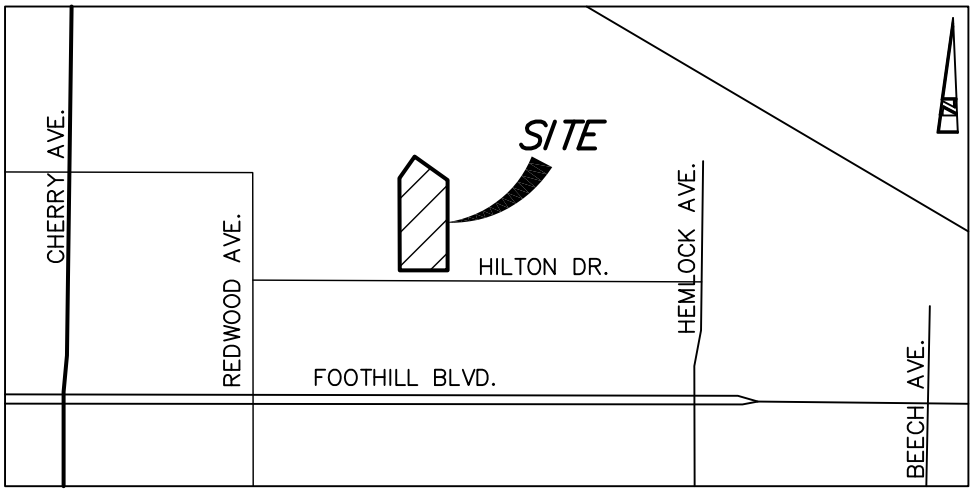
Drainage Area	Area (Acres)	Storm (Yr.)	Q Pre (CFS)	Q Post (CFS)	Allowed Flow Master Plan (CFS)	Peak – Routed Flow (CFS)	
						3-Hour	24 Hour
A	3.98	2	1.21 2YR-Rain	4.96	Not Calc.	0.41	0.41
A	3.98	10	2.52 5YR-Rain	9.04	8.28	0.41	0.41
A	3.98	25	3.63 10YR-Rain	11.34	9.71	2.44	2.44
A	3.98	100	6.16 25 YR-Rain	14.89	12.46	11.25	11.25

CONCLUSION

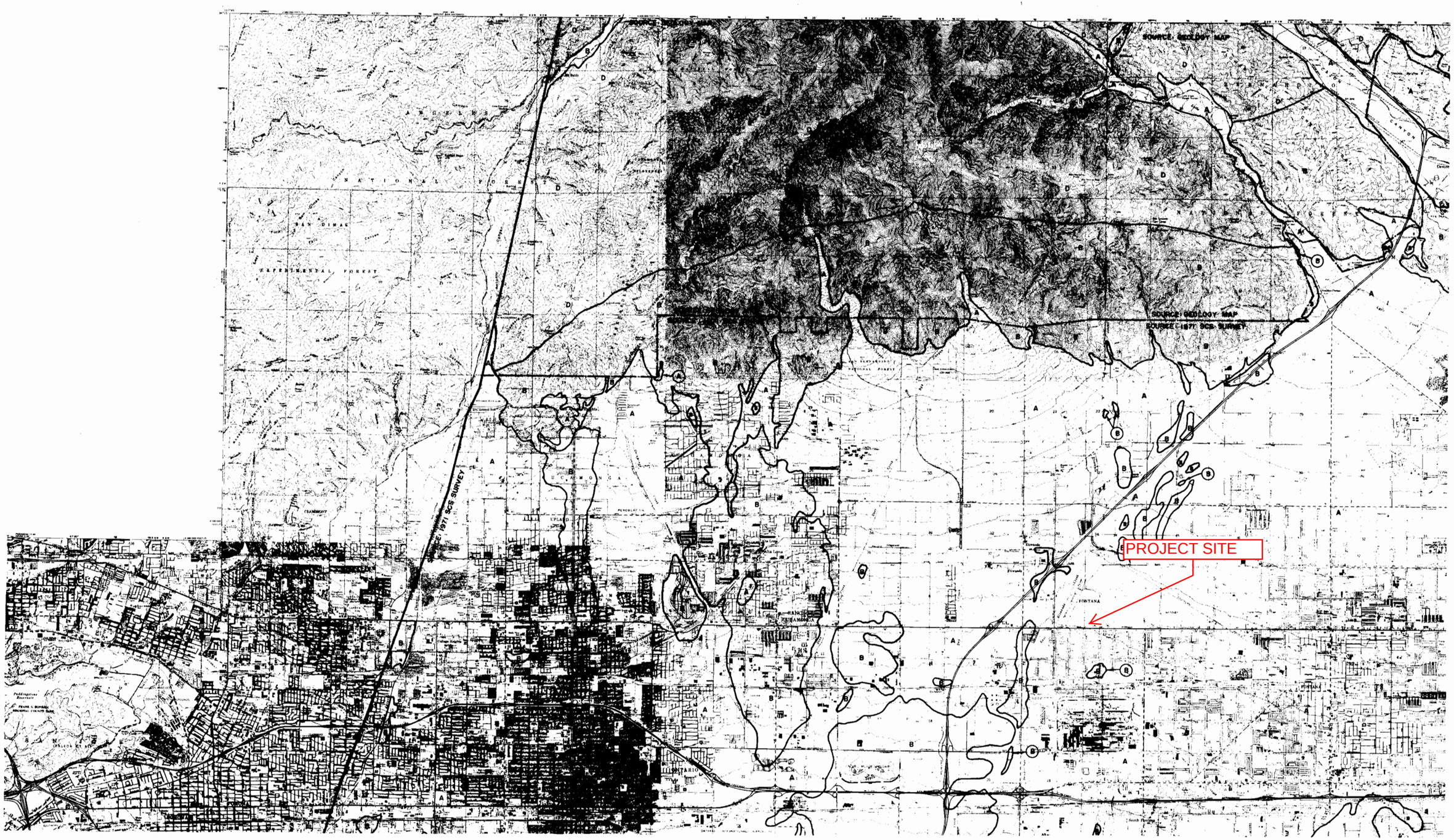
The underground infiltration system is designed to mitigate the increased runoff due to re-development of the site and also designed to meet the requirements per the County of San Bernardino WQMP Technical Guidance Document for treatment of the required storm volume. The WQMP Exhibit is included in Appendix F to show the design layout and cross-section of the underground infiltration system. It also shows the required volumes, as calculated in the WQMP for said project, and provided volumes. Capacity calculations for the systems are also included. The soils report including the infiltration rates are attached in Appendix F. The Factor of Safety Worksheet is included as well as drawdown calculations showing the system infiltrates within 48 hours. The drawdown time is 28.4 hours for the system which is well below the maximum 48 hour drawdown time. Routing calculations show the underground system allows for 0.41 cfs of infiltration. The 2- Year and 10-Year Storms will be contained within the underground infiltration system. The 25-Year and 100-Year storms will exceed the capacity of the underground infiltration system. Once the system is full and overflows the catch basin inlet at the southwest corner (lowest outlet) the flows will discharge through an underwalk drain to

Hilton Drive. The discharge rate for the 25-Year storm is 2.44 cfs and the discharge rate for the 100-Year 24-Hour storm is 11.25 cfs. These rates are well below the allowed rates per the master plan hydrology for Line K, 9.71 cfs and 12.46cfs, respectively.

Appendix A



VICINITY MAP
NTS



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

SCALE REDUCED BY 1/2

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-A AREA

FIGURE C-13

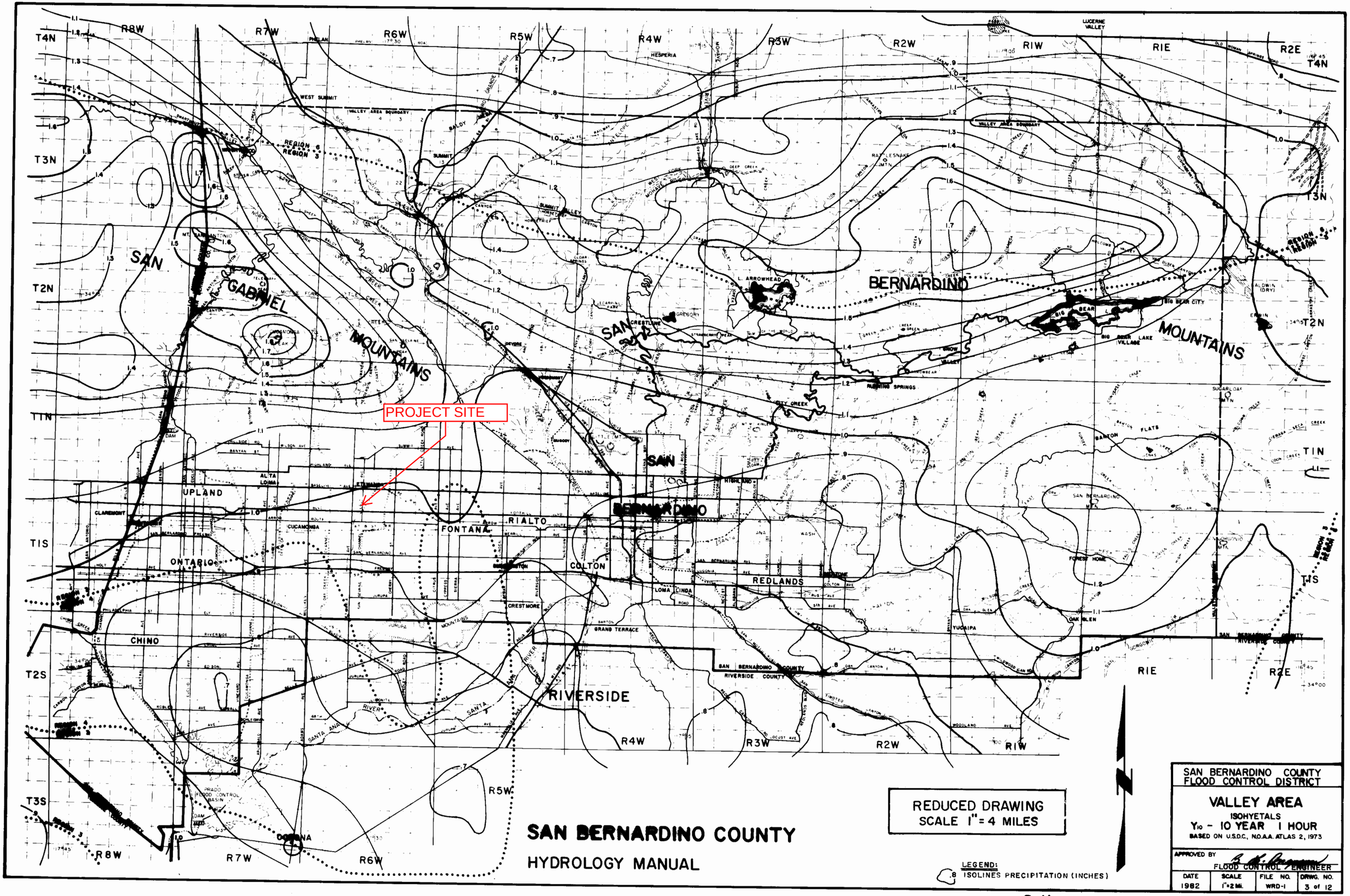

PROJECT SITE
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y10 - 10 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE 1982
SCALE 1"=2 Mi.
FILE NO. WRD-1
DRWG. NO. 3 of 12

FIGURE B-3

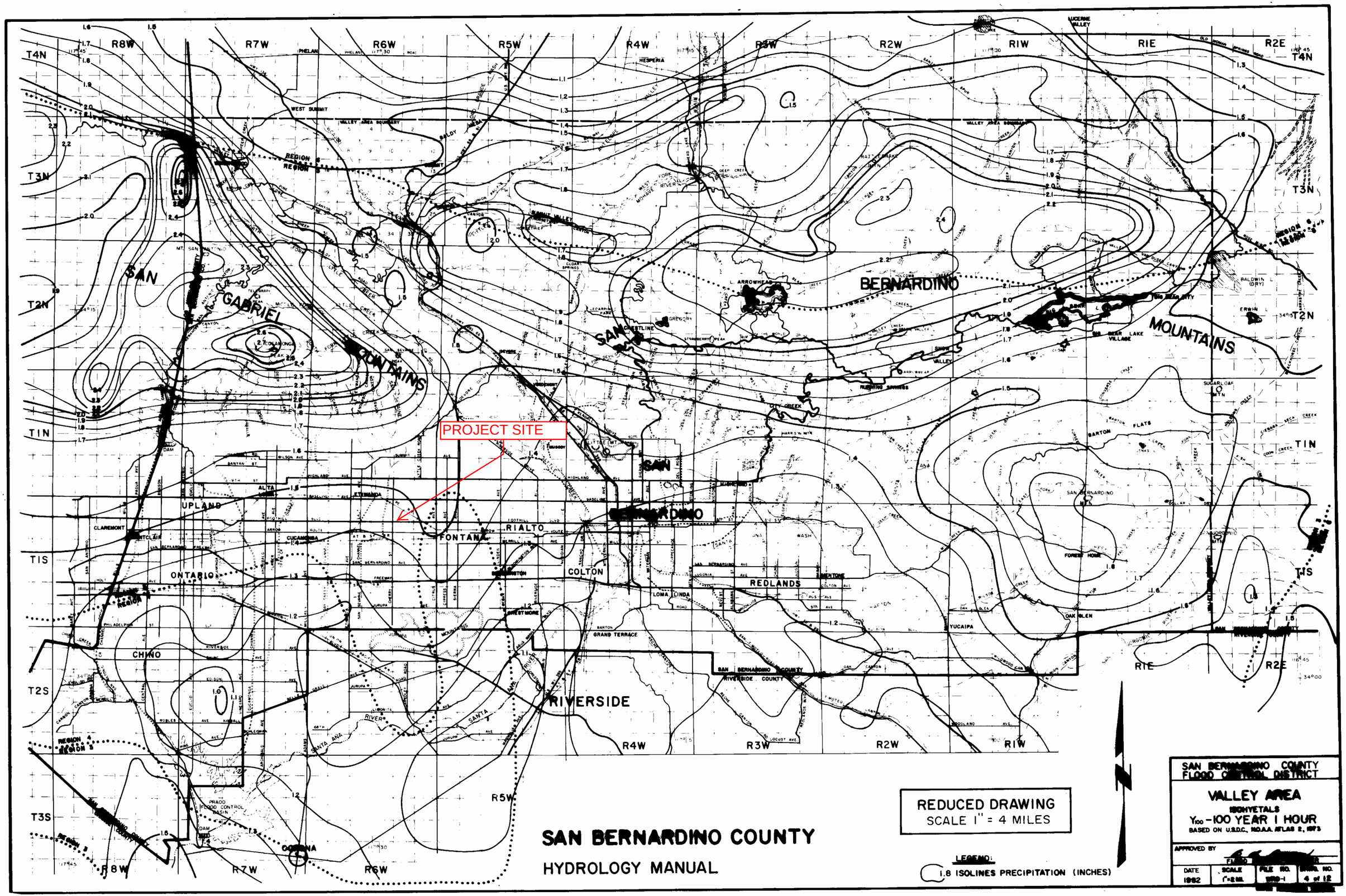

PROJECT SITE
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y100 - 100 YEAR 1 HOUR
BASED ON U.S.D.C., NOAA ATLAS 2, 1973
APPROVED BY
DATE 1982
SCALE 1"=2MI.
FILE NO. SBD-1
DWG. NO. 4 of 12
SAN BERNARDINO MOUNTAINS
SAN GABRIEL MOUNTAINS
RIVERSIDE
UPLAND
ONTARIO
CHINO
CLAREMONT
FONTANA
RIALTO
COLTON
REDLANDS
LOMA LINDA
YUCAIPA
HIGHLAND
SAN BERNARDINO
GRAND TERRACE
CRESTLINE
LAKE ARROWHEAD
BIG BEAR LAKE
RUNNING SPRINGS
SNOW VALLEY
BARTON FLATS
OAK GLEN
WEST SUMMIT
HESPERIA
PHELAN
LUCERNE VALLEY
ERWIN L.
BALDWIN L. (DRY)
SUGARLOAF MTN
SAN BERNARDINO MTN
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E

FIGURE B-4

NOAA Atlas 14, Volume 6, Version 2
Location name: Fontana, California, USA*
Latitude: 34.1092°, Longitude: -117.4808°
Elevation: 1264 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	**1.39** (1.15-1.68)	**1.82** (1.52-2.22)	**2.41** (2.00-2.94)	**2.90** (2.39-3.58)	**3.60** (2.86-4.57)	**4.14** (3.22-5.38)	**4.70** (3.56-6.28)	**5.32** (3.91-7.28)	**6.16** (4.34-8.82)	**6.84** (4.66-10.2)
10-min	**0.996** (0.828-1.21)	**1.31** (1.09-1.59)	**1.73** (1.43-2.11)	**2.08** (1.72-2.56)	**2.57** (2.05-3.28)	**2.96** (2.31-3.85)	**3.37** (2.56-4.49)	**3.80** (2.80-5.22)	**4.42** (3.11-6.32)	**4.91** (3.34-7.28)
15-min	**0.804** (0.668-0.972)	**1.06** (0.880-1.28)	**1.40** (1.16-1.70)	**1.68** (1.38-2.06)	**2.08** (1.65-2.64)	**2.39** (1.86-3.11)	**2.72** (2.06-3.62)	**3.07** (2.26-4.21)	**3.56** (2.51-5.10)	**3.96** (2.69-5.87)
30-min	**0.592** (0.494-0.718)	**0.780** (0.648-0.948)	**1.03** (0.856-1.26)	**1.24** (1.02-1.52)	**1.53** (1.22-1.95)	**1.77** (1.37-2.29)	**2.01** (1.52-2.68)	**2.27** (1.67-3.11)	**2.63** (1.85-3.76)	**2.92** (1.99-4.33)
60-min	**0.437** (0.364-0.530)	**0.575** (0.479-0.698)	**0.760** (0.631-0.926)	**0.915** (0.753-1.12)	**1.13** (0.899-1.44)	**1.30** (1.01-1.69)	**1.48** (1.12-1.97)	**1.67** (1.23-2.29)	**1.94** (1.37-2.78)	**2.15** (1.47-3.20)
2-hr	**0.334** (0.278-0.405)	**0.434** (0.361-0.528)	**0.566** (0.470-0.689)	**0.674** (0.555-0.828)	**0.823** (0.654-1.05)	**0.938** (0.729-1.22)	**1.06** (0.801-1.41)	**1.18** (0.869-1.62)	**1.35** (0.953-1.93)	**1.49** (1.01-2.21)
3-hr	**0.286** (0.238-0.347)	**0.370** (0.308-0.450)	**0.480** (0.398-0.585)	**0.569** (0.468-0.699)	**0.690** (0.548-0.877)	**0.783** (0.609-1.02)	**0.878** (0.665-1.17)	**0.976** (0.718-1.34)	**1.11** (0.783-1.59)	**1.22** (0.828-1.80)
6-hr	**0.209** (0.174-0.254)	**0.270** (0.225-0.328)	**0.348** (0.289-0.424)	**0.411** (0.338-0.505)	**0.495** (0.393-0.629)	**0.558** (0.434-0.725)	**0.621** (0.471-0.828)	**0.686** (0.505-0.941)	**0.773** (0.545-1.11)	**0.840** (0.572-1.24)
12-hr	**0.140** (0.116-0.169)	**0.182** (0.151-0.221)	**0.235** (0.195-0.286)	**0.277** (0.228-0.340)	**0.331** (0.263-0.421)	**0.372** (0.289-0.483)	**0.411** (0.312-0.548)	**0.451** (0.332-0.619)	**0.504** (0.355-0.721)	**0.543** (0.370-0.806)
24-hr	**0.095** (0.084-0.110)	**0.126** (0.111-0.145)	**0.164** (0.144-0.190)	**0.194** (0.169-0.226)	**0.232** (0.196-0.280)	**0.260** (0.216-0.320)	**0.288** (0.233-0.363)	**0.315** (0.248-0.408)	**0.350** (0.265-0.473)	**0.376** (0.275-0.526)
2-day	**0.058** (0.051-0.067)	**0.078** (0.069-0.090)	**0.104** (0.092-0.120)	**0.125** (0.109-0.145)	**0.152** (0.128-0.183)	**0.172** (0.143-0.212)	**0.192** (0.155-0.242)	**0.212** (0.167-0.275)	**0.239** (0.181-0.322)	**0.259** (0.189-0.362)
3-day	**0.041** (0.036-0.048)	**0.057** (0.050-0.066)	**0.077** (0.068-0.089)	**0.093** (0.082-0.109)	**0.115** (0.097-0.139)	**0.132** (0.109-0.162)	**0.149** (0.120-0.187)	**0.166** (0.131-0.215)	**0.189** (0.143-0.255)	**0.207** (0.151-0.289)
4-day	**0.033** (0.029-0.038)	**0.046** (0.041-0.054)	**0.063** (0.056-0.074)	**0.077** (0.068-0.090)	**0.096** (0.082-0.116)	**0.111** (0.092-0.137)	**0.126** (0.102-0.159)	**0.141** (0.111-0.183)	**0.162** (0.122-0.218)	**0.178** (0.130-0.249)
7-day	**0.022** (0.019-0.025)	**0.031** (0.027-0.035)	**0.042** (0.037-0.049)	**0.052** (0.046-0.061)	**0.065** (0.055-0.079)	**0.076** (0.063-0.093)	**0.086** (0.070-0.109)	**0.098** (0.077-0.126)	**0.113** (0.085-0.152)	**0.125** (0.091-0.174)
10-day	**0.016** (0.014-0.019)	**0.023** (0.021-0.027)	**0.033** (0.029-0.038)	**0.040** (0.035-0.047)	**0.051** (0.043-0.061)	**0.059** (0.049-0.073)	**0.068** (0.055-0.085)	**0.077** (0.060-0.099)	**0.089** (0.067-0.120)	**0.099** (0.072-0.138)
20-day	**0.009** (0.008-0.011)	**0.014** (0.012-0.016)	**0.019** (0.017-0.023)	**0.024** (0.021-0.029)	**0.031** (0.026-0.038)	**0.037** (0.030-0.045)	**0.042** (0.034-0.053)	**0.048** (0.038-0.063)	**0.057** (0.043-0.077)	**0.064** (0.046-0.089)
30-day	**0.007** (0.006-0.008)	**0.011** (0.009-0.012)	**0.015** (0.013-0.018)	**0.019** (0.017-0.022)	**0.025** (0.021-0.030)	**0.029** (0.024-0.036)	**0.034** (0.027-0.043)	**0.039** (0.031-0.051)	**0.046** (0.035-0.062)	**0.052** (0.038-0.073)
45-day	**0.006** (0.005-0.007)	**0.008** (0.007-0.010)	**0.012** (0.010-0.014)	**0.015** (0.013-0.018)	**0.019** (0.016-0.023)	**0.023** (0.019-0.028)	**0.027** (0.022-0.034)	**0.031** (0.024-0.040)	**0.037** (0.028-0.050)	**0.042** (0.031-0.059)
60-day	**0.005** (0.004-0.006)	**0.007** (0.006-0.008)	**0.010** (0.009-0.012)	**0.013** (0.011-0.015)	**0.017** (0.014-0.020)	**0.020** (0.016-0.024)	**0.023** (0.019-0.029)	**0.027** (0.021-0.035)	**0.032** (0.024-0.044)	**0.037** (0.027-0.051)

[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

Appendix B

℄ REDWOOD AVE.

℄ HILTON DR.

℄ HEMLOCK AVE.

EXIST. BLDG.

EXIST. DIRT

EXIST. CONCRETE

EXIST. 8" WALL

EXIST. 6' CHAIN LINK FENCE

EXIST. 6' WROUGHT IRON FENCE

EXIST. 12" WATER

EXIST. 24" STORM DRAIN

EXIST. 8" VCP SEWER

EXIST. 8" CMP

EX. 1'ø TREE

EX. 2'ø TREE

EX. 4'ø TREE

EX. 1'ø TREES

N00°01'33"E 553.39'

N89°58'27"W 294.70'

N00°01'33"E 557.58'

N89°58'27"W 294.70'

N00°17'19"E 545.47'

DA A1
A=3.98AC

1255.54FS
Q_2=1.21 CFS
Q_{10} =2.53 CFS
Q_{25} =3.63 CFS
Q_{100}=6.16 CFS
②

L=575LF

1269.00FG ①

LEGEND

- WATER SHED BOUNDARY
- PATH OF SURFACE FLOW
- DIRECTION OF FLOW
- (#) NODE NUMBER

50 0 50 100 150

SCALE: 1"=50'

HYDROLOGY MAP

(PRE-DEVELOPED CONDITION)

SITE:
LOT 2 TR. 13643
HILTON DR.
FONTANA, CA 92336

PREPARED FOR:
GEORGE & DOUGH MCCAN
15 ORION
IRVINE, CA 92603

JN4113

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 06/28/24

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jn4113 Hilton Avenue
Pre-Developed Condition
2 - YEAR STORM

Program License Serial Number 5016

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.575 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION **** AREA A1

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 50.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.810(In/Hr)
Initial subarea data:
Initial area flow distance = 575.000(Ft.)
Top (of initial area) elevation = 1269.000(Ft.)
Bottom (of initial area) elevation = 1255.540(Ft.)
Difference in elevation = 13.460(Ft.)
Slope = 0.02341 s(%)= 2.34
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.002 min.
Rainfall intensity = 1.146(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.264
Subarea runoff = 1.206(CFS)
Total initial stream area = 3.980(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.810(In/Hr)
End of computations, Total Study Area = 3.98 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 50.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 06/28/24

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jn4113 Hilton Avenue
Pre-Developed Condition
10-Year Storm

Program License Serial Number 5016

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.760 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION **** AREA A1

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 50.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.810(In/Hr)
Initial subarea data:
Initial area flow distance = 575.000(Ft.)
Top (of initial area) elevation = 1269.000(Ft.)
Bottom (of initial area) elevation = 1255.540(Ft.)
Difference in elevation = 13.460(Ft.)
Slope = 0.02341 s(%)= 2.34
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.002 min.
Rainfall intensity = 1.515(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.419
Subarea runoff = 2.527(CFS)
Total initial stream area = 3.980(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.810(In/Hr)
End of computations, Total Study Area = 3.98 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 50.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 06/28/24

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jn4113 Hilton Avenue
Pre-Developed Condition
25 - YEAR STORM

Program License Serial Number 5016

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 0.915 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 50.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.810(In/Hr)
Initial subarea data:
Initial area flow distance = 575.000(Ft.)
Top (of initial area) elevation = 1269.000(Ft.)
Bottom (of initial area) elevation = 1255.540(Ft.)
Difference in elevation = 13.460(Ft.)
Slope = 0.02341 s(%)= 2.34
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.002 min.
Rainfall intensity = 1.824(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.501

Subarea runoff = 3.634(CFS)
Total initial stream area = 3.980(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.810(In/Hr)
End of computations, Total Study Area = 3.98 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 50.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 06/28/24

JN4113 HILTON DRIVE
Pre-Developed Condition
100-Year Storm

Program License Serial Number 5016

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.130 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION **** AREA A1

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.532(In/Hr)
Initial subarea data:
Initial area flow distance = 575.000(Ft.)
Top (of initial area) elevation = 1269.000(Ft.)
Bottom (of initial area) elevation = 1255.540(Ft.)
Difference in elevation = 13.460(Ft.)
Slope = 0.02341 s(%)= 2.34
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.002 min.
Rainfall intensity = 2.253(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.687
Subarea runoff = 6.162(CFS)
Total initial stream area = 3.980(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.532(In/Hr)
End of computations, Total Study Area = 3.98 (Ac.)
The following figures may

be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 50.0

Appendix C

REDWOOD AVE.

HILTON DR.

HEMLOCK AVE.

EXIST. STREET LIGHT

EXIST. 6' WALL

EXIST. 6' CHAIN LINK FENCE

EXIST. 12" WATER

EXIST. 8" VCP SEWER

EXIST. 24" STORM DRAIN

EXIST. 8" CMP

1256.15TC
1255.65TG
Q 2 =2.29 CFS
Q10 =4.15 CFS
Q25 =5.20 CFS
Q100 =6.83 CFS
③

L=672LF

L=202LF 18" PIPE TIME ONLY

DA A2
A=1.77AC

DA A1
A=2.21AC

1265.00FL ①

1249.64INV
Q 2 =5.00 CFS (CONFLUENCE)
Q10 =9.04 CFS (CONFLUENCE)
Q25 =11.34 CFS (CONFLUENCE)
Q100 =14.89 CFS (CONFLUENCE)

L=45LF 8" PIPE TIME ONLY

PROP. UNDERGROUND RETENTION SYSTEM

L=773LF

1256.42TG
1255.90INV
Q2 =2.72CFS
Q10 =4.93CFS
Q25 =6.19 CFS
Q100 =8.13 CFS
②

LEGEND

- WATER SHED BOUNDARY
- PATH OF SURFACE FLOW
- DIRECTION OF FLOW
- (#) NODE NUMBER

50 0 50 100 150

SCALE: 1"=50'

HYDROLOGY MAP

(POST-DEVELOPED CONDITION)

SITE:
LOT 2 TR. 13643
HILTON DR.
FONTANA, CA 92336

PREPARED FOR:
GEORGE & DOUGH MCCAN
15 ORION
IRVINE, CA 92603

JN4113

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 07/24/24

JN 4113 Hilton Ave
Post-Developed Condition
2-Year Storm

Program License Serial Number 5016

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
10 Year storm 1 hour rainfall = 0.915(In.)
100 Year storm 1 hour rainfall = 1.480(In.)
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.520 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION **** AREA A1

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 773.000(Ft.)
Top (of initial area) elevation = 1265.000(Ft.)
Bottom (of initial area) elevation = 1256.420(Ft.)
Difference in elevation = 8.580(Ft.)
Slope = 0.01110 s(%)= 1.11
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.693 min.
Rainfall intensity = 1.464(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 2.717(CFS)
Total initial stream area = 2.210(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =  1255.900(Ft.)
Downstream point/station elevation =  1255.680(Ft.)
Pipe length  =    44.87(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.717(CFS)
Given pipe size =      8.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     3.459(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      2.268(Ft.)
 Minor friction loss =      1.411(Ft.)  K-factor =   1.50
Pipe flow velocity =      7.78(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    10.79 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.210(Ac.)
Runoff from this stream =      2.717(CFS)
Time of concentration =   10.79 min.
Rainfall intensity =     1.456(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        3.000
**** INITIAL AREA EVALUATION ****                       AREA A2
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   672.000(Ft.)
Top (of initial area) elevation =  1265.000(Ft.)
Bottom (of initial area) elevation =  1256.650(Ft.)
Difference in elevation =     8.350(Ft.)
Slope =    0.01243  s(%)=       1.24
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.885 min.
```

```
Rainfall intensity =      1.535(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.843
Subarea runoff =      2.289(CFS)
Total initial stream area =        1.770(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =  1251.150(Ft.)
Downstream point/station elevation =  1249.640(Ft.)
Pipe length  =   202.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.289(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     2.289(CFS)
Normal flow depth in pipe =    6.16(In.)
Flow top width inside pipe =   17.08(In.)
Critical Depth =    6.86(In.)
Pipe flow velocity =      4.28(Ft/s)
Travel time through pipe =    0.79 min.
Time of concentration (TC) =    10.67 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.770(Ac.)
Runoff from this stream =      2.289(CFS)
Time of concentration =   10.67 min.
Rainfall intensity =     1.466(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      2.72     2.210     10.79    0.098      1.456
2      2.29     1.770     10.67    0.098      1.466
Qmax(1) =
           1.000 *    1.000 *     2.717) +
           0.993 *    1.000 *     2.289) + =       4.990
Qmax(2) =
           1.007 *    0.989 *     2.717) +
           1.000 *    1.000 *     2.289) + =       4.995
```

```
Total of 2 streams to confluence:
Flow rates before confluence point:
       2.717       2.289
Maximum flow rates at confluence using above data:
        4.990        4.995
Area of streams before confluence:
        2.210        1.770
Effective area values after confluence:
        3.980        3.956
Results of confluence:
Total flow rate =      4.995(CFS)
Time of concentration =    10.671 min.
Effective stream area after confluence =      3.956(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       3.98(Ac.)
End of computations, Total Study Area =            3.98 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 07/24/24

Program License Serial Number 5016

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.915 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION **** AREA A1

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 773.000(Ft.)
Top (of initial area) elevation = 1265.000(Ft.)
Bottom (of initial area) elevation = 1256.420(Ft.)
Difference in elevation = 8.580(Ft.)
Slope = 0.01110 s(%)= 1.11
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.693 min.
Rainfall intensity = 2.575(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.866
Subarea runoff = 4.928(CFS)
Total initial stream area = 2.210(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

++

Process from Point/Station 2.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1255.900(Ft.)
Downstream point/station elevation = 1255.680(Ft.)

```
Pipe length  =    44.87(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.928(CFS)
Given pipe size =      8.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
    11.883(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      7.460(Ft.)
 Minor friction loss =      4.643(Ft.)  K-factor =   1.50
Pipe flow velocity =     14.12(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    10.75 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.210(Ac.)
Runoff from this stream =      4.928(CFS)
Time of concentration =   10.75 min.
Rainfall intensity =     2.568(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        3.000
**** INITIAL AREA EVALUATION ****               AREA A2
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   672.000(Ft.)
Top (of initial area) elevation =  1265.000(Ft.)
Bottom (of initial area) elevation =  1256.650(Ft.)
Difference in elevation =     8.350(Ft.)
Slope =    0.01243  s(%)=       1.24
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.885 min.
Rainfall intensity =      2.700(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.867
Subarea runoff =      4.145(CFS)
Total initial stream area =        1.770(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =  1251.150(Ft.)
Downstream point/station elevation =  1249.640(Ft.)
Pipe length  =   202.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.145(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     4.145(CFS)
Normal flow depth in pipe =    8.53(In.)
Flow top width inside pipe =   17.98(In.)
Critical Depth =    9.35(In.)
Pipe flow velocity =      5.02(Ft/s)
Travel time through pipe =    0.67 min.
Time of concentration (TC) =    10.56 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.770(Ac.)
Runoff from this stream =      4.145(CFS)
Time of concentration =   10.56 min.
Rainfall intensity =     2.596(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)

1      4.93     2.210     10.75    0.098      2.568
2      4.15     1.770     10.56    0.098      2.596
Qmax(1) =
           1.000 *    1.000 *     4.928) +
           0.989 *    1.000 *     4.145) + =       9.027
Qmax(2) =
           1.011 *    0.982 *     4.928) +
           1.000 *    1.000 *     4.145) + =       9.040

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.928       4.145
Maximum flow rates at confluence using above data:
        9.027        9.040
Area of streams before confluence:
        2.210        1.770
Effective area values after confluence:
```

```
        3.980        3.941
Results of confluence:
Total flow rate =      9.040(CFS)
Time of concentration =    10.555 min.
Effective stream area after confluence =      3.941(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       3.98(Ac.)
End of computations, Total Study Area =            3.98 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 07/24/24

JN 4113 Hilton Ave
Post-Developed Condition
25-Year Storm

Program License Serial Number 5016

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 25.0
10 Year storm 1 hour rainfall = 0.915(In.)
100 Year storm 1 hour rainfall = 1.480(In.)
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 1.140 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION **** AREA A1

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 773.000(Ft.)
Top (of initial area) elevation = 1265.000(Ft.)
Bottom (of initial area) elevation = 1256.420(Ft.)
Difference in elevation = 8.580(Ft.)
Slope = 0.01110 s(%)= 1.11
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.693 min.
Rainfall intensity = 3.208(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.873
Subarea runoff = 6.187(CFS)
Total initial stream area = 2.210(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =  1255.900(Ft.)
Downstream point/station elevation =  1255.680(Ft.)
Pipe length  =    44.87(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.187(CFS)
Given pipe size =      8.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
    18.855(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =     11.758(Ft.)
 Minor friction loss =      7.317(Ft.)  K-factor =   1.50
Pipe flow velocity =     17.72(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    10.73 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.210(Ac.)
Runoff from this stream =      6.187(CFS)
Time of concentration =   10.73 min.
Rainfall intensity =     3.201(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        3.000
**** INITIAL AREA EVALUATION ****               AREA A2
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   672.000(Ft.)
Top (of initial area) elevation =  1265.000(Ft.)
Bottom (of initial area) elevation =  1256.650(Ft.)
Difference in elevation =     8.350(Ft.)
Slope =    0.01243  s(%)=       1.24
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.885 min.
Rainfall intensity =      3.363(In/Hr) for a    25.0 year storm
```

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.874
Subarea runoff =      5.202(CFS)
Total initial stream area =        1.770(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =  1251.150(Ft.)
Downstream point/station elevation =  1249.640(Ft.)
Pipe length  =   202.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.202(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     5.202(CFS)
Normal flow depth in pipe =    9.76(In.)
Flow top width inside pipe =   17.94(In.)
Critical Depth =   10.53(In.)
Pipe flow velocity =      5.31(Ft/s)
Travel time through pipe =    0.63 min.
Time of concentration (TC) =    10.52 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.770(Ac.)
Runoff from this stream =      5.202(CFS)
Time of concentration =   10.52 min.
Rainfall intensity =     3.240(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)

1      6.19     2.210     10.73    0.098      3.201
2      5.20     1.770     10.52    0.098      3.240
Qmax(1) =
           1.000 *    1.000 *     6.187) +
           0.987 *    1.000 *     5.202) + =      11.324
Qmax(2) =
           1.013 *    0.980 *     6.187) +
           1.000 *    1.000 *     5.202) + =      11.341

Total of 2 streams to confluence:
Flow rates before confluence point:
```

```
       6.187       5.202
Maximum flow rates at confluence using above data:
       11.324       11.341
Area of streams before confluence:
        2.210        1.770
Effective area values after confluence:
        3.980        3.935
Results of confluence:
Total flow rate =     11.341(CFS)
Time of concentration =    10.518 min.
Effective stream area after confluence =      3.935(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       3.98(Ac.)
End of computations, Total Study Area =            3.98 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 08/16/23

Program License Serial Number 5016

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
10 Year storm 1 hour rainfall = 0.915(In.)
100 Year storm 1 hour rainfall = 1.480(In.)
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.480 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION **** AREA A1

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.079(In/Hr)
Initial subarea data:
Initial area flow distance = 773.000(Ft.)
Top (of initial area) elevation = 1265.000(Ft.)
Bottom (of initial area) elevation = 1256.420(Ft.)
Difference in elevation = 8.580(Ft.)
Slope = 0.01110 s(%)= 1.11
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.693 min.
Rainfall intensity = 4.166(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.883
Subarea runoff = 8.130(CFS)
Total initial stream area = 2.210(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.079(In/Hr)

++

Process from Point/Station 2.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

```
Upstream point/station elevation =  1255.900(Ft.)
Downstream point/station elevation =  1255.680(Ft.)
Pipe length  =    44.87(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.130(CFS)
Given pipe size =      8.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
    32.715(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =     20.302(Ft.)
 Minor friction loss =     12.634(Ft.)  K-factor =   1.50
Pipe flow velocity =     23.29(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    10.72 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.210(Ac.)
Runoff from this stream =      8.130(CFS)
Time of concentration =   10.72 min.
Rainfall intensity =     4.158(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        3.000
**** INITIAL AREA EVALUATION ****       AREA A2
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   672.000(Ft.)
Top (of initial area) elevation =  1265.000(Ft.)
Bottom (of initial area) elevation =  1256.650(Ft.)
Difference in elevation =     8.350(Ft.)
Slope =    0.01243  s(%)=       1.24
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.885 min.
Rainfall intensity =      4.367(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff =      6.831(CFS)
```

```
Total initial stream area =        1.770(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =  1251.150(Ft.)
Downstream point/station elevation =  1249.640(Ft.)
Pipe length  =   202.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.831(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     6.831(CFS)
Normal flow depth in pipe =   11.65(In.)
Flow top width inside pipe =   17.20(In.)
Critical Depth =   12.14(In.)
Pipe flow velocity =      5.64(Ft/s)
Travel time through pipe =    0.60 min.
Time of concentration (TC) =    10.48 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.770(Ac.)
Runoff from this stream =      6.831(CFS)
Time of concentration =   10.48 min.
Rainfall intensity =     4.216(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)

1      8.13     2.210     10.72    0.079      4.158
2      6.83     1.770     10.48    0.079      4.216
Qmax(1) =
           1.000 *    1.000 *     8.130) +
           0.986 *    1.000 *     6.831) + =      14.866
Qmax(2) =
           1.014 *    0.977 *     8.130) +
           1.000 *    1.000 *     6.831) + =      14.889

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.130       6.831
Maximum flow rates at confluence using above data:
```

```
       14.866       14.889
Area of streams before confluence:
        2.210        1.770
Effective area values after confluence:
        3.980        3.930
Results of confluence:
Total flow rate =     14.889(CFS)
Time of concentration =    10.481 min.
Effective stream area after confluence =      3.930(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       3.98(Ac.)
End of computations, Total Study Area =            3.98 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number =  32.0
```

Appendix D

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 07/24/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
2 YEAR 3 HOUR STORM- POST-DEVELOPED

Storm Event Year = 2

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
3.98	1	0.92
Rainfall data for year 2		
3.98	6	0.27
Rainfall data for year 2		
3.98	24	0.13
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++
******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	32.0	3.98	1.000	0.978	0.130	0.127

Area-averaged adjusted loss rate Fm (In/Hr) = 0.127

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.52	0.130	32.0	32.0	2.61	0.000
3.46	0.870	98.0	98.0	0.20	0.647

Area-averaged catchment yield fraction, Y = 0.563
Area-averaged low loss fraction, Yb = 0.437
User entry of time of concentration = 0.178 (hours)
++
Watershed area = 3.98(Ac.)
Catchment Lag time = 0.142 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 58.5700
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.437 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.192(In)
Computed peak 30-minute rainfall = 0.394(In)
Specified peak 1-hour rainfall = 0.520(In)
Computed peak 3-hour rainfall = 0.520(In)
Specified peak 6-hour rainfall = 0.521(In)
Specified peak 24-hour rainfall = 0.522(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of 3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.192(In)
30-minute factor = 1.000 Adjusted rainfall = 0.394(In)
1-hour factor = 1.000 Adjusted rainfall = 0.520(In)
3-hour factor = 1.000 Adjusted rainfall = 0.520(In)
6-hour factor = 1.000 Adjusted rainfall = 0.521(In)
24-hour factor = 1.000 Adjusted rainfall = 0.522(In)

U n i t H y d r o g r a p h

++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))

(K = 48.13 (CFS))

1	6.220	2.994
2	39.874	16.198
3	80.296	19.457
4	94.943	7.050
5	98.536	1.729
6	100.000	0.705

Total soil rain loss = 0.12(In)
Total effective rainfall = 0.40(In)
Peak flow rate in flood hydrograph = 4.43(CFS)

++

3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0000	0.00	Q	|	|	|	|
0+15	0.0000	0.00	Q	|	|	|	|
0+20	0.0000	0.00	Q	|	|	|	|
0+25	0.0000	0.00	Q	|	|	|	|
0+30	0.0000	0.00	Q	|	|	|	|
0+35	0.0000	0.00	Q	|	|	|	|
0+40	0.0000	0.00	Q	|	|	|	|
0+45	0.0000	0.00	Q	|	|	|	|
0+50	0.0000	0.00	Q	|	|	|	|
0+55	0.0000	0.00	Q	|	|	|	|
1+ 0	0.0000	0.00	Q	|	|	|	|
1+ 5	0.0000	0.00	Q	|	|	|	|
1+10	0.0000	0.00	Q	|	|	|	|
1+15	0.0000	0.00	Q	|	|	|	|
1+20	0.0000	0.00	Q	|	|	|	|
1+25	0.0002	0.03	Q	|	|	|	|
1+30	0.0016	0.19	Q	|	|	|	|
1+35	0.0043	0.40	|Q	|	|	|	|
1+40	0.0078	0.51	| Q	|	|	|	|
1+45	0.0119	0.59	| QV	|	|	|	|
1+50	0.0167	0.70	| Q V	|	|	|	|
1+55	0.0228	0.89	| Q V	|	|	|	|
2+ 0	0.0315	1.26	| Q V|	|	|	|	|
2+ 5	0.0468	2.22	| Q | V	|	|	|	|
2+10	0.0764	4.30	| | Q | V	|	|	|	|
2+15	0.1069	4.43	| | Q |	|	| V	|
2+20	0.1218	2.16	| Q |	|	| V	|
2+25	0.1287	1.00	| Q |	|	| V |	|
2+30	0.1321	0.49	|Q |	|	| V|	|

```
    2+35       0.1329      0.12  Q          |          |          |         V|
    2+40       0.1331      0.03  Q          |          |          |         V|
    2+45       0.1332      0.01  Q          |          |          |         V|
    2+50       0.1332      0.00  Q          |          |          |         V|
    2+55       0.1332      0.00  Q          |          |          |         V|
    3+ 0       0.1332      0.00  Q          |          |          |         V|
    3+ 5       0.1332      0.00  Q          |          |          |         V|
    3+10       0.1332      0.00  Q          |          |          |         V|
    3+15       0.1332      0.00  Q          |          |          |         V|
    3+20       0.1332      0.00  Q          |          |          |         V|
    3+25       0.1332      0.00  Q          |          |          |          V
---------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 07/24/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
2 YEAR 24 HOUR STORM- Post-DWEVELOPED CONDITION

Storm Event Year = 2

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
3.98	1	0.92
Rainfall data for year 2		
3.98	6	0.27
Rainfall data for year 2		
3.98	24	0.13
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++

```
******** Area-averaged max loss rate, Fm ********
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      32.0          3.98      1.000     0.978    0.130    0.127

Area-averaged adjusted loss rate Fm (In/Hr) =  0.127

********* Area-Averaged low loss rate fraction, Yb **********
Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     0.52   0.130         32.0      32.0       2.61     0.000
     3.46   0.870         98.0      98.0       0.20     0.647

Area-averaged catchment yield fraction, Y =  0.563
Area-averaged low loss fraction, Yb =  0.437
User entry of time of concentration  =   0.178 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.142 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 58.5700
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.437 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.192(In)
Computed peak 30-minute rainfall =  0.394(In)
Specified peak 1-hour rainfall =  0.520(In)
Computed peak 3-hour rainfall =  0.520(In)
Specified peak 6-hour rainfall =  0.521(In)
Specified peak 24-hour rainfall =  0.522(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.192(In)
30-minute factor = 1.000    Adjusted rainfall =  0.394(In)
1-hour factor = 1.000       Adjusted rainfall =  0.520(In)
3-hour factor = 1.000       Adjusted rainfall =  0.520(In)
6-hour factor = 1.000       Adjusted rainfall =  0.521(In)
24-hour factor = 1.000      Adjusted rainfall =  0.522(In)
----------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
                (K =        48.13 (CFS))
```

1	6.220	2.994
2	39.874	16.198
3	80.296	19.457
4	94.943	7.050
5	98.536	1.729
6	100.000	0.705

Total soil rain loss = 0.12(In)
Total effective rainfall = 0.40(In)
Peak flow rate in flood hydrograph = 4.43(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

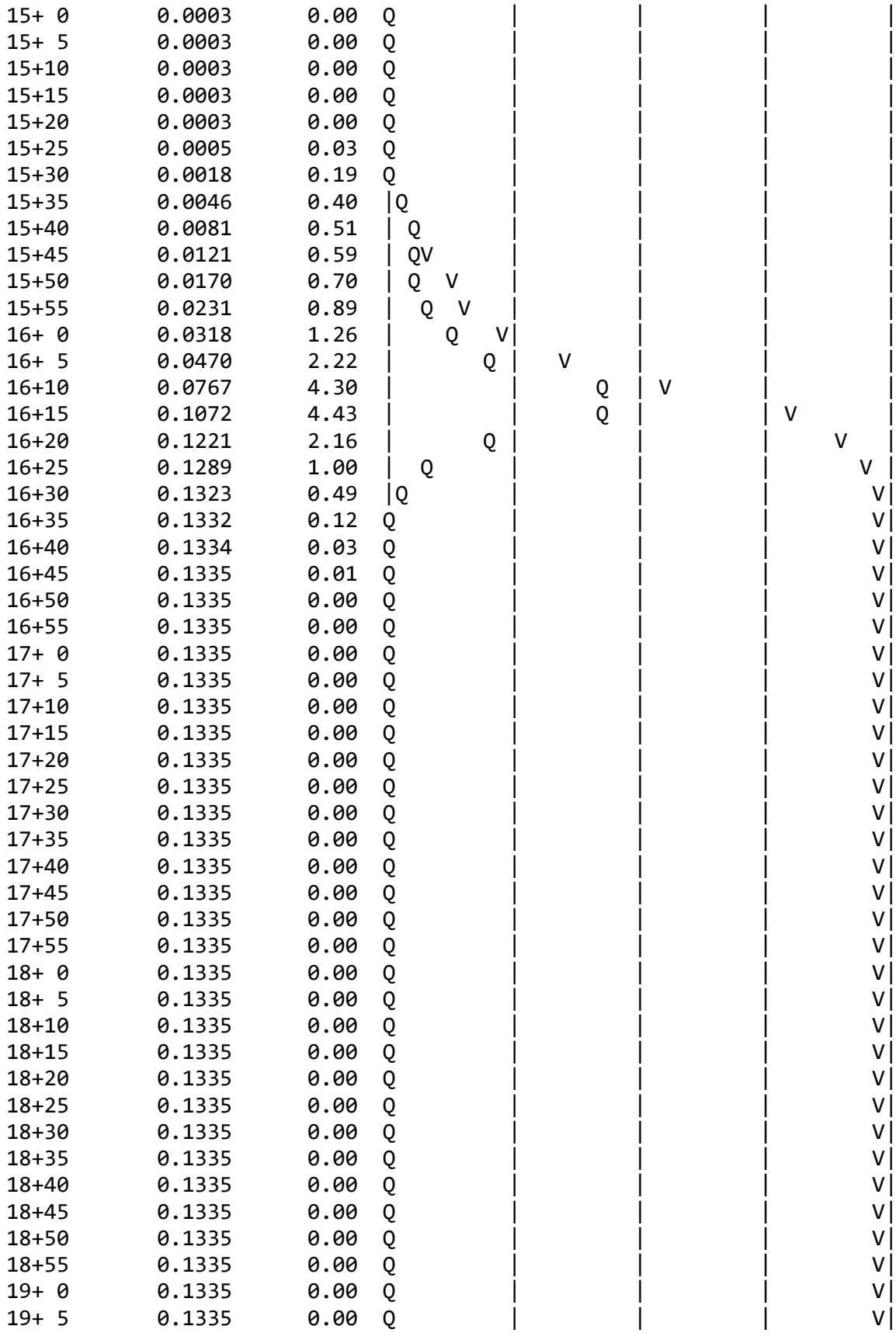
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				

2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+35	0.0000	0.00	Q				
5+40	0.0000	0.00	Q				
5+45	0.0000	0.00	Q				
5+50	0.0000	0.00	Q				
5+55	0.0000	0.00	Q				
6+ 0	0.0000	0.00	Q				
6+ 5	0.0000	0.00	Q				
6+10	0.0000	0.00	Q				
6+15	0.0000	0.00	Q				
6+20	0.0000	0.00	Q				
6+25	0.0000	0.00	Q				
6+30	0.0000	0.00	Q				
6+35	0.0000	0.00	Q				

6+40	0.0000	0.00	Q				
6+45	0.0000	0.00	Q				
6+50	0.0000	0.00	Q				
6+55	0.0000	0.00	Q				
7+ 0	0.0001	0.00	Q				
7+ 5	0.0001	0.00	Q				
7+10	0.0001	0.00	Q				
7+15	0.0001	0.00	Q				
7+20	0.0001	0.00	Q				
7+25	0.0001	0.00	Q				
7+30	0.0001	0.00	Q				
7+35	0.0001	0.00	Q				
7+40	0.0001	0.00	Q				
7+45	0.0001	0.00	Q				
7+50	0.0001	0.00	Q				
7+55	0.0001	0.00	Q				
8+ 0	0.0001	0.00	Q				
8+ 5	0.0001	0.00	Q				
8+10	0.0001	0.00	Q				
8+15	0.0001	0.00	Q				
8+20	0.0001	0.00	Q				
8+25	0.0001	0.00	Q				
8+30	0.0001	0.00	Q				
8+35	0.0001	0.00	Q				
8+40	0.0001	0.00	Q				
8+45	0.0001	0.00	Q				
8+50	0.0001	0.00	Q				
8+55	0.0001	0.00	Q				
9+ 0	0.0001	0.00	Q				
9+ 5	0.0001	0.00	Q				
9+10	0.0001	0.00	Q				
9+15	0.0001	0.00	Q				
9+20	0.0001	0.00	Q				
9+25	0.0001	0.00	Q				
9+30	0.0001	0.00	Q				
9+35	0.0001	0.00	Q				
9+40	0.0001	0.00	Q				
9+45	0.0001	0.00	Q				
9+50	0.0001	0.00	Q				
9+55	0.0001	0.00	Q				
10+ 0	0.0001	0.00	Q				
10+ 5	0.0001	0.00	Q				
10+10	0.0001	0.00	Q				
10+15	0.0001	0.00	Q				
10+20	0.0001	0.00	Q				
10+25	0.0001	0.00	Q				
10+30	0.0001	0.00	Q				
10+35	0.0001	0.00	Q				
10+40	0.0001	0.00	Q				
10+45	0.0001	0.00	Q				

10+50	0.0001	0.00	Q				
10+55	0.0001	0.00	Q				
11+ 0	0.0001	0.00	Q				
11+ 5	0.0001	0.00	Q				
11+10	0.0001	0.00	Q				
11+15	0.0001	0.00	Q				
11+20	0.0001	0.00	Q				
11+25	0.0001	0.00	Q				
11+30	0.0001	0.00	Q				
11+35	0.0001	0.00	Q				
11+40	0.0001	0.00	Q				
11+45	0.0001	0.00	Q				
11+50	0.0001	0.00	Q				
11+55	0.0001	0.00	Q				
12+ 0	0.0001	0.00	Q				
12+ 5	0.0001	0.00	Q				
12+10	0.0001	0.00	Q				
12+15	0.0001	0.00	Q				
12+20	0.0001	0.00	Q				
12+25	0.0001	0.00	Q				
12+30	0.0001	0.00	Q				
12+35	0.0001	0.00	Q				
12+40	0.0001	0.00	Q				
12+45	0.0002	0.00	Q				
12+50	0.0002	0.00	Q				
12+55	0.0002	0.00	Q				
13+ 0	0.0002	0.00	Q				
13+ 5	0.0002	0.00	Q				
13+10	0.0002	0.00	Q				
13+15	0.0002	0.00	Q				
13+20	0.0002	0.00	Q				
13+25	0.0002	0.00	Q				
13+30	0.0002	0.00	Q				
13+35	0.0002	0.00	Q				
13+40	0.0002	0.00	Q				
13+45	0.0002	0.00	Q				
13+50	0.0002	0.00	Q				
13+55	0.0002	0.00	Q				
14+ 0	0.0002	0.00	Q				
14+ 5	0.0002	0.00	Q				
14+10	0.0002	0.00	Q				
14+15	0.0002	0.00	Q				
14+20	0.0002	0.00	Q				
14+25	0.0002	0.00	Q				
14+30	0.0003	0.00	Q				
14+35	0.0003	0.00	Q				
14+40	0.0003	0.00	Q				
14+45	0.0003	0.00	Q				
14+50	0.0003	0.00	Q				
14+55	0.0003	0.00	Q				



19+10	0.1335	0.00	Q	|	|	|	V|
19+15	0.1335	0.00	Q	|	|	|	V|
19+20	0.1335	0.00	Q	|	|	|	V|
19+25	0.1335	0.00	Q	|	|	|	V|
19+30	0.1335	0.00	Q	|	|	|	V|
19+35	0.1335	0.00	Q	|	|	|	V|
19+40	0.1335	0.00	Q	|	|	|	V|
19+45	0.1335	0.00	Q	|	|	|	V|
19+50	0.1335	0.00	Q	|	|	|	V|
19+55	0.1335	0.00	Q	|	|	|	V|
20+ 0	0.1335	0.00	Q	|	|	|	V|
20+ 5	0.1335	0.00	Q	|	|	|	V|
20+10	0.1335	0.00	Q	|	|	|	V|
20+15	0.1335	0.00	Q	|	|	|	V|
20+20	0.1336	0.00	Q	|	|	|	V|
20+25	0.1336	0.00	Q	|	|	|	V|
20+30	0.1336	0.00	Q	|	|	|	V|
20+35	0.1336	0.00	Q	|	|	|	V|
20+40	0.1336	0.00	Q	|	|	|	V|
20+45	0.1336	0.00	Q	|	|	|	V|
20+50	0.1336	0.00	Q	|	|	|	V|
20+55	0.1336	0.00	Q	|	|	|	V|
21+ 0	0.1336	0.00	Q	|	|	|	V|
21+ 5	0.1336	0.00	Q	|	|	|	V|
21+10	0.1336	0.00	Q	|	|	|	V|
21+15	0.1336	0.00	Q	|	|	|	V|
21+20	0.1336	0.00	Q	|	|	|	V|
21+25	0.1336	0.00	Q	|	|	|	V|
21+30	0.1336	0.00	Q	|	|	|	V|
21+35	0.1336	0.00	Q	|	|	|	V|
21+40	0.1336	0.00	Q	|	|	|	V|
21+45	0.1336	0.00	Q	|	|	|	V|
21+50	0.1336	0.00	Q	|	|	|	V|
21+55	0.1336	0.00	Q	|	|	|	V|
22+ 0	0.1336	0.00	Q	|	|	|	V|
22+ 5	0.1336	0.00	Q	|	|	|	V|
22+10	0.1336	0.00	Q	|	|	|	V|
22+15	0.1336	0.00	Q	|	|	|	V|
22+20	0.1336	0.00	Q	|	|	|	V|
22+25	0.1336	0.00	Q	|	|	|	V|
22+30	0.1336	0.00	Q	|	|	|	V|
22+35	0.1336	0.00	Q	|	|	|	V|
22+40	0.1336	0.00	Q	|	|	|	V|
22+45	0.1336	0.00	Q	|	|	|	V|
22+50	0.1336	0.00	Q	|	|	|	V|
22+55	0.1336	0.00	Q	|	|	|	V|
23+ 0	0.1336	0.00	Q	|	|	|	V|
23+ 5	0.1336	0.00	Q	|	|	|	V|
23+10	0.1336	0.00	Q	|	|	|	V|
23+15	0.1336	0.00	Q	|	|	|	V|

```
   23+20       0.1336      0.00  Q          |          |          |         V|
   23+25       0.1336      0.00  Q          |          |          |         V|
   23+30       0.1336      0.00  Q          |          |          |         V|
   23+35       0.1336      0.00  Q          |          |          |         V|
   23+40       0.1336      0.00  Q          |          |          |         V|
   23+45       0.1336      0.00  Q          |          |          |         V|
   23+50       0.1336      0.00  Q          |          |          |         V|
   23+55       0.1336      0.00  Q          |          |          |         V|
   24+ 0       0.1336      0.00  Q          |          |          |         V|
   24+ 5       0.1336      0.00  Q          |          |          |         V|
   24+10       0.1336      0.00  Q          |          |          |         V|
   24+15       0.1336      0.00  Q          |          |          |         V|
   24+20       0.1336      0.00  Q          |          |          |         V|
   24+25       0.1336      0.00  Q          |          |          |          V
-------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 06/28/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
10 YEAR 3 HOUR STORM POST-DEVELOPED

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
3.98	1	0.92
Rainfall data for year 10		
3.98	6	0.41
Rainfall data for year 10		
3.98	24	0.19

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	32.0	3.98	1.000	0.978	0.130	0.127

Area-averaged adjusted loss rate Fm (In/Hr) = 0.127

********* Area-Averaged low loss rate fraction, Yb **********

Area	Area	SCS CN	SCS CN	S	Pervious

```
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
    0.52   0.130         32.0      32.0       4.59     0.000
    3.46   0.870         98.0      98.0       0.20     0.775

Area-averaged catchment yield fraction, Y =  0.674
Area-averaged low loss fraction, Yb =  0.326
User entry of time of concentration  =   0.176 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.141 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.2125
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.326 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.339(In)
Computed peak 30-minute rainfall =  0.693(In)
Specified peak 1-hour rainfall =  0.915(In)
Computed peak 3-hour rainfall =  0.915(In)
Specified peak 6-hour rainfall =  0.916(In)
Specified peak 24-hour rainfall =  0.917(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.339(In)
30-minute factor = 1.000    Adjusted rainfall =  0.693(In)
1-hour factor = 1.000       Adjusted rainfall =  0.915(In)
3-hour factor = 1.000       Adjusted rainfall =  0.915(In)
6-hour factor = 1.000       Adjusted rainfall =  0.916(In)
24-hour factor = 1.000      Adjusted rainfall =  0.917(In)
------------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
------------------------------------------------------------------------
               (K =        48.13 (CFS))

  1                6.354                    3.058
  2               40.669                   16.517
  3               80.945                   19.386
  4               95.214                    6.868
  5               98.595                    1.627
  6              100.000                    0.676
------------------------------------------------------------------------
Total soil rain loss =      0.13(In)
Total effective rainfall =      0.79(In)
```

Peak flow rate in flood hydrograph = 8.16(CFS)

++

3 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0005	0.06	Q				
1+30	0.0033	0.42	VQ				
1+35	0.0093	0.86	V Q				
1+40	0.0170	1.12	V Q				
1+45	0.0261	1.32	V Q				
1+50	0.0370	1.58	VQ				
1+55	0.0504	1.95	Q				
2+ 0	0.0684	2.61	Q				
2+ 5	0.0981	4.32		V Q			
2+10	0.1535	8.04			V	Q	
2+15	0.2097	8.16				Q	
2+20	0.2380	4.12		Q			V
2+25	0.2520	2.02	Q				V
2+30	0.2589	1.01	Q				V
2+35	0.2607	0.26	Q				V
2+40	0.2612	0.06	Q				V
2+45	0.2613	0.02	Q				V
2+50	0.2613	0.00	Q				V
2+55	0.2613	0.00	Q				V
3+ 0	0.2613	0.00	Q				V
3+ 5	0.2613	0.00	Q				V
3+10	0.2613	0.00	Q				V
3+15	0.2613	0.00	Q				V

```
    3+20       0.2613      0.00  Q         |         |         |        V|
    3+25       0.2613      0.00  Q         |         |         |         V
-------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 06/28/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
10 YEAR 24 HOUR STORM POST-DEVELOPED

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
3.98	1	0.92
Rainfall data for year 10		
3.98	6	0.41
Rainfall data for year 10		
3.98	24	0.19

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	32.0	3.98	1.000	0.978	0.130	0.127

Area-averaged adjusted loss rate Fm (In/Hr) = 0.127

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.52	0.130	32.0	32.0	4.59	0.000
3.46	0.870	98.0	98.0	0.20	0.775

Area-averaged catchment yield fraction, Y = 0.674
Area-averaged low loss fraction, Yb = 0.326
User entry of time of concentration = 0.176 (hours)
++
Watershed area = 3.98(Ac.)
Catchment Lag time = 0.141 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 59.2125
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.326 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.339(In)
Computed peak 30-minute rainfall = 0.693(In)
Specified peak 1-hour rainfall = 0.915(In)
Computed peak 3-hour rainfall = 0.915(In)
Specified peak 6-hour rainfall = 0.916(In)
Specified peak 24-hour rainfall = 0.917(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of 3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.339(In)
30-minute factor = 1.000 Adjusted rainfall = 0.693(In)
1-hour factor = 1.000 Adjusted rainfall = 0.915(In)
3-hour factor = 1.000 Adjusted rainfall = 0.915(In)
6-hour factor = 1.000 Adjusted rainfall = 0.916(In)
24-hour factor = 1.000 Adjusted rainfall = 0.917(In)

U n i t H y d r o g r a p h

++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 48.13 (CFS))	
1	6.354	3.058
2	40.669	16.517
3	80.945	19.386
4	95.214	6.868
5	98.595	1.627
6	100.000	0.676

Total soil rain loss = 0.13(In)

Total effective rainfall = 0.79(In)
Peak flow rate in flood hydrograph = 8.16(CFS)

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				

3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+35	0.0000	0.00	Q				
5+40	0.0000	0.00	Q				
5+45	0.0000	0.00	Q				
5+50	0.0000	0.00	Q				
5+55	0.0000	0.00	Q				
6+ 0	0.0000	0.00	Q				
6+ 5	0.0001	0.00	Q				
6+10	0.0001	0.00	Q				
6+15	0.0001	0.00	Q				
6+20	0.0001	0.00	Q				
6+25	0.0001	0.00	Q				
6+30	0.0001	0.00	Q				
6+35	0.0001	0.00	Q				
6+40	0.0001	0.00	Q				
6+45	0.0001	0.00	Q				
6+50	0.0001	0.00	Q				
6+55	0.0001	0.00	Q				
7+ 0	0.0001	0.00	Q				
7+ 5	0.0001	0.00	Q				
7+10	0.0001	0.00	Q				
7+15	0.0001	0.00	Q				
7+20	0.0001	0.00	Q				
7+25	0.0001	0.00	Q				

7+30	0.0001	0.00	Q				
7+35	0.0001	0.00	Q				
7+40	0.0001	0.00	Q				
7+45	0.0001	0.00	Q				
7+50	0.0001	0.00	Q				
7+55	0.0001	0.00	Q				
8+ 0	0.0001	0.00	Q				
8+ 5	0.0001	0.00	Q				
8+10	0.0001	0.00	Q				
8+15	0.0001	0.00	Q				
8+20	0.0001	0.00	Q				
8+25	0.0001	0.00	Q				
8+30	0.0001	0.00	Q				
8+35	0.0001	0.00	Q				
8+40	0.0001	0.00	Q				
8+45	0.0001	0.00	Q				
8+50	0.0001	0.00	Q				
8+55	0.0001	0.00	Q				
9+ 0	0.0001	0.00	Q				
9+ 5	0.0001	0.00	Q				
9+10	0.0001	0.00	Q				
9+15	0.0001	0.00	Q				
9+20	0.0001	0.00	Q				
9+25	0.0001	0.00	Q				
9+30	0.0001	0.00	Q				
9+35	0.0001	0.00	Q				
9+40	0.0001	0.00	Q				
9+45	0.0001	0.00	Q				
9+50	0.0001	0.00	Q				
9+55	0.0001	0.00	Q				
10+ 0	0.0001	0.00	Q				
10+ 5	0.0001	0.00	Q				
10+10	0.0001	0.00	Q				
10+15	0.0001	0.00	Q				
10+20	0.0001	0.00	Q				
10+25	0.0001	0.00	Q				
10+30	0.0001	0.00	Q				
10+35	0.0001	0.00	Q				
10+40	0.0001	0.00	Q				
10+45	0.0001	0.00	Q				
10+50	0.0001	0.00	Q				
10+55	0.0001	0.00	Q				
11+ 0	0.0001	0.00	Q				
11+ 5	0.0001	0.00	Q				
11+10	0.0001	0.00	Q				
11+15	0.0001	0.00	Q				
11+20	0.0001	0.00	Q				
11+25	0.0001	0.00	Q				
11+30	0.0001	0.00	Q				
11+35	0.0001	0.00	Q				

11+40	0.0001	0.00	Q	|	|	|	|
11+45	0.0001	0.00	Q	|	|	|	|
11+50	0.0001	0.00	Q	|	|	|	|
11+55	0.0001	0.00	Q	|	|	|	|
12+ 0	0.0001	0.00	Q	|	|	|	|
12+ 5	0.0001	0.00	Q	|	|	|	|
12+10	0.0002	0.00	Q	|	|	|	|
12+15	0.0002	0.00	Q	|	|	|	|
12+20	0.0002	0.00	Q	|	|	|	|
12+25	0.0002	0.00	Q	|	|	|	|
12+30	0.0002	0.00	Q	|	|	|	|
12+35	0.0002	0.00	Q	|	|	|	|
12+40	0.0002	0.00	Q	|	|	|	|
12+45	0.0002	0.00	Q	|	|	|	|
12+50	0.0002	0.00	Q	|	|	|	|
12+55	0.0002	0.00	Q	|	|	|	|
13+ 0	0.0002	0.00	Q	|	|	|	|
13+ 5	0.0002	0.00	Q	|	|	|	|
13+10	0.0002	0.00	Q	|	|	|	|
13+15	0.0002	0.00	Q	|	|	|	|
13+20	0.0002	0.00	Q	|	|	|	|
13+25	0.0002	0.00	Q	|	|	|	|
13+30	0.0002	0.00	Q	|	|	|	|
13+35	0.0002	0.00	Q	|	|	|	|
13+40	0.0003	0.00	Q	|	|	|	|
13+45	0.0003	0.00	Q	|	|	|	|
13+50	0.0003	0.00	Q	|	|	|	|
13+55	0.0003	0.00	Q	|	|	|	|
14+ 0	0.0003	0.00	Q	|	|	|	|
14+ 5	0.0003	0.00	Q	|	|	|	|
14+10	0.0003	0.00	Q	|	|	|	|
14+15	0.0003	0.00	Q	|	|	|	|
14+20	0.0003	0.00	Q	|	|	|	|
14+25	0.0003	0.00	Q	|	|	|	|
14+30	0.0003	0.00	Q	|	|	|	|
14+35	0.0003	0.00	Q	|	|	|	|
14+40	0.0003	0.00	Q	|	|	|	|
14+45	0.0003	0.00	Q	|	|	|	|
14+50	0.0003	0.00	Q	|	|	|	|
14+55	0.0003	0.00	Q	|	|	|	|
15+ 0	0.0003	0.00	Q	|	|	|	|
15+ 5	0.0003	0.00	Q	|	|	|	|
15+10	0.0003	0.00	Q	|	|	|	|
15+15	0.0003	0.00	Q	|	|	|	|
15+20	0.0003	0.00	Q	|	|	|	|
15+25	0.0008	0.06	Q	|	|	|	|
15+30	0.0036	0.42	VQ	|	|	|	|
15+35	0.0096	0.86	|V Q	|	|	|	|
15+40	0.0173	1.12	| V Q	|	|	|	|
15+45	0.0264	1.32	| VQ	|	|	|	|

```
15+50       0.0372      1.58  |    VQ   |         |         |         |
15+55       0.0507      1.95  |      Q  |         |         |         |
16+ 0       0.0687      2.61  |         Q         |         |         |
16+ 5       0.0984      4.32  |         |    V Q  |         |         |
16+10       0.1538      8.04  |         |         |  V      | Q       |
16+15       0.2099      8.16  |         |         |         | Q       |
16+20       0.2383      4.12  |         |     Q   |         |     V   |
16+25       0.2523      2.02  |        Q|         |         |       V |
16+30       0.2592      1.01  |   Q     |         |         |         V|
16+35       0.2610      0.26  |Q        |         |         |         V|
16+40       0.2615      0.06  Q         |         |         |         V|
16+45       0.2616      0.02  Q         |         |         |         V|
16+50       0.2616      0.00  Q         |         |         |         V|
16+55       0.2616      0.00  Q         |         |         |         V|
17+ 0       0.2616      0.00  Q         |         |         |         V|
17+ 5       0.2616      0.00  Q         |         |         |         V|
17+10       0.2616      0.00  Q         |         |         |         V|
17+15       0.2616      0.00  Q         |         |         |         V|
17+20       0.2616      0.00  Q         |         |         |         V|
17+25       0.2616      0.00  Q         |         |         |         V|
17+30       0.2616      0.00  Q         |         |         |         V|
17+35       0.2616      0.00  Q         |         |         |         V|
17+40       0.2616      0.00  Q         |         |         |         V|
17+45       0.2616      0.00  Q         |         |         |         V|
17+50       0.2616      0.00  Q         |         |         |         V|
17+55       0.2617      0.00  Q         |         |         |         V|
18+ 0       0.2617      0.00  Q         |         |         |         V|
18+ 5       0.2617      0.00  Q         |         |         |         V|
18+10       0.2617      0.00  Q         |         |         |         V|
18+15       0.2617      0.00  Q         |         |         |         V|
18+20       0.2617      0.00  Q         |         |         |         V|
18+25       0.2617      0.00  Q         |         |         |         V|
18+30       0.2617      0.00  Q         |         |         |         V|
18+35       0.2617      0.00  Q         |         |         |         V|
18+40       0.2617      0.00  Q         |         |         |         V|
18+45       0.2617      0.00  Q         |         |         |         V|
18+50       0.2617      0.00  Q         |         |         |         V|
18+55       0.2617      0.00  Q         |         |         |         V|
19+ 0       0.2617      0.00  Q         |         |         |         V|
19+ 5       0.2617      0.00  Q         |         |         |         V|
19+10       0.2617      0.00  Q         |         |         |         V|
19+15       0.2617      0.00  Q         |         |         |         V|
19+20       0.2617      0.00  Q         |         |         |         V|
19+25       0.2617      0.00  Q         |         |         |         V|
19+30       0.2617      0.00  Q         |         |         |         V|
19+35       0.2617      0.00  Q         |         |         |         V|
19+40       0.2617      0.00  Q         |         |         |         V|
19+45       0.2617      0.00  Q         |         |         |         V|
19+50       0.2617      0.00  Q         |         |         |         V|
19+55       0.2617      0.00  Q         |         |         |         V|
```

20+ 0	0.2617	0.00	Q	|	|	|	V|
20+ 5	0.2617	0.00	Q	|	|	|	V|
20+10	0.2617	0.00	Q	|	|	|	V|
20+15	0.2617	0.00	Q	|	|	|	V|
20+20	0.2617	0.00	Q	|	|	|	V|
20+25	0.2617	0.00	Q	|	|	|	V|
20+30	0.2617	0.00	Q	|	|	|	V|
20+35	0.2617	0.00	Q	|	|	|	V|
20+40	0.2617	0.00	Q	|	|	|	V|
20+45	0.2617	0.00	Q	|	|	|	V|
20+50	0.2617	0.00	Q	|	|	|	V|
20+55	0.2617	0.00	Q	|	|	|	V|
21+ 0	0.2617	0.00	Q	|	|	|	V|
21+ 5	0.2617	0.00	Q	|	|	|	V|
21+10	0.2617	0.00	Q	|	|	|	V|
21+15	0.2617	0.00	Q	|	|	|	V|
21+20	0.2617	0.00	Q	|	|	|	V|
21+25	0.2617	0.00	Q	|	|	|	V|
21+30	0.2617	0.00	Q	|	|	|	V|
21+35	0.2617	0.00	Q	|	|	|	V|
21+40	0.2617	0.00	Q	|	|	|	V|
21+45	0.2617	0.00	Q	|	|	|	V|
21+50	0.2617	0.00	Q	|	|	|	V|
21+55	0.2617	0.00	Q	|	|	|	V|
22+ 0	0.2617	0.00	Q	|	|	|	V|
22+ 5	0.2617	0.00	Q	|	|	|	V|
22+10	0.2617	0.00	Q	|	|	|	V|
22+15	0.2617	0.00	Q	|	|	|	V|
22+20	0.2617	0.00	Q	|	|	|	V|
22+25	0.2617	0.00	Q	|	|	|	V|
22+30	0.2617	0.00	Q	|	|	|	V|
22+35	0.2617	0.00	Q	|	|	|	V|
22+40	0.2617	0.00	Q	|	|	|	V|
22+45	0.2617	0.00	Q	|	|	|	V|
22+50	0.2617	0.00	Q	|	|	|	V|
22+55	0.2617	0.00	Q	|	|	|	V|
23+ 0	0.2617	0.00	Q	|	|	|	V|
23+ 5	0.2617	0.00	Q	|	|	|	V|
23+10	0.2617	0.00	Q	|	|	|	V|
23+15	0.2617	0.00	Q	|	|	|	V|
23+20	0.2617	0.00	Q	|	|	|	V|
23+25	0.2617	0.00	Q	|	|	|	V|
23+30	0.2617	0.00	Q	|	|	|	V|
23+35	0.2617	0.00	Q	|	|	|	V|
23+40	0.2617	0.00	Q	|	|	|	V|
23+45	0.2617	0.00	Q	|	|	|	V|
23+50	0.2617	0.00	Q	|	|	|	V|
23+55	0.2617	0.00	Q	|	|	|	V|
24+ 0	0.2617	0.00	Q	|	|	|	V|
24+ 5	0.2617	0.00	Q	|	|	|	V|

```
   24+10       0.2617      0.00  Q         |         |         |        V|
   24+15       0.2617      0.00  Q         |         |         |        V|
   24+20       0.2617      0.00  Q         |         |         |        V|
   24+25       0.2617      0.00  Q         |         |         |        V|
-------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 07/24/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
25 YEAR 3 HOUR STORM POST-DEVELOPED

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
3.98	1	0.92
Rainfall data for year 2		
3.98	6	0.27
Rainfall data for year 2		
3.98	24	0.13
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++
******** Area-averaged max loss rate, Fm ********

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      32.0          3.98      1.000     0.978    0.130    0.127

Area-averaged adjusted loss rate Fm (In/Hr) =  0.127

********* Area-Averaged low loss rate fraction, Yb **********
Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     0.52   0.130         32.0      32.0       5.71     0.000
     3.46   0.870         98.0      98.0       0.20     0.813

Area-averaged catchment yield fraction, Y =  0.708
Area-averaged low loss fraction, Yb =  0.292
User entry of time of concentration  =   0.175 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.140 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.4219
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.292 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.422(In)
Computed peak 30-minute rainfall =  0.864(In)
Specified peak 1-hour rainfall =  1.140(In)
Computed peak 3-hour rainfall =  1.140(In)
Specified peak 6-hour rainfall =  1.141(In)
Specified peak 24-hour rainfall =  1.142(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.422(In)
30-minute factor = 1.000    Adjusted rainfall =  0.864(In)
1-hour factor = 1.000       Adjusted rainfall =  1.140(In)
3-hour factor = 1.000       Adjusted rainfall =  1.140(In)
6-hour factor = 1.000       Adjusted rainfall =  1.141(In)
24-hour factor = 1.000      Adjusted rainfall =  1.142(In)
----------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
               (K =        48.13 (CFS))
```

1	6.397	3.079
2	40.927	16.620
3	81.152	19.361
4	95.299	6.810
5	98.613	1.595
6	100.000	0.668

Total soil rain loss = 0.13(In)
Total effective rainfall = 1.01(In)
Peak flow rate in flood hydrograph = 10.27(CFS)

++

3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 5.0 10.0 15.0 20.0
0+ 5	0.0000	0.00	Q | | | |
0+10	0.0000	0.00	Q | | | |
0+15	0.0000	0.00	Q | | | |
0+20	0.0000	0.00	Q | | | |
0+25	0.0000	0.00	Q | | | |
0+30	0.0000	0.00	Q | | | |
0+35	0.0000	0.00	Q | | | |
0+40	0.0000	0.00	Q | | | |
0+45	0.0000	0.00	Q | | | |
0+50	0.0000	0.00	Q | | | |
0+55	0.0000	0.00	Q | | | |
1+ 0	0.0000	0.00	Q | | | |
1+ 5	0.0000	0.00	Q | | | |
1+10	0.0000	0.00	Q | | | |
1+15	0.0000	0.00	Q | | | |
1+20	0.0000	0.00	Q | | | |
1+25	0.0006	0.09	Q | | | |
1+30	0.0045	0.57	VQ | | | |
1+35	0.0126	1.17	|VQ | | | |
1+40	0.0230	1.51	| VQ | | | |
1+45	0.0352	1.77	| QV | | | |
1+50	0.0496	2.10	| QV | | | |
1+55	0.0672	2.55	| Q V | | | |
2+ 0	0.0905	3.39	| Q V | | |
2+ 5	0.1285	5.52	| |Q V | | |
2+10	0.1986	10.17	| | | Q V | |
2+15	0.2693	10.27	| | | Q | V |
2+20	0.3054	5.24	| | Q | | V |
2+25	0.3234	2.62	| Q | | | V |
2+30	0.3326	1.33	| Q | | | V|
2+35	0.3350	0.34	Q | | | V|

2+40	0.3355	0.08	Q	|	|	|	V|
2+45	0.3357	0.02	Q	|	|	|	V|
2+50	0.3357	0.00	Q	|	|	|	V|
2+55	0.3357	0.00	Q	|	|	|	V|
3+ 0	0.3357	0.00	Q	|	|	|	V|
3+ 5	0.3357	0.00	Q	|	|	|	V|
3+10	0.3357	0.00	Q	|	|	|	V|
3+15	0.3357	0.00	Q	|	|	|	V|
3+20	0.3357	0.00	Q	|	|	|	V|
3+25	0.3357	0.00	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

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Study date 07/24/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
25 YEAR 24 HOUR STORM POST-DEVELOPED

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
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Rainfall data for year 2		
3.98	6	0.27
Rainfall data for year 2		
3.98	24	0.13
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++

```
******** Area-averaged max loss rate, Fm ********

SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      32.0          3.98      1.000     0.978    0.130    0.127

Area-averaged adjusted loss rate Fm (In/Hr) =  0.127

********* Area-Averaged low loss rate fraction, Yb **********
Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     0.52   0.130         32.0      32.0       5.71     0.000
     3.46   0.870         98.0      98.0       0.20     0.813

Area-averaged catchment yield fraction, Y =  0.708
Area-averaged low loss fraction, Yb =  0.292
User entry of time of concentration  =   0.175 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.140 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.4219
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.292 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.422(In)
Computed peak 30-minute rainfall =  0.864(In)
Specified peak 1-hour rainfall =  1.140(In)
Computed peak 3-hour rainfall =  1.140(In)
Specified peak 6-hour rainfall =  1.141(In)
Specified peak 24-hour rainfall =  1.142(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.422(In)
30-minute factor = 1.000    Adjusted rainfall =  0.864(In)
1-hour factor = 1.000       Adjusted rainfall =  1.140(In)
3-hour factor = 1.000       Adjusted rainfall =  1.140(In)
6-hour factor = 1.000       Adjusted rainfall =  1.141(In)
24-hour factor = 1.000      Adjusted rainfall =  1.142(In)
----------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
                (K =        48.13 (CFS))
```

1	6.397	3.079
2	40.927	16.620
3	81.152	19.361
4	95.299	6.810
5	98.613	1.595
6	100.000	0.668

Total soil rain loss = 0.13(In)
Total effective rainfall = 1.01(In)
Peak flow rate in flood hydrograph = 10.27(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

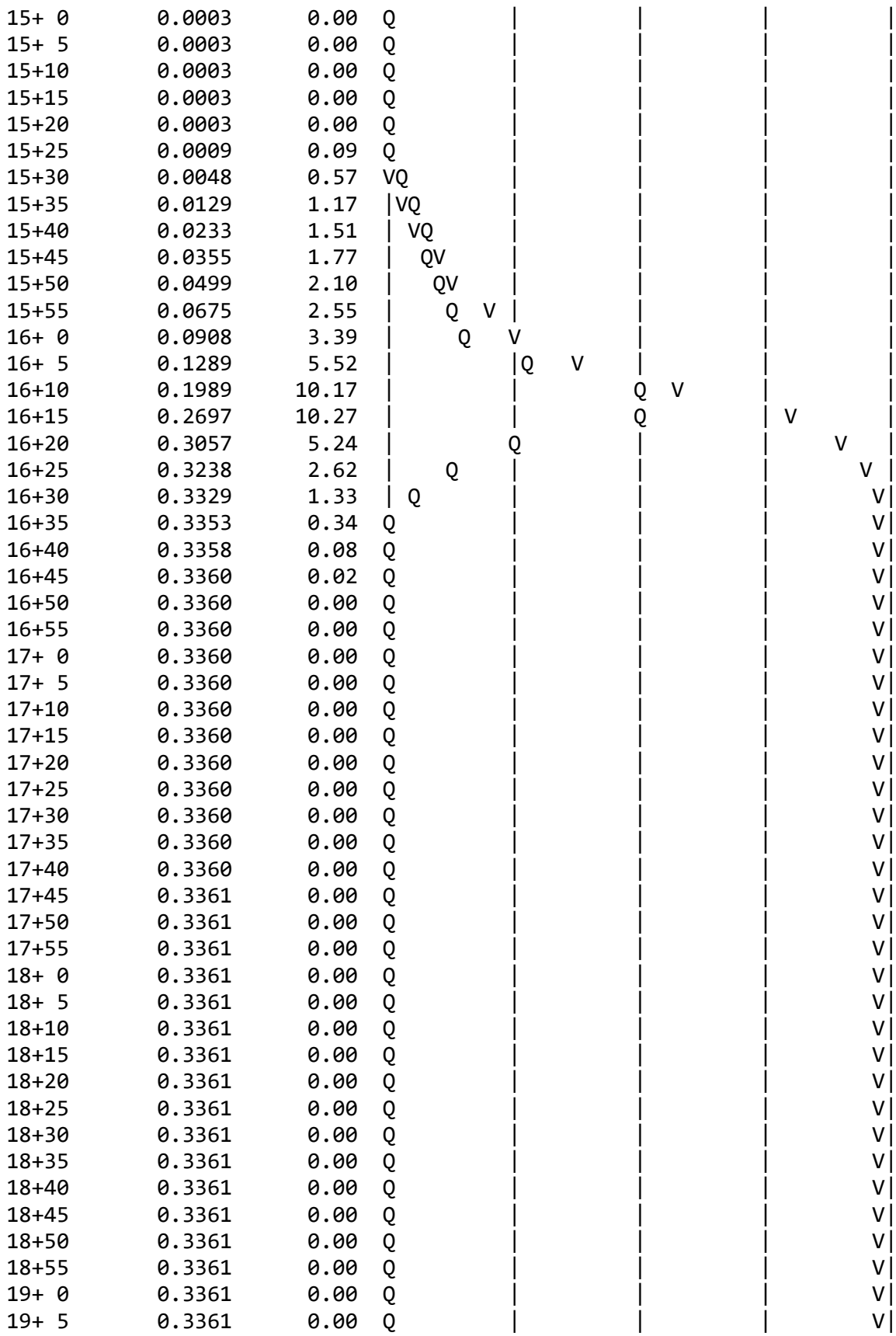
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				

2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+35	0.0000	0.00	Q				
5+40	0.0000	0.00	Q				
5+45	0.0000	0.00	Q				
5+50	0.0000	0.00	Q				
5+55	0.0001	0.00	Q				
6+ 0	0.0001	0.00	Q				
6+ 5	0.0001	0.00	Q				
6+10	0.0001	0.00	Q				
6+15	0.0001	0.00	Q				
6+20	0.0001	0.00	Q				
6+25	0.0001	0.00	Q				
6+30	0.0001	0.00	Q				
6+35	0.0001	0.00	Q				

6+40	0.0001	0.00	Q				
6+45	0.0001	0.00	Q				
6+50	0.0001	0.00	Q				
6+55	0.0001	0.00	Q				
7+ 0	0.0001	0.00	Q				
7+ 5	0.0001	0.00	Q				
7+10	0.0001	0.00	Q				
7+15	0.0001	0.00	Q				
7+20	0.0001	0.00	Q				
7+25	0.0001	0.00	Q				
7+30	0.0001	0.00	Q				
7+35	0.0001	0.00	Q				
7+40	0.0001	0.00	Q				
7+45	0.0001	0.00	Q				
7+50	0.0001	0.00	Q				
7+55	0.0001	0.00	Q				
8+ 0	0.0001	0.00	Q				
8+ 5	0.0001	0.00	Q				
8+10	0.0001	0.00	Q				
8+15	0.0001	0.00	Q				
8+20	0.0001	0.00	Q				
8+25	0.0001	0.00	Q				
8+30	0.0001	0.00	Q				
8+35	0.0001	0.00	Q				
8+40	0.0001	0.00	Q				
8+45	0.0001	0.00	Q				
8+50	0.0001	0.00	Q				
8+55	0.0001	0.00	Q				
9+ 0	0.0001	0.00	Q				
9+ 5	0.0001	0.00	Q				
9+10	0.0001	0.00	Q				
9+15	0.0001	0.00	Q				
9+20	0.0001	0.00	Q				
9+25	0.0001	0.00	Q				
9+30	0.0001	0.00	Q				
9+35	0.0001	0.00	Q				
9+40	0.0001	0.00	Q				
9+45	0.0001	0.00	Q				
9+50	0.0001	0.00	Q				
9+55	0.0001	0.00	Q				
10+ 0	0.0001	0.00	Q				
10+ 5	0.0001	0.00	Q				
10+10	0.0001	0.00	Q				
10+15	0.0001	0.00	Q				
10+20	0.0001	0.00	Q				
10+25	0.0001	0.00	Q				
10+30	0.0001	0.00	Q				
10+35	0.0001	0.00	Q				
10+40	0.0001	0.00	Q				
10+45	0.0001	0.00	Q				

10+50	0.0001	0.00	Q				
10+55	0.0001	0.00	Q				
11+ 0	0.0001	0.00	Q				
11+ 5	0.0001	0.00	Q				
11+10	0.0001	0.00	Q				
11+15	0.0001	0.00	Q				
11+20	0.0001	0.00	Q				
11+25	0.0001	0.00	Q				
11+30	0.0001	0.00	Q				
11+35	0.0001	0.00	Q				
11+40	0.0001	0.00	Q				
11+45	0.0001	0.00	Q				
11+50	0.0001	0.00	Q				
11+55	0.0002	0.00	Q				
12+ 0	0.0002	0.00	Q				
12+ 5	0.0002	0.00	Q				
12+10	0.0002	0.00	Q				
12+15	0.0002	0.00	Q				
12+20	0.0002	0.00	Q				
12+25	0.0002	0.00	Q				
12+30	0.0002	0.00	Q				
12+35	0.0002	0.00	Q				
12+40	0.0002	0.00	Q				
12+45	0.0002	0.00	Q				
12+50	0.0002	0.00	Q				
12+55	0.0002	0.00	Q				
13+ 0	0.0002	0.00	Q				
13+ 5	0.0002	0.00	Q				
13+10	0.0002	0.00	Q				
13+15	0.0002	0.00	Q				
13+20	0.0002	0.00	Q				
13+25	0.0002	0.00	Q				
13+30	0.0003	0.00	Q				
13+35	0.0003	0.00	Q				
13+40	0.0003	0.00	Q				
13+45	0.0003	0.00	Q				
13+50	0.0003	0.00	Q				
13+55	0.0003	0.00	Q				
14+ 0	0.0003	0.00	Q				
14+ 5	0.0003	0.00	Q				
14+10	0.0003	0.00	Q				
14+15	0.0003	0.00	Q				
14+20	0.0003	0.00	Q				
14+25	0.0003	0.00	Q				
14+30	0.0003	0.00	Q				
14+35	0.0003	0.00	Q				
14+40	0.0003	0.00	Q				
14+45	0.0003	0.00	Q				
14+50	0.0003	0.00	Q				
14+55	0.0003	0.00	Q				


15+ 0 0.0003 0.00
15+ 5 0.0003 0.00
15+10 0.0003 0.00
15+15 0.0003 0.00
15+20 0.0003 0.00
15+25 0.0009 0.09
15+30 0.0048 0.57
15+35 0.0129 1.17
15+40 0.0233 1.51
15+45 0.0355 1.77
15+50 0.0499 2.10
15+55 0.0675 2.55
16+ 0 0.0908 3.39
16+ 5 0.1289 5.52
16+10 0.1989 10.17
16+15 0.2697 10.27
16+20 0.3057 5.24
16+25 0.3238 2.62
16+30 0.3329 1.33
16+35 0.3353 0.34
16+40 0.3358 0.08
16+45 0.3360 0.02
16+50 0.3360 0.00
16+55 0.3360 0.00
17+ 0 0.3360 0.00
17+ 5 0.3360 0.00
17+10 0.3360 0.00
17+15 0.3360 0.00
17+20 0.3360 0.00
17+25 0.3360 0.00
17+30 0.3360 0.00
17+35 0.3360 0.00
17+40 0.3360 0.00
17+45 0.3361 0.00
17+50 0.3361 0.00
17+55 0.3361 0.00
18+ 0 0.3361 0.00
18+ 5 0.3361 0.00
18+10 0.3361 0.00
18+15 0.3361 0.00
18+20 0.3361 0.00
18+25 0.3361 0.00
18+30 0.3361 0.00
18+35 0.3361 0.00
18+40 0.3361 0.00
18+45 0.3361 0.00
18+50 0.3361 0.00
18+55 0.3361 0.00
19+ 0 0.3361 0.00
19+ 5 0.3361 0.00

19+10	0.3361	0.00	Q	|	|	|	V|
19+15	0.3361	0.00	Q	|	|	|	V|
19+20	0.3361	0.00	Q	|	|	|	V|
19+25	0.3361	0.00	Q	|	|	|	V|
19+30	0.3361	0.00	Q	|	|	|	V|
19+35	0.3361	0.00	Q	|	|	|	V|
19+40	0.3361	0.00	Q	|	|	|	V|
19+45	0.3361	0.00	Q	|	|	|	V|
19+50	0.3361	0.00	Q	|	|	|	V|
19+55	0.3361	0.00	Q	|	|	|	V|
20+ 0	0.3361	0.00	Q	|	|	|	V|
20+ 5	0.3361	0.00	Q	|	|	|	V|
20+10	0.3361	0.00	Q	|	|	|	V|
20+15	0.3361	0.00	Q	|	|	|	V|
20+20	0.3361	0.00	Q	|	|	|	V|
20+25	0.3361	0.00	Q	|	|	|	V|
20+30	0.3361	0.00	Q	|	|	|	V|
20+35	0.3361	0.00	Q	|	|	|	V|
20+40	0.3361	0.00	Q	|	|	|	V|
20+45	0.3361	0.00	Q	|	|	|	V|
20+50	0.3361	0.00	Q	|	|	|	V|
20+55	0.3361	0.00	Q	|	|	|	V|
21+ 0	0.3361	0.00	Q	|	|	|	V|
21+ 5	0.3361	0.00	Q	|	|	|	V|
21+10	0.3361	0.00	Q	|	|	|	V|
21+15	0.3361	0.00	Q	|	|	|	V|
21+20	0.3361	0.00	Q	|	|	|	V|
21+25	0.3361	0.00	Q	|	|	|	V|
21+30	0.3361	0.00	Q	|	|	|	V|
21+35	0.3361	0.00	Q	|	|	|	V|
21+40	0.3361	0.00	Q	|	|	|	V|
21+45	0.3361	0.00	Q	|	|	|	V|
21+50	0.3361	0.00	Q	|	|	|	V|
21+55	0.3361	0.00	Q	|	|	|	V|
22+ 0	0.3361	0.00	Q	|	|	|	V|
22+ 5	0.3361	0.00	Q	|	|	|	V|
22+10	0.3361	0.00	Q	|	|	|	V|
22+15	0.3361	0.00	Q	|	|	|	V|
22+20	0.3361	0.00	Q	|	|	|	V|
22+25	0.3361	0.00	Q	|	|	|	V|
22+30	0.3361	0.00	Q	|	|	|	V|
22+35	0.3361	0.00	Q	|	|	|	V|
22+40	0.3361	0.00	Q	|	|	|	V|
22+45	0.3361	0.00	Q	|	|	|	V|
22+50	0.3361	0.00	Q	|	|	|	V|
22+55	0.3362	0.00	Q	|	|	|	V|
23+ 0	0.3362	0.00	Q	|	|	|	V|
23+ 5	0.3362	0.00	Q	|	|	|	V|
23+10	0.3362	0.00	Q	|	|	|	V|
23+15	0.3362	0.00	Q	|	|	|	V|

23+20	0.3362	0.00	Q	|	|	|	V|
23+25	0.3362	0.00	Q	|	|	|	V|
23+30	0.3362	0.00	Q	|	|	|	V|
23+35	0.3362	0.00	Q	|	|	|	V|
23+40	0.3362	0.00	Q	|	|	|	V|
23+45	0.3362	0.00	Q	|	|	|	V|
23+50	0.3362	0.00	Q	|	|	|	V|
23+55	0.3362	0.00	Q	|	|	|	V|
24+ 0	0.3362	0.00	Q	|	|	|	V|
24+ 5	0.3362	0.00	Q	|	|	|	V|
24+10	0.3362	0.00	Q	|	|	|	V|
24+15	0.3362	0.00	Q	|	|	|	V|
24+20	0.3362	0.00	Q	|	|	|	V|
24+25	0.3362	0.00	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

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Study date 06/28/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
100 YEAR 3 HOUR STORM POST-DEVELOPED

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	3.98	1.000	0.785	0.130	0.102

Area-averaged adjusted loss rate Fm (In/Hr) = 0.102

********* Area-Averaged low loss rate fraction, Yb **********

Area	Area	SCS CN	SCS CN	S	Pervious

```
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
    0.52   0.130         32.0      52.0       7.41     0.000
    3.46   0.870         98.0      98.0       0.20     0.852

Area-averaged catchment yield fraction, Y =  0.741
Area-averaged low loss fraction, Yb =  0.259
User entry of time of concentration  =   0.175 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.140 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.6329
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.102(In/Hr)
Average low loss rate fraction (Yb) = 0.259 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.548(In)
Computed peak 30-minute rainfall =  1.122(In)
Specified peak 1-hour rainfall =  1.480(In)
Computed peak 3-hour rainfall =  1.480(In)
Specified peak 6-hour rainfall =  1.481(In)
Specified peak 24-hour rainfall =  1.482(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.548(In)
30-minute factor = 1.000    Adjusted rainfall =  1.121(In)
1-hour factor = 1.000       Adjusted rainfall =  1.480(In)
3-hour factor = 1.000       Adjusted rainfall =  1.480(In)
6-hour factor = 1.000       Adjusted rainfall =  1.481(In)
24-hour factor = 1.000      Adjusted rainfall =  1.482(In)
------------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
------------------------------------------------------------------------
               (K =        48.13 (CFS))

  1                6.442                   3.101
  2               41.188                  16.724
  3               81.358                  19.335
  4               95.384                   6.751
  5               98.630                   1.562
  6              100.000                   0.659
------------------------------------------------------------------------
Total soil rain loss =      0.10(In)
Total effective rainfall =      1.38(In)
```

Peak flow rate in flood hydrograph = 13.57(CFS)

3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 5.0 10.0 15.0 20.0
0+ 5	0.0000	0.00	Q
0+10	0.0000	0.00	Q
0+15	0.0000	0.00	Q
0+20	0.0000	0.00	Q
0+25	0.0000	0.00	Q
0+30	0.0000	0.00	Q
0+35	0.0000	0.00	Q
0+40	0.0000	0.00	Q
0+45	0.0000	0.00	Q
0+50	0.0000	0.00	Q
0+55	0.0000	0.00	Q
1+ 0	0.0000	0.00	Q
1+ 5	0.0000	0.00	Q
1+10	0.0000	0.00	Q
1+15	0.0000	0.00	Q
1+20	0.0000	0.00	Q
1+25	0.0009	0.13	Q
1+30	0.0067	0.84	VQ
1+35	0.0186	1.73	V Q
1+40	0.0338	2.20	V Q
1+45	0.0514	2.55	VQ
1+50	0.0719	2.98	QV
1+55	0.0965	3.57	QV
2+ 0	0.1285	4.66	Q V
2+ 5	0.1798	7.44	QV
2+10	0.2728	13.50	V Q
2+15	0.3663	13.57	Q V
2+20	0.4146	7.02	Q V
2+25	0.4395	3.62	Q V
2+30	0.4524	1.86	Q V
2+35	0.4557	0.49	Q V
2+40	0.4565	0.12	Q V
2+45	0.4567	0.03	Q V
2+50	0.4567	0.00	Q V
2+55	0.4567	0.00	Q V
3+ 0	0.4567	0.00	Q V
3+ 5	0.4567	0.00	Q V
3+10	0.4567	0.00	Q V
3+15	0.4567	0.00	Q V
3+20	0.4567	0.00	Q V

```
    3+25       0.4567      0.00  Q         |         |         |         V
-------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 06/28/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
100 YEAR 24 HOUR STORM POST-DEVELOPED

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	3.98	1.000	0.785	0.130	0.102

Area-averaged adjusted loss rate Fm (In/Hr) = 0.102

********* Area-Averaged low loss rate fraction, Yb **********

Area	Area	SCS CN	SCS CN	S	Pervious

```
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
    0.52   0.130         32.0      52.0       7.41     0.000
    3.46   0.870         98.0      98.0       0.20     0.852

Area-averaged catchment yield fraction, Y =  0.741
Area-averaged low loss fraction, Yb =  0.259
User entry of time of concentration  =   0.175 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.140 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.6329
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.102(In/Hr)
Average low loss rate fraction (Yb) = 0.259 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.548(In)
Computed peak 30-minute rainfall =  1.122(In)
Specified peak 1-hour rainfall =  1.480(In)
Computed peak 3-hour rainfall =  1.480(In)
Specified peak 6-hour rainfall =  1.481(In)
Specified peak 24-hour rainfall =  1.482(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.548(In)
30-minute factor = 1.000    Adjusted rainfall =  1.121(In)
1-hour factor = 1.000       Adjusted rainfall =  1.480(In)
3-hour factor = 1.000       Adjusted rainfall =  1.480(In)
6-hour factor = 1.000       Adjusted rainfall =  1.481(In)
24-hour factor = 1.000      Adjusted rainfall =  1.482(In)
------------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
------------------------------------------------------------------------
               (K =        48.13 (CFS))

  1                6.442                   3.101
  2               41.188                  16.724
  3               81.358                  19.335
  4               95.384                   6.751
  5               98.630                   1.562
  6              100.000                   0.659
------------------------------------------------------------------------
Total soil rain loss =      0.10(In)
Total effective rainfall =      1.38(In)
```

Peak flow rate in flood hydrograph = 13.57(CFS)

++

24 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				

3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+35	0.0000	0.00	Q				
5+40	0.0001	0.00	Q				
5+45	0.0001	0.00	Q				
5+50	0.0001	0.00	Q				
5+55	0.0001	0.00	Q				
6+ 0	0.0001	0.00	Q				
6+ 5	0.0001	0.00	Q				
6+10	0.0001	0.00	Q				
6+15	0.0001	0.00	Q				
6+20	0.0001	0.00	Q				
6+25	0.0001	0.00	Q				
6+30	0.0001	0.00	Q				
6+35	0.0001	0.00	Q				
6+40	0.0001	0.00	Q				
6+45	0.0001	0.00	Q				
6+50	0.0001	0.00	Q				
6+55	0.0001	0.00	Q				
7+ 0	0.0001	0.00	Q				
7+ 5	0.0001	0.00	Q				
7+10	0.0001	0.00	Q				
7+15	0.0001	0.00	Q				
7+20	0.0001	0.00	Q				
7+25	0.0001	0.00	Q				
7+30	0.0001	0.00	Q				

7+35	0.0001	0.00	Q				
7+40	0.0001	0.00	Q				
7+45	0.0001	0.00	Q				
7+50	0.0001	0.00	Q				
7+55	0.0001	0.00	Q				
8+ 0	0.0001	0.00	Q				
8+ 5	0.0001	0.00	Q				
8+10	0.0001	0.00	Q				
8+15	0.0001	0.00	Q				
8+20	0.0001	0.00	Q				
8+25	0.0001	0.00	Q				
8+30	0.0001	0.00	Q				
8+35	0.0001	0.00	Q				
8+40	0.0001	0.00	Q				
8+45	0.0001	0.00	Q				
8+50	0.0001	0.00	Q				
8+55	0.0001	0.00	Q				
9+ 0	0.0001	0.00	Q				
9+ 5	0.0001	0.00	Q				
9+10	0.0001	0.00	Q				
9+15	0.0001	0.00	Q				
9+20	0.0001	0.00	Q				
9+25	0.0001	0.00	Q				
9+30	0.0001	0.00	Q				
9+35	0.0001	0.00	Q				
9+40	0.0001	0.00	Q				
9+45	0.0001	0.00	Q				
9+50	0.0001	0.00	Q				
9+55	0.0001	0.00	Q				
10+ 0	0.0001	0.00	Q				
10+ 5	0.0001	0.00	Q				
10+10	0.0001	0.00	Q				
10+15	0.0001	0.00	Q				
10+20	0.0001	0.00	Q				
10+25	0.0001	0.00	Q				
10+30	0.0001	0.00	Q				
10+35	0.0001	0.00	Q				
10+40	0.0001	0.00	Q				
10+45	0.0001	0.00	Q				
10+50	0.0001	0.00	Q				
10+55	0.0001	0.00	Q				
11+ 0	0.0001	0.00	Q				
11+ 5	0.0001	0.00	Q				
11+10	0.0001	0.00	Q				
11+15	0.0001	0.00	Q				
11+20	0.0001	0.00	Q				
11+25	0.0001	0.00	Q				
11+30	0.0001	0.00	Q				
11+35	0.0001	0.00	Q				
11+40	0.0002	0.00	Q				

11+45	0.0002	0.00	Q	|	|	|	|
11+50	0.0002	0.00	Q	|	|	|	|
11+55	0.0002	0.00	Q	|	|	|	|
12+ 0	0.0002	0.00	Q	|	|	|	|
12+ 5	0.0002	0.00	Q	|	|	|	|
12+10	0.0002	0.00	Q	|	|	|	|
12+15	0.0002	0.00	Q	|	|	|	|
12+20	0.0002	0.00	Q	|	|	|	|
12+25	0.0002	0.00	Q	|	|	|	|
12+30	0.0002	0.00	Q	|	|	|	|
12+35	0.0002	0.00	Q	|	|	|	|
12+40	0.0002	0.00	Q	|	|	|	|
12+45	0.0002	0.00	Q	|	|	|	|
12+50	0.0002	0.00	Q	|	|	|	|
12+55	0.0002	0.00	Q	|	|	|	|
13+ 0	0.0002	0.00	Q	|	|	|	|
13+ 5	0.0002	0.00	Q	|	|	|	|
13+10	0.0002	0.00	Q	|	|	|	|
13+15	0.0002	0.00	Q	|	|	|	|
13+20	0.0002	0.00	Q	|	|	|	|
13+25	0.0003	0.00	Q	|	|	|	|
13+30	0.0003	0.00	Q	|	|	|	|
13+35	0.0003	0.00	Q	|	|	|	|
13+40	0.0003	0.00	Q	|	|	|	|
13+45	0.0003	0.00	Q	|	|	|	|
13+50	0.0003	0.00	Q	|	|	|	|
13+55	0.0003	0.00	Q	|	|	|	|
14+ 0	0.0003	0.00	Q	|	|	|	|
14+ 5	0.0003	0.00	Q	|	|	|	|
14+10	0.0003	0.00	Q	|	|	|	|
14+15	0.0003	0.00	Q	|	|	|	|
14+20	0.0003	0.00	Q	|	|	|	|
14+25	0.0003	0.00	Q	|	|	|	|
14+30	0.0003	0.00	Q	|	|	|	|
14+35	0.0003	0.00	Q	|	|	|	|
14+40	0.0003	0.00	Q	|	|	|	|
14+45	0.0003	0.00	Q	|	|	|	|
14+50	0.0003	0.00	Q	|	|	|	|
14+55	0.0003	0.00	Q	|	|	|	|
15+ 0	0.0003	0.00	Q	|	|	|	|
15+ 5	0.0004	0.00	Q	|	|	|	|
15+10	0.0004	0.00	Q	|	|	|	|
15+15	0.0004	0.00	Q	|	|	|	|
15+20	0.0004	0.00	Q	|	|	|	|
15+25	0.0013	0.13	Q	|	|	|	|
15+30	0.0071	0.84	VQ	|	|	|	|
15+35	0.0190	1.73	|V Q	|	|	|	|
15+40	0.0341	2.20	| V Q	|	|	|	|
15+45	0.0517	2.55	| VQ	|	|	|	|
15+50	0.0722	2.98	| QV	|	|	|	|

```
15+55       0.0968      3.57  |      QV |         |         |          |
16+ 0       0.1289      4.66  |        Q|V        |         |          |
16+ 5       0.1801      7.44  |         |   QV    |         |          |
16+10       0.2731     13.50  |         |         |  V   Q  |          |
16+15       0.3666     13.57  |         |         |      Q  | V        |
16+20       0.4150      7.02  |         |   Q     |         |     V    |
16+25       0.4399      3.62  |      Q  |         |         |       V  |
16+30       0.4527      1.86  |  Q      |         |         |        V |
16+35       0.4560      0.49  Q         |         |         |        V |
16+40       0.4568      0.12  Q         |         |         |        V |
16+45       0.4571      0.03  Q         |         |         |        V |
16+50       0.4571      0.00  Q         |         |         |        V |
16+55       0.4571      0.00  Q         |         |         |        V |
17+ 0       0.4571      0.00  Q         |         |         |        V |
17+ 5       0.4571      0.00  Q         |         |         |        V |
17+10       0.4571      0.00  Q         |         |         |        V |
17+15       0.4571      0.00  Q         |         |         |        V |
17+20       0.4571      0.00  Q         |         |         |        V |
17+25       0.4571      0.00  Q         |         |         |        V |
17+30       0.4571      0.00  Q         |         |         |        V |
17+35       0.4571      0.00  Q         |         |         |        V |
17+40       0.4571      0.00  Q         |         |         |        V |
17+45       0.4571      0.00  Q         |         |         |        V |
17+50       0.4571      0.00  Q         |         |         |        V |
17+55       0.4571      0.00  Q         |         |         |        V |
18+ 0       0.4572      0.00  Q         |         |         |        V |
18+ 5       0.4572      0.00  Q         |         |         |        V |
18+10       0.4572      0.00  Q         |         |         |        V |
18+15       0.4572      0.00  Q         |         |         |        V |
18+20       0.4572      0.00  Q         |         |         |        V |
18+25       0.4572      0.00  Q         |         |         |        V |
18+30       0.4572      0.00  Q         |         |         |        V |
18+35       0.4572      0.00  Q         |         |         |        V |
18+40       0.4572      0.00  Q         |         |         |        V |
18+45       0.4572      0.00  Q         |         |         |        V |
18+50       0.4572      0.00  Q         |         |         |        V |
18+55       0.4572      0.00  Q         |         |         |        V |
19+ 0       0.4572      0.00  Q         |         |         |        V |
19+ 5       0.4572      0.00  Q         |         |         |        V |
19+10       0.4572      0.00  Q         |         |         |        V |
19+15       0.4572      0.00  Q         |         |         |        V |
19+20       0.4572      0.00  Q         |         |         |        V |
19+25       0.4572      0.00  Q         |         |         |        V |
19+30       0.4572      0.00  Q         |         |         |        V |
19+35       0.4572      0.00  Q         |         |         |        V |
19+40       0.4572      0.00  Q         |         |         |        V |
19+45       0.4572      0.00  Q         |         |         |        V |
19+50       0.4572      0.00  Q         |         |         |        V |
19+55       0.4572      0.00  Q         |         |         |        V |
20+ 0       0.4572      0.00  Q         |         |         |        V |
```

20+ 5	0.4572	0.00	Q	|	|	|	V|
20+10	0.4572	0.00	Q	|	|	|	V|
20+15	0.4572	0.00	Q	|	|	|	V|
20+20	0.4572	0.00	Q	|	|	|	V|
20+25	0.4572	0.00	Q	|	|	|	V|
20+30	0.4572	0.00	Q	|	|	|	V|
20+35	0.4572	0.00	Q	|	|	|	V|
20+40	0.4572	0.00	Q	|	|	|	V|
20+45	0.4572	0.00	Q	|	|	|	V|
20+50	0.4572	0.00	Q	|	|	|	V|
20+55	0.4572	0.00	Q	|	|	|	V|
21+ 0	0.4572	0.00	Q	|	|	|	V|
21+ 5	0.4572	0.00	Q	|	|	|	V|
21+10	0.4572	0.00	Q	|	|	|	V|
21+15	0.4572	0.00	Q	|	|	|	V|
21+20	0.4572	0.00	Q	|	|	|	V|
21+25	0.4572	0.00	Q	|	|	|	V|
21+30	0.4572	0.00	Q	|	|	|	V|
21+35	0.4572	0.00	Q	|	|	|	V|
21+40	0.4572	0.00	Q	|	|	|	V|
21+45	0.4572	0.00	Q	|	|	|	V|
21+50	0.4572	0.00	Q	|	|	|	V|
21+55	0.4572	0.00	Q	|	|	|	V|
22+ 0	0.4572	0.00	Q	|	|	|	V|
22+ 5	0.4572	0.00	Q	|	|	|	V|
22+10	0.4572	0.00	Q	|	|	|	V|
22+15	0.4572	0.00	Q	|	|	|	V|
22+20	0.4572	0.00	Q	|	|	|	V|
22+25	0.4572	0.00	Q	|	|	|	V|
22+30	0.4572	0.00	Q	|	|	|	V|
22+35	0.4572	0.00	Q	|	|	|	V|
22+40	0.4572	0.00	Q	|	|	|	V|
22+45	0.4572	0.00	Q	|	|	|	V|
22+50	0.4572	0.00	Q	|	|	|	V|
22+55	0.4572	0.00	Q	|	|	|	V|
23+ 0	0.4572	0.00	Q	|	|	|	V|
23+ 5	0.4572	0.00	Q	|	|	|	V|
23+10	0.4572	0.00	Q	|	|	|	V|
23+15	0.4572	0.00	Q	|	|	|	V|
23+20	0.4572	0.00	Q	|	|	|	V|
23+25	0.4572	0.00	Q	|	|	|	V|
23+30	0.4572	0.00	Q	|	|	|	V|
23+35	0.4572	0.00	Q	|	|	|	V|
23+40	0.4572	0.00	Q	|	|	|	V|
23+45	0.4572	0.00	Q	|	|	|	V|
23+50	0.4572	0.00	Q	|	|	|	V|
23+55	0.4572	0.00	Q	|	|	|	V|
24+ 0	0.4572	0.00	Q	|	|	|	V|
24+ 5	0.4572	0.00	Q	|	|	|	V|
24+10	0.4572	0.00	Q	|	|	|	V|

```
   24+15       0.4572      0.00  Q         |         |         |        V|
   24+20       0.4572      0.00  Q         |         |         |        V|
   24+25       0.4572      0.00  Q         |         |         |        V|
-------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 07/24/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
2 YEAR 3 HOUR STORM- POST-DEVELOPED

Storm Event Year = 2

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
3.98	1	0.92
Rainfall data for year 2		
3.98	6	0.27
Rainfall data for year 2		
3.98	24	0.13
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++
******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	32.0	3.98	1.000	0.978	0.130	0.127

Area-averaged adjusted loss rate Fm (In/Hr) = 0.127

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.52	0.130	32.0	32.0	2.61	0.000
3.46	0.870	98.0	98.0	0.20	0.647

Area-averaged catchment yield fraction, Y = 0.563
Area-averaged low loss fraction, Yb = 0.437
User entry of time of concentration = 0.178 (hours)
++
Watershed area = 3.98(Ac.)
Catchment Lag time = 0.142 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 58.5700
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.437 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.192(In)
Computed peak 30-minute rainfall = 0.394(In)
Specified peak 1-hour rainfall = 0.520(In)
Computed peak 3-hour rainfall = 0.520(In)
Specified peak 6-hour rainfall = 0.521(In)
Specified peak 24-hour rainfall = 0.522(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of 3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.192(In)
30-minute factor = 1.000 Adjusted rainfall = 0.394(In)
1-hour factor = 1.000 Adjusted rainfall = 0.520(In)
3-hour factor = 1.000 Adjusted rainfall = 0.520(In)
6-hour factor = 1.000 Adjusted rainfall = 0.521(In)
24-hour factor = 1.000 Adjusted rainfall = 0.522(In)

U n i t H y d r o g r a p h

++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))

(K = 48.13 (CFS))

1	6.220	2.994
2	39.874	16.198
3	80.296	19.457
4	94.943	7.050
5	98.536	1.729
6	100.000	0.705

Total soil rain loss = 0.12(In)
Total effective rainfall = 0.40(In)
Peak flow rate in flood hydrograph = 4.43(CFS)

++

3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0000	0.00	Q	|	|	|	|
0+15	0.0000	0.00	Q	|	|	|	|
0+20	0.0000	0.00	Q	|	|	|	|
0+25	0.0000	0.00	Q	|	|	|	|
0+30	0.0000	0.00	Q	|	|	|	|
0+35	0.0000	0.00	Q	|	|	|	|
0+40	0.0000	0.00	Q	|	|	|	|
0+45	0.0000	0.00	Q	|	|	|	|
0+50	0.0000	0.00	Q	|	|	|	|
0+55	0.0000	0.00	Q	|	|	|	|
1+ 0	0.0000	0.00	Q	|	|	|	|
1+ 5	0.0000	0.00	Q	|	|	|	|
1+10	0.0000	0.00	Q	|	|	|	|
1+15	0.0000	0.00	Q	|	|	|	|
1+20	0.0000	0.00	Q	|	|	|	|
1+25	0.0002	0.03	Q	|	|	|	|
1+30	0.0016	0.19	Q	|	|	|	|
1+35	0.0043	0.40	|Q	|	|	|	|
1+40	0.0078	0.51	| Q	|	|	|	|
1+45	0.0119	0.59	| QV	|	|	|	|
1+50	0.0167	0.70	| Q V	|	|	|	|
1+55	0.0228	0.89	| Q V	|	|	|	|
2+ 0	0.0315	1.26	| Q V|	|	|	|	|
2+ 5	0.0468	2.22	| Q | V	|	|	|	|
2+10	0.0764	4.30	| | Q | V	|	|	|	|
2+15	0.1069	4.43	| | Q |	|	| V	|
2+20	0.1218	2.16	| Q |	|	| V	|
2+25	0.1287	1.00	| Q |	|	| V |	|
2+30	0.1321	0.49	|Q |	|	| V|	|

```
    2+35       0.1329      0.12  Q          |          |          |         V|
    2+40       0.1331      0.03  Q          |          |          |         V|
    2+45       0.1332      0.01  Q          |          |          |         V|
    2+50       0.1332      0.00  Q          |          |          |         V|
    2+55       0.1332      0.00  Q          |          |          |         V|
    3+ 0       0.1332      0.00  Q          |          |          |         V|
    3+ 5       0.1332      0.00  Q          |          |          |         V|
    3+10       0.1332      0.00  Q          |          |          |         V|
    3+15       0.1332      0.00  Q          |          |          |         V|
    3+20       0.1332      0.00  Q          |          |          |         V|
    3+25       0.1332      0.00  Q          |          |          |          V
---------------------------------------------------------------------------
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U n i t H y d r o g r a p h A n a l y s i s

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Study date 07/24/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
2 YEAR 24 HOUR STORM- Post-DWEVELOPED CONDITION

Storm Event Year = 2

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
3.98	1	0.92
Rainfall data for year 2		
3.98	6	0.27
Rainfall data for year 2		
3.98	24	0.13
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++

```
******** Area-averaged max loss rate, Fm ********
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      32.0          3.98      1.000     0.978    0.130    0.127

Area-averaged adjusted loss rate Fm (In/Hr) =  0.127

********* Area-Averaged low loss rate fraction, Yb **********
Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     0.52   0.130         32.0      32.0       2.61     0.000
     3.46   0.870         98.0      98.0       0.20     0.647

Area-averaged catchment yield fraction, Y =  0.563
Area-averaged low loss fraction, Yb =  0.437
User entry of time of concentration  =   0.178 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.142 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 58.5700
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.437 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.192(In)
Computed peak 30-minute rainfall =  0.394(In)
Specified peak 1-hour rainfall =  0.520(In)
Computed peak 3-hour rainfall =  0.520(In)
Specified peak 6-hour rainfall =  0.521(In)
Specified peak 24-hour rainfall =  0.522(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.192(In)
30-minute factor = 1.000    Adjusted rainfall =  0.394(In)
1-hour factor = 1.000       Adjusted rainfall =  0.520(In)
3-hour factor = 1.000       Adjusted rainfall =  0.520(In)
6-hour factor = 1.000       Adjusted rainfall =  0.521(In)
24-hour factor = 1.000      Adjusted rainfall =  0.522(In)
----------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
                (K =        48.13 (CFS))
```

1	6.220	2.994
2	39.874	16.198
3	80.296	19.457
4	94.943	7.050
5	98.536	1.729
6	100.000	0.705

Total soil rain loss = 0.12(In)
Total effective rainfall = 0.40(In)
Peak flow rate in flood hydrograph = 4.43(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

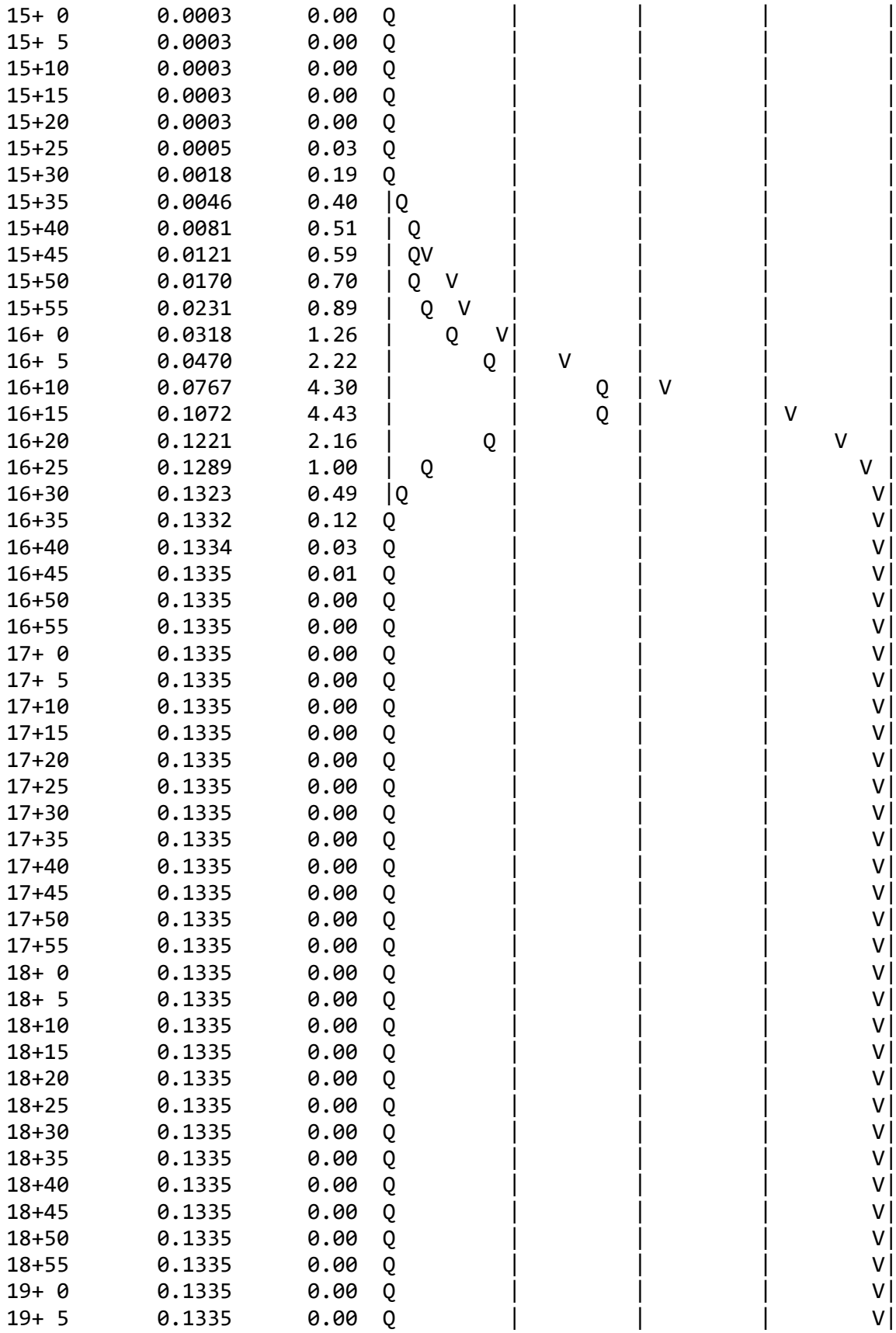
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				

2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+35	0.0000	0.00	Q				
5+40	0.0000	0.00	Q				
5+45	0.0000	0.00	Q				
5+50	0.0000	0.00	Q				
5+55	0.0000	0.00	Q				
6+ 0	0.0000	0.00	Q				
6+ 5	0.0000	0.00	Q				
6+10	0.0000	0.00	Q				
6+15	0.0000	0.00	Q				
6+20	0.0000	0.00	Q				
6+25	0.0000	0.00	Q				
6+30	0.0000	0.00	Q				
6+35	0.0000	0.00	Q				

6+40	0.0000	0.00	Q				
6+45	0.0000	0.00	Q				
6+50	0.0000	0.00	Q				
6+55	0.0000	0.00	Q				
7+ 0	0.0001	0.00	Q				
7+ 5	0.0001	0.00	Q				
7+10	0.0001	0.00	Q				
7+15	0.0001	0.00	Q				
7+20	0.0001	0.00	Q				
7+25	0.0001	0.00	Q				
7+30	0.0001	0.00	Q				
7+35	0.0001	0.00	Q				
7+40	0.0001	0.00	Q				
7+45	0.0001	0.00	Q				
7+50	0.0001	0.00	Q				
7+55	0.0001	0.00	Q				
8+ 0	0.0001	0.00	Q				
8+ 5	0.0001	0.00	Q				
8+10	0.0001	0.00	Q				
8+15	0.0001	0.00	Q				
8+20	0.0001	0.00	Q				
8+25	0.0001	0.00	Q				
8+30	0.0001	0.00	Q				
8+35	0.0001	0.00	Q				
8+40	0.0001	0.00	Q				
8+45	0.0001	0.00	Q				
8+50	0.0001	0.00	Q				
8+55	0.0001	0.00	Q				
9+ 0	0.0001	0.00	Q				
9+ 5	0.0001	0.00	Q				
9+10	0.0001	0.00	Q				
9+15	0.0001	0.00	Q				
9+20	0.0001	0.00	Q				
9+25	0.0001	0.00	Q				
9+30	0.0001	0.00	Q				
9+35	0.0001	0.00	Q				
9+40	0.0001	0.00	Q				
9+45	0.0001	0.00	Q				
9+50	0.0001	0.00	Q				
9+55	0.0001	0.00	Q				
10+ 0	0.0001	0.00	Q				
10+ 5	0.0001	0.00	Q				
10+10	0.0001	0.00	Q				
10+15	0.0001	0.00	Q				
10+20	0.0001	0.00	Q				
10+25	0.0001	0.00	Q				
10+30	0.0001	0.00	Q				
10+35	0.0001	0.00	Q				
10+40	0.0001	0.00	Q				
10+45	0.0001	0.00	Q				

10+50	0.0001	0.00	Q				
10+55	0.0001	0.00	Q				
11+ 0	0.0001	0.00	Q				
11+ 5	0.0001	0.00	Q				
11+10	0.0001	0.00	Q				
11+15	0.0001	0.00	Q				
11+20	0.0001	0.00	Q				
11+25	0.0001	0.00	Q				
11+30	0.0001	0.00	Q				
11+35	0.0001	0.00	Q				
11+40	0.0001	0.00	Q				
11+45	0.0001	0.00	Q				
11+50	0.0001	0.00	Q				
11+55	0.0001	0.00	Q				
12+ 0	0.0001	0.00	Q				
12+ 5	0.0001	0.00	Q				
12+10	0.0001	0.00	Q				
12+15	0.0001	0.00	Q				
12+20	0.0001	0.00	Q				
12+25	0.0001	0.00	Q				
12+30	0.0001	0.00	Q				
12+35	0.0001	0.00	Q				
12+40	0.0001	0.00	Q				
12+45	0.0002	0.00	Q				
12+50	0.0002	0.00	Q				
12+55	0.0002	0.00	Q				
13+ 0	0.0002	0.00	Q				
13+ 5	0.0002	0.00	Q				
13+10	0.0002	0.00	Q				
13+15	0.0002	0.00	Q				
13+20	0.0002	0.00	Q				
13+25	0.0002	0.00	Q				
13+30	0.0002	0.00	Q				
13+35	0.0002	0.00	Q				
13+40	0.0002	0.00	Q				
13+45	0.0002	0.00	Q				
13+50	0.0002	0.00	Q				
13+55	0.0002	0.00	Q				
14+ 0	0.0002	0.00	Q				
14+ 5	0.0002	0.00	Q				
14+10	0.0002	0.00	Q				
14+15	0.0002	0.00	Q				
14+20	0.0002	0.00	Q				
14+25	0.0002	0.00	Q				
14+30	0.0003	0.00	Q				
14+35	0.0003	0.00	Q				
14+40	0.0003	0.00	Q				
14+45	0.0003	0.00	Q				
14+50	0.0003	0.00	Q				
14+55	0.0003	0.00	Q				



19+10	0.1335	0.00	Q	|	|	|	V|
19+15	0.1335	0.00	Q	|	|	|	V|
19+20	0.1335	0.00	Q	|	|	|	V|
19+25	0.1335	0.00	Q	|	|	|	V|
19+30	0.1335	0.00	Q	|	|	|	V|
19+35	0.1335	0.00	Q	|	|	|	V|
19+40	0.1335	0.00	Q	|	|	|	V|
19+45	0.1335	0.00	Q	|	|	|	V|
19+50	0.1335	0.00	Q	|	|	|	V|
19+55	0.1335	0.00	Q	|	|	|	V|
20+ 0	0.1335	0.00	Q	|	|	|	V|
20+ 5	0.1335	0.00	Q	|	|	|	V|
20+10	0.1335	0.00	Q	|	|	|	V|
20+15	0.1335	0.00	Q	|	|	|	V|
20+20	0.1336	0.00	Q	|	|	|	V|
20+25	0.1336	0.00	Q	|	|	|	V|
20+30	0.1336	0.00	Q	|	|	|	V|
20+35	0.1336	0.00	Q	|	|	|	V|
20+40	0.1336	0.00	Q	|	|	|	V|
20+45	0.1336	0.00	Q	|	|	|	V|
20+50	0.1336	0.00	Q	|	|	|	V|
20+55	0.1336	0.00	Q	|	|	|	V|
21+ 0	0.1336	0.00	Q	|	|	|	V|
21+ 5	0.1336	0.00	Q	|	|	|	V|
21+10	0.1336	0.00	Q	|	|	|	V|
21+15	0.1336	0.00	Q	|	|	|	V|
21+20	0.1336	0.00	Q	|	|	|	V|
21+25	0.1336	0.00	Q	|	|	|	V|
21+30	0.1336	0.00	Q	|	|	|	V|
21+35	0.1336	0.00	Q	|	|	|	V|
21+40	0.1336	0.00	Q	|	|	|	V|
21+45	0.1336	0.00	Q	|	|	|	V|
21+50	0.1336	0.00	Q	|	|	|	V|
21+55	0.1336	0.00	Q	|	|	|	V|
22+ 0	0.1336	0.00	Q	|	|	|	V|
22+ 5	0.1336	0.00	Q	|	|	|	V|
22+10	0.1336	0.00	Q	|	|	|	V|
22+15	0.1336	0.00	Q	|	|	|	V|
22+20	0.1336	0.00	Q	|	|	|	V|
22+25	0.1336	0.00	Q	|	|	|	V|
22+30	0.1336	0.00	Q	|	|	|	V|
22+35	0.1336	0.00	Q	|	|	|	V|
22+40	0.1336	0.00	Q	|	|	|	V|
22+45	0.1336	0.00	Q	|	|	|	V|
22+50	0.1336	0.00	Q	|	|	|	V|
22+55	0.1336	0.00	Q	|	|	|	V|
23+ 0	0.1336	0.00	Q	|	|	|	V|
23+ 5	0.1336	0.00	Q	|	|	|	V|
23+10	0.1336	0.00	Q	|	|	|	V|
23+15	0.1336	0.00	Q	|	|	|	V|

```
   23+20       0.1336      0.00  Q          |          |          |         V|
   23+25       0.1336      0.00  Q          |          |          |         V|
   23+30       0.1336      0.00  Q          |          |          |         V|
   23+35       0.1336      0.00  Q          |          |          |         V|
   23+40       0.1336      0.00  Q          |          |          |         V|
   23+45       0.1336      0.00  Q          |          |          |         V|
   23+50       0.1336      0.00  Q          |          |          |         V|
   23+55       0.1336      0.00  Q          |          |          |         V|
   24+ 0       0.1336      0.00  Q          |          |          |         V|
   24+ 5       0.1336      0.00  Q          |          |          |         V|
   24+10       0.1336      0.00  Q          |          |          |         V|
   24+15       0.1336      0.00  Q          |          |          |         V|
   24+20       0.1336      0.00  Q          |          |          |         V|
   24+25       0.1336      0.00  Q          |          |          |          V
-------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 06/28/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
10 YEAR 3 HOUR STORM POST-DEVELOPED

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
3.98	1	0.92
Rainfall data for year 10		
3.98	6	0.41
Rainfall data for year 10		
3.98	24	0.19

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	32.0	3.98	1.000	0.978	0.130	0.127

Area-averaged adjusted loss rate Fm (In/Hr) = 0.127

********* Area-Averaged low loss rate fraction, Yb **********

Area	Area	SCS CN	SCS CN	S	Pervious

```
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
    0.52   0.130         32.0      32.0       4.59     0.000
    3.46   0.870         98.0      98.0       0.20     0.775

Area-averaged catchment yield fraction, Y =  0.674
Area-averaged low loss fraction, Yb =  0.326
User entry of time of concentration  =   0.176 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.141 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.2125
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.326 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.339(In)
Computed peak 30-minute rainfall =  0.693(In)
Specified peak 1-hour rainfall =  0.915(In)
Computed peak 3-hour rainfall =  0.915(In)
Specified peak 6-hour rainfall =  0.916(In)
Specified peak 24-hour rainfall =  0.917(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.339(In)
30-minute factor = 1.000    Adjusted rainfall =  0.693(In)
1-hour factor = 1.000       Adjusted rainfall =  0.915(In)
3-hour factor = 1.000       Adjusted rainfall =  0.915(In)
6-hour factor = 1.000       Adjusted rainfall =  0.916(In)
24-hour factor = 1.000      Adjusted rainfall =  0.917(In)
------------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
------------------------------------------------------------------------
               (K =        48.13 (CFS))

  1                6.354                    3.058
  2               40.669                   16.517
  3               80.945                   19.386
  4               95.214                    6.868
  5               98.595                    1.627
  6              100.000                    0.676
------------------------------------------------------------------------
Total soil rain loss =      0.13(In)
Total effective rainfall =      0.79(In)
```

Peak flow rate in flood hydrograph = 8.16(CFS)

++

3 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0005	0.06	Q				
1+30	0.0033	0.42	VQ				
1+35	0.0093	0.86	V Q				
1+40	0.0170	1.12	V Q				
1+45	0.0261	1.32	V Q				
1+50	0.0370	1.58	VQ				
1+55	0.0504	1.95	Q				
2+ 0	0.0684	2.61	Q				
2+ 5	0.0981	4.32		V Q			
2+10	0.1535	8.04			V	Q	
2+15	0.2097	8.16				Q	
2+20	0.2380	4.12		Q			V
2+25	0.2520	2.02	Q				V
2+30	0.2589	1.01	Q				V
2+35	0.2607	0.26	Q				V
2+40	0.2612	0.06	Q				V
2+45	0.2613	0.02	Q				V
2+50	0.2613	0.00	Q				V
2+55	0.2613	0.00	Q				V
3+ 0	0.2613	0.00	Q				V
3+ 5	0.2613	0.00	Q				V
3+10	0.2613	0.00	Q				V
3+15	0.2613	0.00	Q				V

```
    3+20       0.2613      0.00  Q         |         |         |        V|
    3+25       0.2613      0.00  Q         |         |         |         V
-------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 06/28/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
10 YEAR 24 HOUR STORM POST-DEVELOPED

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
3.98	1	0.92
Rainfall data for year 10		
3.98	6	0.41
Rainfall data for year 10		
3.98	24	0.19

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	32.0	3.98	1.000	0.978	0.130	0.127

Area-averaged adjusted loss rate Fm (In/Hr) = 0.127

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.52	0.130	32.0	32.0	4.59	0.000
3.46	0.870	98.0	98.0	0.20	0.775

Area-averaged catchment yield fraction, Y = 0.674
Area-averaged low loss fraction, Yb = 0.326
User entry of time of concentration = 0.176 (hours)
++
Watershed area = 3.98(Ac.)
Catchment Lag time = 0.141 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 59.2125
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.326 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.339(In)
Computed peak 30-minute rainfall = 0.693(In)
Specified peak 1-hour rainfall = 0.915(In)
Computed peak 3-hour rainfall = 0.915(In)
Specified peak 6-hour rainfall = 0.916(In)
Specified peak 24-hour rainfall = 0.917(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of 3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.339(In)
30-minute factor = 1.000 Adjusted rainfall = 0.693(In)
1-hour factor = 1.000 Adjusted rainfall = 0.915(In)
3-hour factor = 1.000 Adjusted rainfall = 0.915(In)
6-hour factor = 1.000 Adjusted rainfall = 0.916(In)
24-hour factor = 1.000 Adjusted rainfall = 0.917(In)

U n i t H y d r o g r a p h

++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 48.13 (CFS))	
1	6.354	3.058
2	40.669	16.517
3	80.945	19.386
4	95.214	6.868
5	98.595	1.627
6	100.000	0.676

Total soil rain loss = 0.13(In)

Total effective rainfall = 0.79(In)
Peak flow rate in flood hydrograph = 8.16(CFS)

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				

3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+35	0.0000	0.00	Q				
5+40	0.0000	0.00	Q				
5+45	0.0000	0.00	Q				
5+50	0.0000	0.00	Q				
5+55	0.0000	0.00	Q				
6+ 0	0.0000	0.00	Q				
6+ 5	0.0001	0.00	Q				
6+10	0.0001	0.00	Q				
6+15	0.0001	0.00	Q				
6+20	0.0001	0.00	Q				
6+25	0.0001	0.00	Q				
6+30	0.0001	0.00	Q				
6+35	0.0001	0.00	Q				
6+40	0.0001	0.00	Q				
6+45	0.0001	0.00	Q				
6+50	0.0001	0.00	Q				
6+55	0.0001	0.00	Q				
7+ 0	0.0001	0.00	Q				
7+ 5	0.0001	0.00	Q				
7+10	0.0001	0.00	Q				
7+15	0.0001	0.00	Q				
7+20	0.0001	0.00	Q				
7+25	0.0001	0.00	Q				

7+30	0.0001	0.00	Q				
7+35	0.0001	0.00	Q				
7+40	0.0001	0.00	Q				
7+45	0.0001	0.00	Q				
7+50	0.0001	0.00	Q				
7+55	0.0001	0.00	Q				
8+ 0	0.0001	0.00	Q				
8+ 5	0.0001	0.00	Q				
8+10	0.0001	0.00	Q				
8+15	0.0001	0.00	Q				
8+20	0.0001	0.00	Q				
8+25	0.0001	0.00	Q				
8+30	0.0001	0.00	Q				
8+35	0.0001	0.00	Q				
8+40	0.0001	0.00	Q				
8+45	0.0001	0.00	Q				
8+50	0.0001	0.00	Q				
8+55	0.0001	0.00	Q				
9+ 0	0.0001	0.00	Q				
9+ 5	0.0001	0.00	Q				
9+10	0.0001	0.00	Q				
9+15	0.0001	0.00	Q				
9+20	0.0001	0.00	Q				
9+25	0.0001	0.00	Q				
9+30	0.0001	0.00	Q				
9+35	0.0001	0.00	Q				
9+40	0.0001	0.00	Q				
9+45	0.0001	0.00	Q				
9+50	0.0001	0.00	Q				
9+55	0.0001	0.00	Q				
10+ 0	0.0001	0.00	Q				
10+ 5	0.0001	0.00	Q				
10+10	0.0001	0.00	Q				
10+15	0.0001	0.00	Q				
10+20	0.0001	0.00	Q				
10+25	0.0001	0.00	Q				
10+30	0.0001	0.00	Q				
10+35	0.0001	0.00	Q				
10+40	0.0001	0.00	Q				
10+45	0.0001	0.00	Q				
10+50	0.0001	0.00	Q				
10+55	0.0001	0.00	Q				
11+ 0	0.0001	0.00	Q				
11+ 5	0.0001	0.00	Q				
11+10	0.0001	0.00	Q				
11+15	0.0001	0.00	Q				
11+20	0.0001	0.00	Q				
11+25	0.0001	0.00	Q				
11+30	0.0001	0.00	Q				
11+35	0.0001	0.00	Q				

11+40	0.0001	0.00	Q	|	|	|	|
11+45	0.0001	0.00	Q	|	|	|	|
11+50	0.0001	0.00	Q	|	|	|	|
11+55	0.0001	0.00	Q	|	|	|	|
12+ 0	0.0001	0.00	Q	|	|	|	|
12+ 5	0.0001	0.00	Q	|	|	|	|
12+10	0.0002	0.00	Q	|	|	|	|
12+15	0.0002	0.00	Q	|	|	|	|
12+20	0.0002	0.00	Q	|	|	|	|
12+25	0.0002	0.00	Q	|	|	|	|
12+30	0.0002	0.00	Q	|	|	|	|
12+35	0.0002	0.00	Q	|	|	|	|
12+40	0.0002	0.00	Q	|	|	|	|
12+45	0.0002	0.00	Q	|	|	|	|
12+50	0.0002	0.00	Q	|	|	|	|
12+55	0.0002	0.00	Q	|	|	|	|
13+ 0	0.0002	0.00	Q	|	|	|	|
13+ 5	0.0002	0.00	Q	|	|	|	|
13+10	0.0002	0.00	Q	|	|	|	|
13+15	0.0002	0.00	Q	|	|	|	|
13+20	0.0002	0.00	Q	|	|	|	|
13+25	0.0002	0.00	Q	|	|	|	|
13+30	0.0002	0.00	Q	|	|	|	|
13+35	0.0002	0.00	Q	|	|	|	|
13+40	0.0003	0.00	Q	|	|	|	|
13+45	0.0003	0.00	Q	|	|	|	|
13+50	0.0003	0.00	Q	|	|	|	|
13+55	0.0003	0.00	Q	|	|	|	|
14+ 0	0.0003	0.00	Q	|	|	|	|
14+ 5	0.0003	0.00	Q	|	|	|	|
14+10	0.0003	0.00	Q	|	|	|	|
14+15	0.0003	0.00	Q	|	|	|	|
14+20	0.0003	0.00	Q	|	|	|	|
14+25	0.0003	0.00	Q	|	|	|	|
14+30	0.0003	0.00	Q	|	|	|	|
14+35	0.0003	0.00	Q	|	|	|	|
14+40	0.0003	0.00	Q	|	|	|	|
14+45	0.0003	0.00	Q	|	|	|	|
14+50	0.0003	0.00	Q	|	|	|	|
14+55	0.0003	0.00	Q	|	|	|	|
15+ 0	0.0003	0.00	Q	|	|	|	|
15+ 5	0.0003	0.00	Q	|	|	|	|
15+10	0.0003	0.00	Q	|	|	|	|
15+15	0.0003	0.00	Q	|	|	|	|
15+20	0.0003	0.00	Q	|	|	|	|
15+25	0.0008	0.06	Q	|	|	|	|
15+30	0.0036	0.42	VQ	|	|	|	|
15+35	0.0096	0.86	|V Q	|	|	|	|
15+40	0.0173	1.12	| V Q	|	|	|	|
15+45	0.0264	1.32	| VQ	|	|	|	|

```
15+50       0.0372      1.58  |    VQ   |         |         |         |
15+55       0.0507      1.95  |      Q  |         |         |         |
16+ 0       0.0687      2.61  |         Q         |         |         |
16+ 5       0.0984      4.32  |         |    V Q  |         |         |
16+10       0.1538      8.04  |         |         |  V      | Q       |
16+15       0.2099      8.16  |         |         |         | Q       |
16+20       0.2383      4.12  |         |     Q   |         |     V   |
16+25       0.2523      2.02  |        Q|         |         |       V |
16+30       0.2592      1.01  |   Q     |         |         |         V|
16+35       0.2610      0.26  |Q        |         |         |         V|
16+40       0.2615      0.06  Q         |         |         |         V|
16+45       0.2616      0.02  Q         |         |         |         V|
16+50       0.2616      0.00  Q         |         |         |         V|
16+55       0.2616      0.00  Q         |         |         |         V|
17+ 0       0.2616      0.00  Q         |         |         |         V|
17+ 5       0.2616      0.00  Q         |         |         |         V|
17+10       0.2616      0.00  Q         |         |         |         V|
17+15       0.2616      0.00  Q         |         |         |         V|
17+20       0.2616      0.00  Q         |         |         |         V|
17+25       0.2616      0.00  Q         |         |         |         V|
17+30       0.2616      0.00  Q         |         |         |         V|
17+35       0.2616      0.00  Q         |         |         |         V|
17+40       0.2616      0.00  Q         |         |         |         V|
17+45       0.2616      0.00  Q         |         |         |         V|
17+50       0.2616      0.00  Q         |         |         |         V|
17+55       0.2617      0.00  Q         |         |         |         V|
18+ 0       0.2617      0.00  Q         |         |         |         V|
18+ 5       0.2617      0.00  Q         |         |         |         V|
18+10       0.2617      0.00  Q         |         |         |         V|
18+15       0.2617      0.00  Q         |         |         |         V|
18+20       0.2617      0.00  Q         |         |         |         V|
18+25       0.2617      0.00  Q         |         |         |         V|
18+30       0.2617      0.00  Q         |         |         |         V|
18+35       0.2617      0.00  Q         |         |         |         V|
18+40       0.2617      0.00  Q         |         |         |         V|
18+45       0.2617      0.00  Q         |         |         |         V|
18+50       0.2617      0.00  Q         |         |         |         V|
18+55       0.2617      0.00  Q         |         |         |         V|
19+ 0       0.2617      0.00  Q         |         |         |         V|
19+ 5       0.2617      0.00  Q         |         |         |         V|
19+10       0.2617      0.00  Q         |         |         |         V|
19+15       0.2617      0.00  Q         |         |         |         V|
19+20       0.2617      0.00  Q         |         |         |         V|
19+25       0.2617      0.00  Q         |         |         |         V|
19+30       0.2617      0.00  Q         |         |         |         V|
19+35       0.2617      0.00  Q         |         |         |         V|
19+40       0.2617      0.00  Q         |         |         |         V|
19+45       0.2617      0.00  Q         |         |         |         V|
19+50       0.2617      0.00  Q         |         |         |         V|
19+55       0.2617      0.00  Q         |         |         |         V|
```

20+ 0	0.2617	0.00	Q	|	|	|	V|
20+ 5	0.2617	0.00	Q	|	|	|	V|
20+10	0.2617	0.00	Q	|	|	|	V|
20+15	0.2617	0.00	Q	|	|	|	V|
20+20	0.2617	0.00	Q	|	|	|	V|
20+25	0.2617	0.00	Q	|	|	|	V|
20+30	0.2617	0.00	Q	|	|	|	V|
20+35	0.2617	0.00	Q	|	|	|	V|
20+40	0.2617	0.00	Q	|	|	|	V|
20+45	0.2617	0.00	Q	|	|	|	V|
20+50	0.2617	0.00	Q	|	|	|	V|
20+55	0.2617	0.00	Q	|	|	|	V|
21+ 0	0.2617	0.00	Q	|	|	|	V|
21+ 5	0.2617	0.00	Q	|	|	|	V|
21+10	0.2617	0.00	Q	|	|	|	V|
21+15	0.2617	0.00	Q	|	|	|	V|
21+20	0.2617	0.00	Q	|	|	|	V|
21+25	0.2617	0.00	Q	|	|	|	V|
21+30	0.2617	0.00	Q	|	|	|	V|
21+35	0.2617	0.00	Q	|	|	|	V|
21+40	0.2617	0.00	Q	|	|	|	V|
21+45	0.2617	0.00	Q	|	|	|	V|
21+50	0.2617	0.00	Q	|	|	|	V|
21+55	0.2617	0.00	Q	|	|	|	V|
22+ 0	0.2617	0.00	Q	|	|	|	V|
22+ 5	0.2617	0.00	Q	|	|	|	V|
22+10	0.2617	0.00	Q	|	|	|	V|
22+15	0.2617	0.00	Q	|	|	|	V|
22+20	0.2617	0.00	Q	|	|	|	V|
22+25	0.2617	0.00	Q	|	|	|	V|
22+30	0.2617	0.00	Q	|	|	|	V|
22+35	0.2617	0.00	Q	|	|	|	V|
22+40	0.2617	0.00	Q	|	|	|	V|
22+45	0.2617	0.00	Q	|	|	|	V|
22+50	0.2617	0.00	Q	|	|	|	V|
22+55	0.2617	0.00	Q	|	|	|	V|
23+ 0	0.2617	0.00	Q	|	|	|	V|
23+ 5	0.2617	0.00	Q	|	|	|	V|
23+10	0.2617	0.00	Q	|	|	|	V|
23+15	0.2617	0.00	Q	|	|	|	V|
23+20	0.2617	0.00	Q	|	|	|	V|
23+25	0.2617	0.00	Q	|	|	|	V|
23+30	0.2617	0.00	Q	|	|	|	V|
23+35	0.2617	0.00	Q	|	|	|	V|
23+40	0.2617	0.00	Q	|	|	|	V|
23+45	0.2617	0.00	Q	|	|	|	V|
23+50	0.2617	0.00	Q	|	|	|	V|
23+55	0.2617	0.00	Q	|	|	|	V|
24+ 0	0.2617	0.00	Q	|	|	|	V|
24+ 5	0.2617	0.00	Q	|	|	|	V|

```
   24+10       0.2617      0.00  Q         |         |         |        V|
   24+15       0.2617      0.00  Q         |         |         |        V|
   24+20       0.2617      0.00  Q         |         |         |        V|
   24+25       0.2617      0.00  Q         |         |         |        V|
-------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 07/24/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
25 YEAR 3 HOUR STORM POST-DEVELOPED

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
3.98	1	0.92
Rainfall data for year 2		
3.98	6	0.27
Rainfall data for year 2		
3.98	24	0.13
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++
******** Area-averaged max loss rate, Fm ********

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      32.0          3.98      1.000     0.978    0.130    0.127

Area-averaged adjusted loss rate Fm (In/Hr) =  0.127

********* Area-Averaged low loss rate fraction, Yb **********
Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     0.52   0.130         32.0      32.0       5.71     0.000
     3.46   0.870         98.0      98.0       0.20     0.813

Area-averaged catchment yield fraction, Y =  0.708
Area-averaged low loss fraction, Yb =  0.292
User entry of time of concentration  =   0.175 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.140 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.4219
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.292 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.422(In)
Computed peak 30-minute rainfall =  0.864(In)
Specified peak 1-hour rainfall =  1.140(In)
Computed peak 3-hour rainfall =  1.140(In)
Specified peak 6-hour rainfall =  1.141(In)
Specified peak 24-hour rainfall =  1.142(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.422(In)
30-minute factor = 1.000    Adjusted rainfall =  0.864(In)
1-hour factor = 1.000       Adjusted rainfall =  1.140(In)
3-hour factor = 1.000       Adjusted rainfall =  1.140(In)
6-hour factor = 1.000       Adjusted rainfall =  1.141(In)
24-hour factor = 1.000      Adjusted rainfall =  1.142(In)
----------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
               (K =        48.13 (CFS))
```

1	6.397	3.079
2	40.927	16.620
3	81.152	19.361
4	95.299	6.810
5	98.613	1.595
6	100.000	0.668

Total soil rain loss = 0.13(In)
Total effective rainfall = 1.01(In)
Peak flow rate in flood hydrograph = 10.27(CFS)

++

3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 5.0 10.0 15.0 20.0
0+ 5	0.0000	0.00	Q | | | |
0+10	0.0000	0.00	Q | | | |
0+15	0.0000	0.00	Q | | | |
0+20	0.0000	0.00	Q | | | |
0+25	0.0000	0.00	Q | | | |
0+30	0.0000	0.00	Q | | | |
0+35	0.0000	0.00	Q | | | |
0+40	0.0000	0.00	Q | | | |
0+45	0.0000	0.00	Q | | | |
0+50	0.0000	0.00	Q | | | |
0+55	0.0000	0.00	Q | | | |
1+ 0	0.0000	0.00	Q | | | |
1+ 5	0.0000	0.00	Q | | | |
1+10	0.0000	0.00	Q | | | |
1+15	0.0000	0.00	Q | | | |
1+20	0.0000	0.00	Q | | | |
1+25	0.0006	0.09	Q | | | |
1+30	0.0045	0.57	VQ | | | |
1+35	0.0126	1.17	|VQ | | | |
1+40	0.0230	1.51	| VQ | | | |
1+45	0.0352	1.77	| QV | | | |
1+50	0.0496	2.10	| QV | | | |
1+55	0.0672	2.55	| Q V | | | |
2+ 0	0.0905	3.39	| Q V | | |
2+ 5	0.1285	5.52	| |Q V | | |
2+10	0.1986	10.17	| | | Q V | |
2+15	0.2693	10.27	| | | Q | V |
2+20	0.3054	5.24	| | Q | | V |
2+25	0.3234	2.62	| Q | | | V |
2+30	0.3326	1.33	| Q | | | V|
2+35	0.3350	0.34	Q | | | V|

2+40	0.3355	0.08	Q	|	|	|	V|
2+45	0.3357	0.02	Q	|	|	|	V|
2+50	0.3357	0.00	Q	|	|	|	V|
2+55	0.3357	0.00	Q	|	|	|	V|
3+ 0	0.3357	0.00	Q	|	|	|	V|
3+ 5	0.3357	0.00	Q	|	|	|	V|
3+10	0.3357	0.00	Q	|	|	|	V|
3+15	0.3357	0.00	Q	|	|	|	V|
3+20	0.3357	0.00	Q	|	|	|	V|
3+25	0.3357	0.00	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

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Study date 07/24/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
25 YEAR 24 HOUR STORM POST-DEVELOPED

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
3.98	1	0.92
Rainfall data for year 2		
3.98	6	0.27
Rainfall data for year 2		
3.98	24	0.13
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++

```
******** Area-averaged max loss rate, Fm ********

SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      32.0          3.98      1.000     0.978    0.130    0.127

Area-averaged adjusted loss rate Fm (In/Hr) =  0.127

********* Area-Averaged low loss rate fraction, Yb **********
Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     0.52   0.130         32.0      32.0       5.71     0.000
     3.46   0.870         98.0      98.0       0.20     0.813

Area-averaged catchment yield fraction, Y =  0.708
Area-averaged low loss fraction, Yb =  0.292
User entry of time of concentration  =   0.175 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.140 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.4219
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.127(In/Hr)
Average low loss rate fraction (Yb) = 0.292 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.422(In)
Computed peak 30-minute rainfall =  0.864(In)
Specified peak 1-hour rainfall =  1.140(In)
Computed peak 3-hour rainfall =  1.140(In)
Specified peak 6-hour rainfall =  1.141(In)
Specified peak 24-hour rainfall =  1.142(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.422(In)
30-minute factor = 1.000    Adjusted rainfall =  0.864(In)
1-hour factor = 1.000       Adjusted rainfall =  1.140(In)
3-hour factor = 1.000       Adjusted rainfall =  1.140(In)
6-hour factor = 1.000       Adjusted rainfall =  1.141(In)
24-hour factor = 1.000      Adjusted rainfall =  1.142(In)
----------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
                (K =        48.13 (CFS))
```

1	6.397	3.079
2	40.927	16.620
3	81.152	19.361
4	95.299	6.810
5	98.613	1.595
6	100.000	0.668

Total soil rain loss = 0.13(In)
Total effective rainfall = 1.01(In)
Peak flow rate in flood hydrograph = 10.27(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

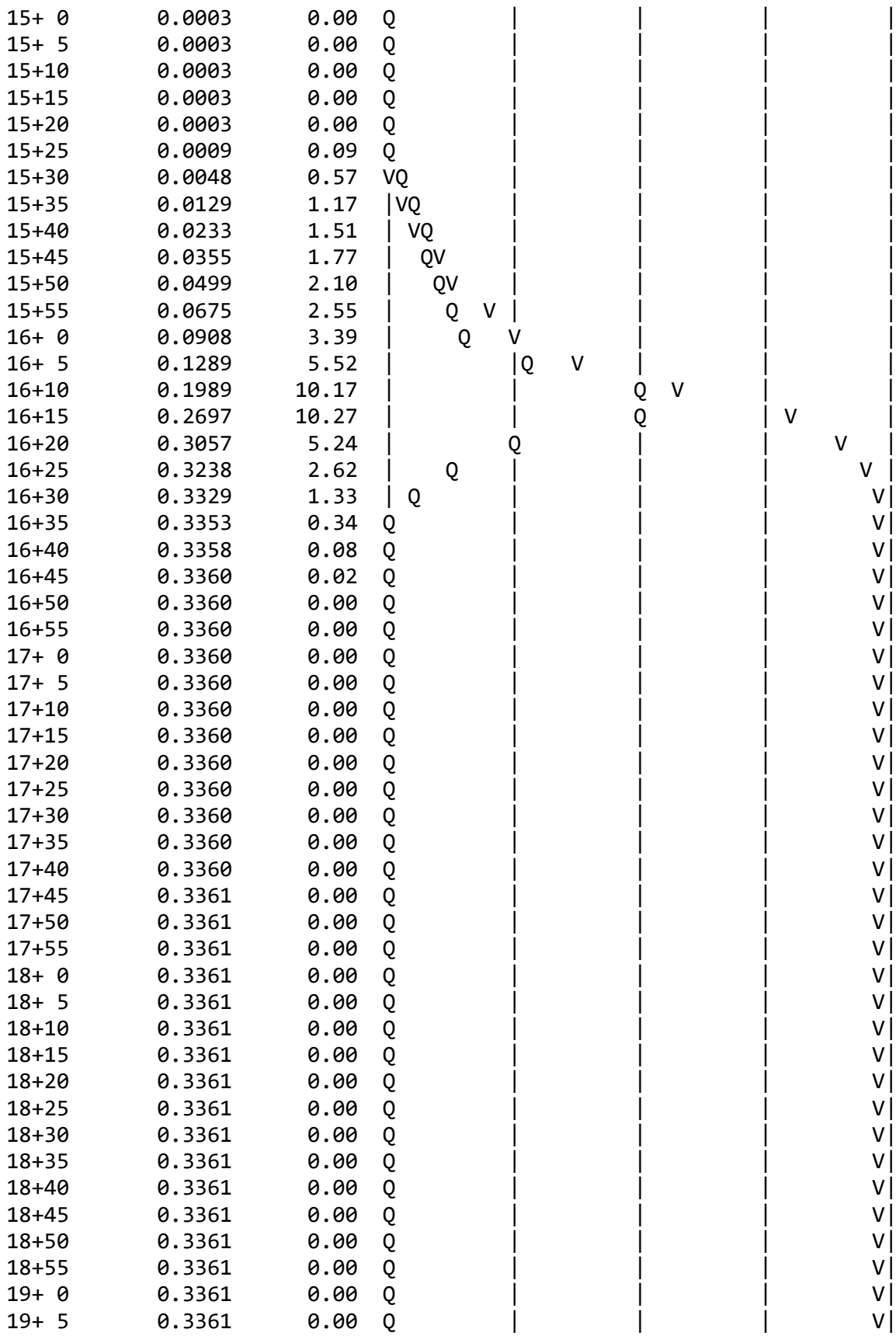
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				

2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+35	0.0000	0.00	Q				
5+40	0.0000	0.00	Q				
5+45	0.0000	0.00	Q				
5+50	0.0000	0.00	Q				
5+55	0.0001	0.00	Q				
6+ 0	0.0001	0.00	Q				
6+ 5	0.0001	0.00	Q				
6+10	0.0001	0.00	Q				
6+15	0.0001	0.00	Q				
6+20	0.0001	0.00	Q				
6+25	0.0001	0.00	Q				
6+30	0.0001	0.00	Q				
6+35	0.0001	0.00	Q				

6+40	0.0001	0.00	Q				
6+45	0.0001	0.00	Q				
6+50	0.0001	0.00	Q				
6+55	0.0001	0.00	Q				
7+ 0	0.0001	0.00	Q				
7+ 5	0.0001	0.00	Q				
7+10	0.0001	0.00	Q				
7+15	0.0001	0.00	Q				
7+20	0.0001	0.00	Q				
7+25	0.0001	0.00	Q				
7+30	0.0001	0.00	Q				
7+35	0.0001	0.00	Q				
7+40	0.0001	0.00	Q				
7+45	0.0001	0.00	Q				
7+50	0.0001	0.00	Q				
7+55	0.0001	0.00	Q				
8+ 0	0.0001	0.00	Q				
8+ 5	0.0001	0.00	Q				
8+10	0.0001	0.00	Q				
8+15	0.0001	0.00	Q				
8+20	0.0001	0.00	Q				
8+25	0.0001	0.00	Q				
8+30	0.0001	0.00	Q				
8+35	0.0001	0.00	Q				
8+40	0.0001	0.00	Q				
8+45	0.0001	0.00	Q				
8+50	0.0001	0.00	Q				
8+55	0.0001	0.00	Q				
9+ 0	0.0001	0.00	Q				
9+ 5	0.0001	0.00	Q				
9+10	0.0001	0.00	Q				
9+15	0.0001	0.00	Q				
9+20	0.0001	0.00	Q				
9+25	0.0001	0.00	Q				
9+30	0.0001	0.00	Q				
9+35	0.0001	0.00	Q				
9+40	0.0001	0.00	Q				
9+45	0.0001	0.00	Q				
9+50	0.0001	0.00	Q				
9+55	0.0001	0.00	Q				
10+ 0	0.0001	0.00	Q				
10+ 5	0.0001	0.00	Q				
10+10	0.0001	0.00	Q				
10+15	0.0001	0.00	Q				
10+20	0.0001	0.00	Q				
10+25	0.0001	0.00	Q				
10+30	0.0001	0.00	Q				
10+35	0.0001	0.00	Q				
10+40	0.0001	0.00	Q				
10+45	0.0001	0.00	Q				

10+50	0.0001	0.00	Q				
10+55	0.0001	0.00	Q				
11+ 0	0.0001	0.00	Q				
11+ 5	0.0001	0.00	Q				
11+10	0.0001	0.00	Q				
11+15	0.0001	0.00	Q				
11+20	0.0001	0.00	Q				
11+25	0.0001	0.00	Q				
11+30	0.0001	0.00	Q				
11+35	0.0001	0.00	Q				
11+40	0.0001	0.00	Q				
11+45	0.0001	0.00	Q				
11+50	0.0001	0.00	Q				
11+55	0.0002	0.00	Q				
12+ 0	0.0002	0.00	Q				
12+ 5	0.0002	0.00	Q				
12+10	0.0002	0.00	Q				
12+15	0.0002	0.00	Q				
12+20	0.0002	0.00	Q				
12+25	0.0002	0.00	Q				
12+30	0.0002	0.00	Q				
12+35	0.0002	0.00	Q				
12+40	0.0002	0.00	Q				
12+45	0.0002	0.00	Q				
12+50	0.0002	0.00	Q				
12+55	0.0002	0.00	Q				
13+ 0	0.0002	0.00	Q				
13+ 5	0.0002	0.00	Q				
13+10	0.0002	0.00	Q				
13+15	0.0002	0.00	Q				
13+20	0.0002	0.00	Q				
13+25	0.0002	0.00	Q				
13+30	0.0003	0.00	Q				
13+35	0.0003	0.00	Q				
13+40	0.0003	0.00	Q				
13+45	0.0003	0.00	Q				
13+50	0.0003	0.00	Q				
13+55	0.0003	0.00	Q				
14+ 0	0.0003	0.00	Q				
14+ 5	0.0003	0.00	Q				
14+10	0.0003	0.00	Q				
14+15	0.0003	0.00	Q				
14+20	0.0003	0.00	Q				
14+25	0.0003	0.00	Q				
14+30	0.0003	0.00	Q				
14+35	0.0003	0.00	Q				
14+40	0.0003	0.00	Q				
14+45	0.0003	0.00	Q				
14+50	0.0003	0.00	Q				
14+55	0.0003	0.00	Q				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15+ 5 0.0003 0.00
15+10 0.0003 0.00
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15+20 0.0003 0.00
15+25 0.0009 0.09
15+30 0.0048 0.57
15+35 0.0129 1.17
15+40 0.0233 1.51
15+45 0.0355 1.77
15+50 0.0499 2.10
15+55 0.0675 2.55
16+ 0 0.0908 3.39
16+ 5 0.1289 5.52
16+10 0.1989 10.17
16+15 0.2697 10.27
16+20 0.3057 5.24
16+25 0.3238 2.62
16+30 0.3329 1.33
16+35 0.3353 0.34
16+40 0.3358 0.08
16+45 0.3360 0.02
16+50 0.3360 0.00
16+55 0.3360 0.00
17+ 0 0.3360 0.00
17+ 5 0.3360 0.00
17+10 0.3360 0.00
17+15 0.3360 0.00
17+20 0.3360 0.00
17+25 0.3360 0.00
17+30 0.3360 0.00
17+35 0.3360 0.00
17+40 0.3360 0.00
17+45 0.3361 0.00
17+50 0.3361 0.00
17+55 0.3361 0.00
18+ 0 0.3361 0.00
18+ 5 0.3361 0.00
18+10 0.3361 0.00
18+15 0.3361 0.00
18+20 0.3361 0.00
18+25 0.3361 0.00
18+30 0.3361 0.00
18+35 0.3361 0.00
18+40 0.3361 0.00
18+45 0.3361 0.00
18+50 0.3361 0.00
18+55 0.3361 0.00
19+ 0 0.3361 0.00
19+ 5 0.3361 0.00

19+10	0.3361	0.00	Q	|	|	|	V|
19+15	0.3361	0.00	Q	|	|	|	V|
19+20	0.3361	0.00	Q	|	|	|	V|
19+25	0.3361	0.00	Q	|	|	|	V|
19+30	0.3361	0.00	Q	|	|	|	V|
19+35	0.3361	0.00	Q	|	|	|	V|
19+40	0.3361	0.00	Q	|	|	|	V|
19+45	0.3361	0.00	Q	|	|	|	V|
19+50	0.3361	0.00	Q	|	|	|	V|
19+55	0.3361	0.00	Q	|	|	|	V|
20+ 0	0.3361	0.00	Q	|	|	|	V|
20+ 5	0.3361	0.00	Q	|	|	|	V|
20+10	0.3361	0.00	Q	|	|	|	V|
20+15	0.3361	0.00	Q	|	|	|	V|
20+20	0.3361	0.00	Q	|	|	|	V|
20+25	0.3361	0.00	Q	|	|	|	V|
20+30	0.3361	0.00	Q	|	|	|	V|
20+35	0.3361	0.00	Q	|	|	|	V|
20+40	0.3361	0.00	Q	|	|	|	V|
20+45	0.3361	0.00	Q	|	|	|	V|
20+50	0.3361	0.00	Q	|	|	|	V|
20+55	0.3361	0.00	Q	|	|	|	V|
21+ 0	0.3361	0.00	Q	|	|	|	V|
21+ 5	0.3361	0.00	Q	|	|	|	V|
21+10	0.3361	0.00	Q	|	|	|	V|
21+15	0.3361	0.00	Q	|	|	|	V|
21+20	0.3361	0.00	Q	|	|	|	V|
21+25	0.3361	0.00	Q	|	|	|	V|
21+30	0.3361	0.00	Q	|	|	|	V|
21+35	0.3361	0.00	Q	|	|	|	V|
21+40	0.3361	0.00	Q	|	|	|	V|
21+45	0.3361	0.00	Q	|	|	|	V|
21+50	0.3361	0.00	Q	|	|	|	V|
21+55	0.3361	0.00	Q	|	|	|	V|
22+ 0	0.3361	0.00	Q	|	|	|	V|
22+ 5	0.3361	0.00	Q	|	|	|	V|
22+10	0.3361	0.00	Q	|	|	|	V|
22+15	0.3361	0.00	Q	|	|	|	V|
22+20	0.3361	0.00	Q	|	|	|	V|
22+25	0.3361	0.00	Q	|	|	|	V|
22+30	0.3361	0.00	Q	|	|	|	V|
22+35	0.3361	0.00	Q	|	|	|	V|
22+40	0.3361	0.00	Q	|	|	|	V|
22+45	0.3361	0.00	Q	|	|	|	V|
22+50	0.3361	0.00	Q	|	|	|	V|
22+55	0.3362	0.00	Q	|	|	|	V|
23+ 0	0.3362	0.00	Q	|	|	|	V|
23+ 5	0.3362	0.00	Q	|	|	|	V|
23+10	0.3362	0.00	Q	|	|	|	V|
23+15	0.3362	0.00	Q	|	|	|	V|

23+20	0.3362	0.00	Q	|	|	|	V|
23+25	0.3362	0.00	Q	|	|	|	V|
23+30	0.3362	0.00	Q	|	|	|	V|
23+35	0.3362	0.00	Q	|	|	|	V|
23+40	0.3362	0.00	Q	|	|	|	V|
23+45	0.3362	0.00	Q	|	|	|	V|
23+50	0.3362	0.00	Q	|	|	|	V|
23+55	0.3362	0.00	Q	|	|	|	V|
24+ 0	0.3362	0.00	Q	|	|	|	V|
24+ 5	0.3362	0.00	Q	|	|	|	V|
24+10	0.3362	0.00	Q	|	|	|	V|
24+15	0.3362	0.00	Q	|	|	|	V|
24+20	0.3362	0.00	Q	|	|	|	V|
24+25	0.3362	0.00	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

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Study date 06/28/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
100 YEAR 3 HOUR STORM POST-DEVELOPED

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	3.98	1.000	0.785	0.130	0.102

Area-averaged adjusted loss rate Fm (In/Hr) = 0.102

********* Area-Averaged low loss rate fraction, Yb **********

Area	Area	SCS CN	SCS CN	S	Pervious

```
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
    0.52   0.130         32.0      52.0       7.41     0.000
    3.46   0.870         98.0      98.0       0.20     0.852

Area-averaged catchment yield fraction, Y =  0.741
Area-averaged low loss fraction, Yb =  0.259
User entry of time of concentration  =   0.175 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.140 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.6329
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.102(In/Hr)
Average low loss rate fraction (Yb) = 0.259 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.548(In)
Computed peak 30-minute rainfall =  1.122(In)
Specified peak 1-hour rainfall =  1.480(In)
Computed peak 3-hour rainfall =  1.480(In)
Specified peak 6-hour rainfall =  1.481(In)
Specified peak 24-hour rainfall =  1.482(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.548(In)
30-minute factor = 1.000    Adjusted rainfall =  1.121(In)
1-hour factor = 1.000       Adjusted rainfall =  1.480(In)
3-hour factor = 1.000       Adjusted rainfall =  1.480(In)
6-hour factor = 1.000       Adjusted rainfall =  1.481(In)
24-hour factor = 1.000      Adjusted rainfall =  1.482(In)
------------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
------------------------------------------------------------------------
               (K =        48.13 (CFS))

  1                6.442                   3.101
  2               41.188                  16.724
  3               81.358                  19.335
  4               95.384                   6.751
  5               98.630                   1.562
  6              100.000                   0.659
------------------------------------------------------------------------
Total soil rain loss =      0.10(In)
Total effective rainfall =      1.38(In)
```

Peak flow rate in flood hydrograph = 13.57(CFS)

3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 5.0 10.0 15.0 20.0
0+ 5	0.0000	0.00	Q
0+10	0.0000	0.00	Q
0+15	0.0000	0.00	Q
0+20	0.0000	0.00	Q
0+25	0.0000	0.00	Q
0+30	0.0000	0.00	Q
0+35	0.0000	0.00	Q
0+40	0.0000	0.00	Q
0+45	0.0000	0.00	Q
0+50	0.0000	0.00	Q
0+55	0.0000	0.00	Q
1+ 0	0.0000	0.00	Q
1+ 5	0.0000	0.00	Q
1+10	0.0000	0.00	Q
1+15	0.0000	0.00	Q
1+20	0.0000	0.00	Q
1+25	0.0009	0.13	Q
1+30	0.0067	0.84	VQ
1+35	0.0186	1.73	V Q
1+40	0.0338	2.20	V Q
1+45	0.0514	2.55	VQ
1+50	0.0719	2.98	QV
1+55	0.0965	3.57	QV
2+ 0	0.1285	4.66	Q V
2+ 5	0.1798	7.44	QV
2+10	0.2728	13.50	V Q
2+15	0.3663	13.57	Q V
2+20	0.4146	7.02	Q V
2+25	0.4395	3.62	Q V
2+30	0.4524	1.86	Q V
2+35	0.4557	0.49	Q V
2+40	0.4565	0.12	Q V
2+45	0.4567	0.03	Q V
2+50	0.4567	0.00	Q V
2+55	0.4567	0.00	Q V
3+ 0	0.4567	0.00	Q V
3+ 5	0.4567	0.00	Q V
3+10	0.4567	0.00	Q V
3+15	0.4567	0.00	Q V
3+20	0.4567	0.00	Q V

```
    3+25       0.4567      0.00  Q         |         |         |         V
-------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 06/28/24

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5016

JN 4113 UNIT HYDROGRAPH
100 YEAR 24 HOUR STORM POST-DEVELOPED

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
3.98	1	1.48
Rainfall data for year 100		
3.98	6	0.62
Rainfall data for year 100		
3.98	24	0.29

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	3.98	1.000	0.785	0.130	0.102

Area-averaged adjusted loss rate Fm (In/Hr) = 0.102

********* Area-Averaged low loss rate fraction, Yb **********

Area	Area	SCS CN	SCS CN	S	Pervious

```
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
    0.52   0.130         32.0      52.0       7.41     0.000
    3.46   0.870         98.0      98.0       0.20     0.852

Area-averaged catchment yield fraction, Y =  0.741
Area-averaged low loss fraction, Yb =  0.259
User entry of time of concentration  =   0.175 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.98(Ac.)
Catchment Lag time =   0.140 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.6329
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.102(In/Hr)
Average low loss rate fraction (Yb) = 0.259 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.548(In)
Computed peak 30-minute rainfall =  1.122(In)
Specified peak 1-hour rainfall =  1.480(In)
Computed peak 3-hour rainfall =  1.480(In)
Specified peak 6-hour rainfall =  1.481(In)
Specified peak 24-hour rainfall =  1.482(In)

Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       3.98(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.548(In)
30-minute factor = 1.000    Adjusted rainfall =  1.121(In)
1-hour factor = 1.000       Adjusted rainfall =  1.480(In)
3-hour factor = 1.000       Adjusted rainfall =  1.480(In)
6-hour factor = 1.000       Adjusted rainfall =  1.481(In)
24-hour factor = 1.000      Adjusted rainfall =  1.482(In)
------------------------------------------------------------------------
                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
------------------------------------------------------------------------
               (K =        48.13 (CFS))

  1                6.442                   3.101
  2               41.188                  16.724
  3               81.358                  19.335
  4               95.384                   6.751
  5               98.630                   1.562
  6              100.000                   0.659
------------------------------------------------------------------------
Total soil rain loss =      0.10(In)
Total effective rainfall =      1.38(In)
```

Peak flow rate in flood hydrograph = 13.57(CFS)

++

24 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				

3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				
5+30	0.0000	0.00	Q				
5+35	0.0000	0.00	Q				
5+40	0.0001	0.00	Q				
5+45	0.0001	0.00	Q				
5+50	0.0001	0.00	Q				
5+55	0.0001	0.00	Q				
6+ 0	0.0001	0.00	Q				
6+ 5	0.0001	0.00	Q				
6+10	0.0001	0.00	Q				
6+15	0.0001	0.00	Q				
6+20	0.0001	0.00	Q				
6+25	0.0001	0.00	Q				
6+30	0.0001	0.00	Q				
6+35	0.0001	0.00	Q				
6+40	0.0001	0.00	Q				
6+45	0.0001	0.00	Q				
6+50	0.0001	0.00	Q				
6+55	0.0001	0.00	Q				
7+ 0	0.0001	0.00	Q				
7+ 5	0.0001	0.00	Q				
7+10	0.0001	0.00	Q				
7+15	0.0001	0.00	Q				
7+20	0.0001	0.00	Q				
7+25	0.0001	0.00	Q				
7+30	0.0001	0.00	Q				

7+35	0.0001	0.00	Q				
7+40	0.0001	0.00	Q				
7+45	0.0001	0.00	Q				
7+50	0.0001	0.00	Q				
7+55	0.0001	0.00	Q				
8+ 0	0.0001	0.00	Q				
8+ 5	0.0001	0.00	Q				
8+10	0.0001	0.00	Q				
8+15	0.0001	0.00	Q				
8+20	0.0001	0.00	Q				
8+25	0.0001	0.00	Q				
8+30	0.0001	0.00	Q				
8+35	0.0001	0.00	Q				
8+40	0.0001	0.00	Q				
8+45	0.0001	0.00	Q				
8+50	0.0001	0.00	Q				
8+55	0.0001	0.00	Q				
9+ 0	0.0001	0.00	Q				
9+ 5	0.0001	0.00	Q				
9+10	0.0001	0.00	Q				
9+15	0.0001	0.00	Q				
9+20	0.0001	0.00	Q				
9+25	0.0001	0.00	Q				
9+30	0.0001	0.00	Q				
9+35	0.0001	0.00	Q				
9+40	0.0001	0.00	Q				
9+45	0.0001	0.00	Q				
9+50	0.0001	0.00	Q				
9+55	0.0001	0.00	Q				
10+ 0	0.0001	0.00	Q				
10+ 5	0.0001	0.00	Q				
10+10	0.0001	0.00	Q				
10+15	0.0001	0.00	Q				
10+20	0.0001	0.00	Q				
10+25	0.0001	0.00	Q				
10+30	0.0001	0.00	Q				
10+35	0.0001	0.00	Q				
10+40	0.0001	0.00	Q				
10+45	0.0001	0.00	Q				
10+50	0.0001	0.00	Q				
10+55	0.0001	0.00	Q				
11+ 0	0.0001	0.00	Q				
11+ 5	0.0001	0.00	Q				
11+10	0.0001	0.00	Q				
11+15	0.0001	0.00	Q				
11+20	0.0001	0.00	Q				
11+25	0.0001	0.00	Q				
11+30	0.0001	0.00	Q				
11+35	0.0001	0.00	Q				
11+40	0.0002	0.00	Q				

11+45	0.0002	0.00	Q	|	|	|	|
11+50	0.0002	0.00	Q	|	|	|	|
11+55	0.0002	0.00	Q	|	|	|	|
12+ 0	0.0002	0.00	Q	|	|	|	|
12+ 5	0.0002	0.00	Q	|	|	|	|
12+10	0.0002	0.00	Q	|	|	|	|
12+15	0.0002	0.00	Q	|	|	|	|
12+20	0.0002	0.00	Q	|	|	|	|
12+25	0.0002	0.00	Q	|	|	|	|
12+30	0.0002	0.00	Q	|	|	|	|
12+35	0.0002	0.00	Q	|	|	|	|
12+40	0.0002	0.00	Q	|	|	|	|
12+45	0.0002	0.00	Q	|	|	|	|
12+50	0.0002	0.00	Q	|	|	|	|
12+55	0.0002	0.00	Q	|	|	|	|
13+ 0	0.0002	0.00	Q	|	|	|	|
13+ 5	0.0002	0.00	Q	|	|	|	|
13+10	0.0002	0.00	Q	|	|	|	|
13+15	0.0002	0.00	Q	|	|	|	|
13+20	0.0002	0.00	Q	|	|	|	|
13+25	0.0003	0.00	Q	|	|	|	|
13+30	0.0003	0.00	Q	|	|	|	|
13+35	0.0003	0.00	Q	|	|	|	|
13+40	0.0003	0.00	Q	|	|	|	|
13+45	0.0003	0.00	Q	|	|	|	|
13+50	0.0003	0.00	Q	|	|	|	|
13+55	0.0003	0.00	Q	|	|	|	|
14+ 0	0.0003	0.00	Q	|	|	|	|
14+ 5	0.0003	0.00	Q	|	|	|	|
14+10	0.0003	0.00	Q	|	|	|	|
14+15	0.0003	0.00	Q	|	|	|	|
14+20	0.0003	0.00	Q	|	|	|	|
14+25	0.0003	0.00	Q	|	|	|	|
14+30	0.0003	0.00	Q	|	|	|	|
14+35	0.0003	0.00	Q	|	|	|	|
14+40	0.0003	0.00	Q	|	|	|	|
14+45	0.0003	0.00	Q	|	|	|	|
14+50	0.0003	0.00	Q	|	|	|	|
14+55	0.0003	0.00	Q	|	|	|	|
15+ 0	0.0003	0.00	Q	|	|	|	|
15+ 5	0.0004	0.00	Q	|	|	|	|
15+10	0.0004	0.00	Q	|	|	|	|
15+15	0.0004	0.00	Q	|	|	|	|
15+20	0.0004	0.00	Q	|	|	|	|
15+25	0.0013	0.13	Q	|	|	|	|
15+30	0.0071	0.84	VQ	|	|	|	|
15+35	0.0190	1.73	|V Q	|	|	|	|
15+40	0.0341	2.20	| V Q	|	|	|	|
15+45	0.0517	2.55	| VQ	|	|	|	|
15+50	0.0722	2.98	| QV	|	|	|	|

```
15+55       0.0968      3.57  |      QV |         |         |          |
16+ 0       0.1289      4.66  |        Q|V        |         |          |
16+ 5       0.1801      7.44  |         |   QV    |         |          |
16+10       0.2731     13.50  |         |         |  V   Q  |          |
16+15       0.3666     13.57  |         |         |      Q  | V        |
16+20       0.4150      7.02  |         |   Q     |         |     V    |
16+25       0.4399      3.62  |      Q  |         |         |       V  |
16+30       0.4527      1.86  |  Q      |         |         |        V |
16+35       0.4560      0.49  Q         |         |         |        V |
16+40       0.4568      0.12  Q         |         |         |        V |
16+45       0.4571      0.03  Q         |         |         |        V |
16+50       0.4571      0.00  Q         |         |         |        V |
16+55       0.4571      0.00  Q         |         |         |        V |
17+ 0       0.4571      0.00  Q         |         |         |        V |
17+ 5       0.4571      0.00  Q         |         |         |        V |
17+10       0.4571      0.00  Q         |         |         |        V |
17+15       0.4571      0.00  Q         |         |         |        V |
17+20       0.4571      0.00  Q         |         |         |        V |
17+25       0.4571      0.00  Q         |         |         |        V |
17+30       0.4571      0.00  Q         |         |         |        V |
17+35       0.4571      0.00  Q         |         |         |        V |
17+40       0.4571      0.00  Q         |         |         |        V |
17+45       0.4571      0.00  Q         |         |         |        V |
17+50       0.4571      0.00  Q         |         |         |        V |
17+55       0.4571      0.00  Q         |         |         |        V |
18+ 0       0.4572      0.00  Q         |         |         |        V |
18+ 5       0.4572      0.00  Q         |         |         |        V |
18+10       0.4572      0.00  Q         |         |         |        V |
18+15       0.4572      0.00  Q         |         |         |        V |
18+20       0.4572      0.00  Q         |         |         |        V |
18+25       0.4572      0.00  Q         |         |         |        V |
18+30       0.4572      0.00  Q         |         |         |        V |
18+35       0.4572      0.00  Q         |         |         |        V |
18+40       0.4572      0.00  Q         |         |         |        V |
18+45       0.4572      0.00  Q         |         |         |        V |
18+50       0.4572      0.00  Q         |         |         |        V |
18+55       0.4572      0.00  Q         |         |         |        V |
19+ 0       0.4572      0.00  Q         |         |         |        V |
19+ 5       0.4572      0.00  Q         |         |         |        V |
19+10       0.4572      0.00  Q         |         |         |        V |
19+15       0.4572      0.00  Q         |         |         |        V |
19+20       0.4572      0.00  Q         |         |         |        V |
19+25       0.4572      0.00  Q         |         |         |        V |
19+30       0.4572      0.00  Q         |         |         |        V |
19+35       0.4572      0.00  Q         |         |         |        V |
19+40       0.4572      0.00  Q         |         |         |        V |
19+45       0.4572      0.00  Q         |         |         |        V |
19+50       0.4572      0.00  Q         |         |         |        V |
19+55       0.4572      0.00  Q         |         |         |        V |
20+ 0       0.4572      0.00  Q         |         |         |        V |
```

20+ 5	0.4572	0.00	Q	|	|	|	V|
20+10	0.4572	0.00	Q	|	|	|	V|
20+15	0.4572	0.00	Q	|	|	|	V|
20+20	0.4572	0.00	Q	|	|	|	V|
20+25	0.4572	0.00	Q	|	|	|	V|
20+30	0.4572	0.00	Q	|	|	|	V|
20+35	0.4572	0.00	Q	|	|	|	V|
20+40	0.4572	0.00	Q	|	|	|	V|
20+45	0.4572	0.00	Q	|	|	|	V|
20+50	0.4572	0.00	Q	|	|	|	V|
20+55	0.4572	0.00	Q	|	|	|	V|
21+ 0	0.4572	0.00	Q	|	|	|	V|
21+ 5	0.4572	0.00	Q	|	|	|	V|
21+10	0.4572	0.00	Q	|	|	|	V|
21+15	0.4572	0.00	Q	|	|	|	V|
21+20	0.4572	0.00	Q	|	|	|	V|
21+25	0.4572	0.00	Q	|	|	|	V|
21+30	0.4572	0.00	Q	|	|	|	V|
21+35	0.4572	0.00	Q	|	|	|	V|
21+40	0.4572	0.00	Q	|	|	|	V|
21+45	0.4572	0.00	Q	|	|	|	V|
21+50	0.4572	0.00	Q	|	|	|	V|
21+55	0.4572	0.00	Q	|	|	|	V|
22+ 0	0.4572	0.00	Q	|	|	|	V|
22+ 5	0.4572	0.00	Q	|	|	|	V|
22+10	0.4572	0.00	Q	|	|	|	V|
22+15	0.4572	0.00	Q	|	|	|	V|
22+20	0.4572	0.00	Q	|	|	|	V|
22+25	0.4572	0.00	Q	|	|	|	V|
22+30	0.4572	0.00	Q	|	|	|	V|
22+35	0.4572	0.00	Q	|	|	|	V|
22+40	0.4572	0.00	Q	|	|	|	V|
22+45	0.4572	0.00	Q	|	|	|	V|
22+50	0.4572	0.00	Q	|	|	|	V|
22+55	0.4572	0.00	Q	|	|	|	V|
23+ 0	0.4572	0.00	Q	|	|	|	V|
23+ 5	0.4572	0.00	Q	|	|	|	V|
23+10	0.4572	0.00	Q	|	|	|	V|
23+15	0.4572	0.00	Q	|	|	|	V|
23+20	0.4572	0.00	Q	|	|	|	V|
23+25	0.4572	0.00	Q	|	|	|	V|
23+30	0.4572	0.00	Q	|	|	|	V|
23+35	0.4572	0.00	Q	|	|	|	V|
23+40	0.4572	0.00	Q	|	|	|	V|
23+45	0.4572	0.00	Q	|	|	|	V|
23+50	0.4572	0.00	Q	|	|	|	V|
23+55	0.4572	0.00	Q	|	|	|	V|
24+ 0	0.4572	0.00	Q	|	|	|	V|
24+ 5	0.4572	0.00	Q	|	|	|	V|
24+10	0.4572	0.00	Q	|	|	|	V|

```
   24+15       0.4572      0.00  Q         |         |         |        V|
   24+20       0.4572      0.00  Q         |         |         |        V|
   24+25       0.4572      0.00  Q         |         |         |        V|
-------------------------------------------------------------------------
```

Appendix E

Volume/Outflow Calcs

d = 0.01' (Und. Sys. Begins to Fill) - Gravel Only

V_{Trench} = (72) (29) (0.01) = 20.88 (40% Void) = 8.35 cf = 0.0002 af

Infiltration Rate Per Report 25.6i in/hr

Safety Factor = 3

Design Rate = 25.6/3 = 8.53 in/hr

Q_{Out} = (72) (29) (8.53/12)/((60 m/hr)(60 s/m)) = 0.41 cfs

d = 0.1'

V Trench = (72) (29) (0.1)(40%) = 208.8 (0.40) = 83.5 cf = 0.0019 af

Q_{Out} = 0.41 cfs

d = 1.1' (Und. Sys. – Pipe Begins to Fill) Pipe = 208 LF 7 ft Ø

V Trench = (72) (29) (1.1) = 2,296.8cf

V Pipes - King's Table 7 - 4

$\frac{d}{D} = \frac{0.1}{7} = 0.0167$ Ca= 0.0023 $A = CaD^2 = 0.0023\ (7)^2 = 0.113$ V = 208 (0.113) = 23.44 cf

V Gravel = (V Trench – V Pipes)(40%) = (2,296.8 – 23.44)(0.40) = 358.11 cf

V Total = V pipe + V Gravel = 23.44 + 358.11 = 381.55 cf = 0.0088 af

Q_{Out} = 0.41 cfs

d= 2.75' (Und. Sys. – Pipe 25% Full)

V Trench = (72) (29) (2.75) = 5,742 cf

V Pipes - King's Table 7 - 4

$\frac{d}{D} = \frac{1.75}{7} = 0.25$ Ca= 0.1535 $A = CaD^2 = 0.1535\ (7)^2 = 3.62$ V = 208 (3.62) = 752.96 cf

V Gravel = (V Trench – V Pipes)(40%) = (5,742 – 752.96)(0.40) = 1,995.62 cf

V Total = V pipe + V Gravel = 752.99 + 1,995.62 = 2,748.58 cf = 0.0631 af

Q_{Out} = 0.41 cfs

d = 4.50' (Und. Sys. – Pipe 50% Full)

V Trench = (72) (29) (4.50) = 9,396 cf

V Pipes - King's Table 7 - 4

$\frac{d}{D} = \frac{3.50}{7} = 0.50$ Ca= 0.393 $A = CaD^2 = 0.393\ (7)^2 = 19.25$ V = 208 (19.25) = 4,004 cf

V Gravel = (V Trench – V Pipes)(40%) = (9,396 – 4,004)(0.40) = 2,156.8 cf

V Total = V pipe + V Gravel = 4,004 + 2,156.8 = 6,156.8 cf = 0.1413 af

Q_{Out} = 0.41 cf

d = 6.25' (Und. Sys. – Pipe 75% Full)

V Trench = (72) (29) (6.25) = 13,050 cf

V Pipes - King's Table 7 - 4

$\frac{d}{D} = \frac{5.25}{7} = 0.75$ Ca= 0.632 $A = CaD^2 = 0.632\ (7)^2 = 30.97$ V = 208 (30.97) = 6,441.75 cf

V Gravel = (V Trench – V Pipes)(40%) = (13,050 – 6,441.76)(0.40) = 2,643.30 cf

V Total = V pipe + V Gravel = 6,441.76 + 2,643.3 = 9,085.06 cf = 0.2086 af

Q_{Out} = 0.41 cf

d = 8.0' (Und. Sys. – Pipe 100% Full)

V Trench = (72) (29) (8) = 16,704 cf

V Pipes = (Length Pipes)$\pi(r)^2$ = $(208)(3.5)^2\ \pi$ = 8,004.78

V Gravel = (V Trench – V Pipes)(40%) = (16,704 – 8,004.78)(0.40) = 3,479.69 cf

V Total = V pipe + V Gravel = 8,004.78 + 3,479.69 = 11,484.47 cf = 0.2636 af

Q_{Out} = 0.41 cf

d = 8.1' (Und. Sys. – Filling Gravel Just Above Pipe)

V Trench = (72) (29) (8.1) = 16,912.8 cf

V Pipes = (Length Pipes)$\pi(r)^2$ = $(208)(3.5)^2\ \pi$ = 8,004.78

V Gravel = (V Trench – V Pipes)(40%) = (16,912.8 – 8,004.78)(0.40) = 3,563.21 cf

V Total = V pipe + V Gravel = 8,004.78 + 3,563.21 = 11,567.9 cf = 0.2656 af

Q_{Out} = 0.41 cfs

d = 9.0' (Und. Sys. Is Full)

V Trench = (72) (29) (9.0) = 18,792 cf

V Pipes = (Length Pipes)$\pi(r)^2$ = $(208)(3.5)^2\ \pi$ = 8,004.78

V Gravel = (V Trench – V Pipes)(40%) = (18,792 – 8,004.78)(0.40) = 4,314.89 cf

V Total = V pipe + V Gravel = 8,004.78 + 4,314.89 = 12,319.67 cf = 0.2828 af

Q_{Out} = 0.41 cfs

d = 9.1' Overflow/Bubble out of Und. Sys.
0.1' Depth in 12Ø" Outflow pipe)
Insignificant volume Addition

VTotal = 0.2828 af

Kings Tabel 7-14

$Q\ Pipe = \frac{K\, d^{8/3}\, s^{1/2}}{n}$

d = 0.1' D = 1' n = 0.013 s = 0.005

$\frac{d}{D} = \frac{0.1}{1} = 0.1$ K= 0.0097 $Q = \frac{(0.0097)(1)^{8/3}(0.005)^{1/2}}{0.013} = 0.052$

Q Pipe = 0.05 cfs Q system = 0.41cfs

Q total = 0.05 + 0.41 = 0.46 cfs

d = 9.5' Overflow/Bubble out of Und. Sys.
0.5' Depth in 12Ø" Outflow pipe)
Insignificant volume Addition

VTotal = 0.2828 af s=0.005

Kings Tabel 7-14

$Q\ Pipe = \frac{K\, d^{8/3}\, s^{1/2}}{n}$

d = 0.5' D = 1' n = 0.013 s = 0.005

$\frac{d}{D} = \frac{0.5}{1} = 0.5$ K= 0.232 $Q = \frac{(0.232)(1)^{8/3}(0.005)^{1/2}}{0.013} = 1.26cfs$

Q Pipe = 1.26 cfs Q System = 0.41cfs

Q total = 1.26 + 0.41 = 1.67 cfs

d = 10.0' Overflow/Bubble out of Und. Sys.
1.0' Depth in 12Ø" Outflow pipe)
Insignificant volume Addition

VTotal = 0.2828 af s=0.005

Kings Tabel 7-14

$Q\ Pipe = \frac{K\, d^{8/3}\, s^{1/2}}{n}$

d = 1' D = 1' n = 0.013 s= 0.005

$\frac{d}{D} = \frac{1}{1} = 1$ K= 0.463 $Q = \frac{(0.463)(1)^{8/3}(0.005)^{1/2}}{0.013} = 2.51cfs$

Q Pipe = 2.92 cfs Q System = 0.41cfs

Q total = 2.51 + 0.41 = 2.92 cfs

```
                    FLOOD HYDROGRAPH ROUTING PROGRAM
             Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                        Study date: 07/24/24
------------------------------------------------------------------------
JN 4113 FLOOD ROUTING
2 YEAR 3 HUR STORM
------------------------------------------------------------------------
Program License Serial Number 5016
------------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

                From study/file name: 4113UH2Y3H.rte
****************************HYDROGRAPH DATA*****************************
                Number of intervals =    41
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =        4.432 (CFS)
                Total volume =       0.133 (Ac.Ft)
        Status of hydrographs being held in storage
                    Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
************************************************************************
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** RETARDING BASIN ROUTING ****
________________________________________________________________________
User entry of depth-outflow-storage data
------------------------------------------------------------------------
Total number of inflow hydrograph intervals = 41
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
------------------------------------------------------------------------
------------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
------------------------------------------------------------------------
------------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
------------------------------------------------------------------------
  0.000      0.000      0.000      0.000        0.000
  0.010      0.001      0.410     -0.000        0.002
  0.100      0.002      0.410      0.001        0.003
  1.100      0.009      0.410      0.008        0.010
  2.750      0.063      0.410      0.062        0.064
  4.500      0.141      0.410      0.140        0.142
  6.250      0.209      0.410      0.208        0.210
```

8.000	0.264	0.410	0.263	0.265
8.100	0.266	0.410	0.265	0.267
9.000	0.283	0.410	0.282	0.284
9.100	0.284	0.460	0.282	0.286
9.500	0.285	1.670	0.279	0.291
10.000	0.286	2.920	0.276	0.296

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 1.1 2.22 3.32 4.43	Depth (Ft.)
0.083	0.00	0.00	0.000	O | | | |	0.00
0.167	0.00	0.00	0.000	O | | | |	0.00
0.250	0.00	0.00	0.000	O | | | |	0.00
0.333	0.00	0.00	0.000	O | | | |	0.00
0.417	0.00	0.00	0.000	O | | | |	0.00
0.500	0.00	0.00	0.000	O | | | |	0.00
0.583	0.00	0.00	0.000	O | | | |	0.00
0.667	0.00	0.00	0.000	O | | | |	0.00
0.750	0.00	0.00	0.000	O | | | |	0.00
0.833	0.00	0.00	0.000	O | | | |	0.00
0.917	0.00	0.00	0.000	O | | | |	0.00
1.000	0.00	0.00	0.000	O | | | |	0.00
1.083	0.00	0.00	0.000	O | | | |	0.00
1.167	0.00	0.00	0.000	O | | | |	0.00
1.250	0.00	0.00	0.000	O | | | |	0.00
1.333	0.00	0.00	0.000	O | | | |	0.00
1.417	0.03	0.02	0.000	O | | | |	0.00
1.500	0.19	0.13	0.000	OI | | | |	0.00
1.583	0.40	0.33	0.001	| O | | | |	0.01
1.667	0.51	0.41	0.001	| OI | | | |	0.05
1.750	0.59	0.41	0.002	| O I | | | |	0.15
1.833	0.70	0.41	0.004	| O I | | | |	0.38
1.917	0.89	0.41	0.007	| O I | | | |	0.76
2.000	1.26	0.41	0.011	| O |I | | |	1.17
2.083	2.22	0.41	0.020	| O | I | |	1.45
2.167	4.30	0.41	0.040	| O | | | I|	2.05
2.250	4.43	0.41	0.067	| O | | | I |	2.84
2.333	2.16	0.41	0.087	| O | I| | |	3.29
2.417	1.00	0.41	0.095	| O I| | | |	3.47
2.500	0.49	0.41	0.097	| OI | | | |	3.52
2.583	0.12	0.41	0.097	I O | | | |	3.51
2.667	0.03	0.41	0.094	I O | | | |	3.46
2.750	0.01	0.41	0.092	I O | | | |	3.40
2.833	0.00	0.41	0.089	I O | | | |	3.33
2.917	0.00	0.41	0.086	I O | | | |	3.27
3.000	0.00	0.41	0.083	I O | | | |	3.21

3.083	0.00	0.41	0.081	I O	|	|	|	3.14
3.167	0.00	0.41	0.078	I O	|	|	|	3.08
3.250	0.00	0.41	0.075	I O	|	|	|	3.02
3.333	0.00	0.41	0.072	I O	|	|	|	2.95
3.417	0.00	0.41	0.069	I O	|	|	|	2.89
3.500	0.00	0.41	0.066	I O	|	|	|	2.83
3.583	0.00	0.41	0.064	I O	|	|	|	2.76
3.667	0.00	0.41	0.061	I O	|	|	|	2.68
3.750	0.00	0.41	0.058	I O	|	|	|	2.60
3.833	0.00	0.41	0.055	I O	|	|	|	2.51
3.917	0.00	0.41	0.052	I O	|	|	|	2.42
4.000	0.00	0.41	0.049	I O	|	|	|	2.34
4.083	0.00	0.41	0.047	I O	|	|	|	2.25
4.167	0.00	0.41	0.044	I O	|	|	|	2.16
4.250	0.00	0.41	0.041	I O	|	|	|	2.08
4.333	0.00	0.41	0.038	I O	|	|	|	1.99
4.417	0.00	0.41	0.035	I O	|	|	|	1.90
4.500	0.00	0.41	0.033	I O	|	|	|	1.82
4.583	0.00	0.41	0.030	I O	|	|	|	1.73
4.667	0.00	0.41	0.027	I O	|	|	|	1.65
4.750	0.00	0.41	0.024	I O	|	|	|	1.56
4.833	0.00	0.41	0.021	I O	|	|	|	1.47
4.917	0.00	0.41	0.018	I O	|	|	|	1.39
5.000	0.00	0.41	0.016	I O	|	|	|	1.30
5.083	0.00	0.41	0.013	I O	|	|	|	1.21
5.167	0.00	0.41	0.010	I O	|	|	|	1.13
5.250	0.00	0.41	0.007	I O	|	|	|	0.83
5.333	0.00	0.41	0.004	I O	|	|	|	0.43
5.417	0.00	0.41	0.001	I O	|	|	|	0.05
5.500	0.00	0.01	0.000	O	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 66
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.410 (CFS)
Total volume = 0.133 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

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                  FLOOD HYDROGRAPH ROUTING PROGRAM
            Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                        Study date: 07/24/24
------------------------------------------------------------------------
JN 4113 FLOOD ROUTING
2 YEAR 24 HOUR STORM
------------------------------------------------------------------------
Program License Serial Number 5016
------------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************
                From study/file name: 4113UH2Y24H.rte
****************************HYDROGRAPH DATA****************************
                Number of intervals =   293
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =        4.432 (CFS)
                Total volume =       0.134 (Ac.Ft)
        Status of hydrographs being held in storage
                    Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
************************************************************************
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** RETARDING BASIN ROUTING ****
________________________________________________________________________
User entry of depth-outflow-storage data
------------------------------------------------------------------------
Total number of inflow hydrograph intervals = 293
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
------------------------------------------------------------------------
------------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
------------------------------------------------------------------------
------------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
------------------------------------------------------------------------
  0.000      0.000      0.000      0.000        0.000
  0.010      0.001      0.410     -0.000        0.002
  0.100      0.002      0.410      0.001        0.003
  1.100      0.009      0.410      0.008        0.010
  2.750      0.063      0.410      0.062        0.064
  4.500      0.141      0.410      0.140        0.142
  6.250      0.209      0.410      0.208        0.210
  8.000      0.264      0.410      0.263        0.265
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8.100	0.266	0.410	0.265	0.267
9.000	0.283	0.410	0.282	0.284
9.100	0.284	0.460	0.282	0.286
9.500	0.285	1.670	0.279	0.291
10.000	0.286	2.920	0.276	0.296

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	1.1	2.22	3.32	4.43	Depth (Ft.)
0.083	0.00	0.00	0.000	O	|	|	|	|	0.00
0.167	0.00	0.00	0.000	O	|	|	|	|	0.00
0.250	0.00	0.00	0.000	O	|	|	|	|	0.00
0.333	0.00	0.00	0.000	O	|	|	|	|	0.00
0.417	0.00	0.00	0.000	O	|	|	|	|	0.00
0.500	0.00	0.00	0.000	O	|	|	|	|	0.00
0.583	0.00	0.00	0.000	O	|	|	|	|	0.00
0.667	0.00	0.00	0.000	O	|	|	|	|	0.00
0.750	0.00	0.00	0.000	O	|	|	|	|	0.00
0.833	0.00	0.00	0.000	O	|	|	|	|	0.00
0.917	0.00	0.00	0.000	O	|	|	|	|	0.00
1.000	0.00	0.00	0.000	O	|	|	|	|	0.00
1.083	0.00	0.00	0.000	O	|	|	|	|	0.00
1.167	0.00	0.00	0.000	O	|	|	|	|	0.00
1.250	0.00	0.00	0.000	O	|	|	|	|	0.00
1.333	0.00	0.00	0.000	O	|	|	|	|	0.00
1.417	0.00	0.00	0.000	O	|	|	|	|	0.00
1.500	0.00	0.00	0.000	O	|	|	|	|	0.00
1.583	0.00	0.00	0.000	O	|	|	|	|	0.00
1.667	0.00	0.00	0.000	O	|	|	|	|	0.00
1.750	0.00	0.00	0.000	O	|	|	|	|	0.00
1.833	0.00	0.00	0.000	O	|	|	|	|	0.00
1.917	0.00	0.00	0.000	O	|	|	|	|	0.00
2.000	0.00	0.00	0.000	O	|	|	|	|	0.00
2.083	0.00	0.00	0.000	O	|	|	|	|	0.00
2.167	0.00	0.00	0.000	O	|	|	|	|	0.00
2.250	0.00	0.00	0.000	O	|	|	|	|	0.00
2.333	0.00	0.00	0.000	O	|	|	|	|	0.00
2.417	0.00	0.00	0.000	O	|	|	|	|	0.00
2.500	0.00	0.00	0.000	O	|	|	|	|	0.00
2.583	0.00	0.00	0.000	O	|	|	|	|	0.00
2.667	0.00	0.00	0.000	O	|	|	|	|	0.00
2.750	0.00	0.00	0.000	O	|	|	|	|	0.00
2.833	0.00	0.00	0.000	O	|	|	|	|	0.00
2.917	0.00	0.00	0.000	O	|	|	|	|	0.00
3.000	0.00	0.00	0.000	O	|	|	|	|	0.00
3.083	0.00	0.00	0.000	O	|	|	|	|	0.00
3.167	0.00	0.00	0.000	O	|	|	|	|	0.00

3.250	0.00	0.00	0.000	O	|	|	|	0.00
3.333	0.00	0.00	0.000	O	|	|	|	0.00
3.417	0.00	0.00	0.000	O	|	|	|	0.00
3.500	0.00	0.00	0.000	O	|	|	|	0.00
3.583	0.00	0.00	0.000	O	|	|	|	0.00
3.667	0.00	0.00	0.000	O	|	|	|	0.00
3.750	0.00	0.00	0.000	O	|	|	|	0.00
3.833	0.00	0.00	0.000	O	|	|	|	0.00
3.917	0.00	0.00	0.000	O	|	|	|	0.00
4.000	0.00	0.00	0.000	O	|	|	|	0.00
4.083	0.00	0.00	0.000	O	|	|	|	0.00
4.167	0.00	0.00	0.000	O	|	|	|	0.00
4.250	0.00	0.00	0.000	O	|	|	|	0.00
4.333	0.00	0.00	0.000	O	|	|	|	0.00
4.417	0.00	0.00	0.000	O	|	|	|	0.00
4.500	0.00	0.00	0.000	O	|	|	|	0.00
4.583	0.00	0.00	0.000	O	|	|	|	0.00
4.667	0.00	0.00	0.000	O	|	|	|	0.00
4.750	0.00	0.00	0.000	O	|	|	|	0.00
4.833	0.00	0.00	0.000	O	|	|	|	0.00
4.917	0.00	0.00	0.000	O	|	|	|	0.00
5.000	0.00	0.00	0.000	O	|	|	|	0.00
5.083	0.00	0.00	0.000	O	|	|	|	0.00
5.167	0.00	0.00	0.000	O	|	|	|	0.00
5.250	0.00	0.00	0.000	O	|	|	|	0.00
5.333	0.00	0.00	0.000	O	|	|	|	0.00
5.417	0.00	0.00	0.000	O	|	|	|	0.00
5.500	0.00	0.00	0.000	O	|	|	|	0.00
5.583	0.00	0.00	0.000	O	|	|	|	0.00
5.667	0.00	0.00	0.000	O	|	|	|	0.00
5.750	0.00	0.00	0.000	O	|	|	|	0.00
5.833	0.00	0.00	0.000	O	|	|	|	0.00
5.917	0.00	0.00	0.000	O	|	|	|	0.00
6.000	0.00	0.00	0.000	O	|	|	|	0.00
6.083	0.00	0.00	0.000	O	|	|	|	0.00
6.167	0.00	0.00	0.000	O	|	|	|	0.00
6.250	0.00	0.00	0.000	O	|	|	|	0.00
6.333	0.00	0.00	0.000	O	|	|	|	0.00
6.417	0.00	0.00	0.000	O	|	|	|	0.00
6.500	0.00	0.00	0.000	O	|	|	|	0.00
6.583	0.00	0.00	0.000	O	|	|	|	0.00
6.667	0.00	0.00	0.000	O	|	|	|	0.00
6.750	0.00	0.00	0.000	O	|	|	|	0.00
6.833	0.00	0.00	0.000	O	|	|	|	0.00
6.917	0.00	0.00	0.000	O	|	|	|	0.00
7.000	0.00	0.00	0.000	O	|	|	|	0.00
7.083	0.00	0.00	0.000	O	|	|	|	0.00
7.167	0.00	0.00	0.000	O	|	|	|	0.00
7.250	0.00	0.00	0.000	O	|	|	|	0.00
7.333	0.00	0.00	0.000	O	|	|	|	0.00

7.417	0.00	0.00	0.000	O				0.00
7.500	0.00	0.00	0.000	O				0.00
7.583	0.00	0.00	0.000	O				0.00
7.667	0.00	0.00	0.000	O				0.00
7.750	0.00	0.00	0.000	O				0.00
7.833	0.00	0.00	0.000	O				0.00
7.917	0.00	0.00	0.000	O				0.00
8.000	0.00	0.00	0.000	O				0.00
8.083	0.00	0.00	0.000	O				0.00
8.167	0.00	0.00	0.000	O				0.00
8.250	0.00	0.00	0.000	O				0.00
8.333	0.00	0.00	0.000	O				0.00
8.417	0.00	0.00	0.000	O				0.00
8.500	0.00	0.00	0.000	O				0.00
8.583	0.00	0.00	0.000	O				0.00
8.667	0.00	0.00	0.000	O				0.00
8.750	0.00	0.00	0.000	O				0.00
8.833	0.00	0.00	0.000	O				0.00
8.917	0.00	0.00	0.000	O				0.00
9.000	0.00	0.00	0.000	O				0.00
9.083	0.00	0.00	0.000	O				0.00
9.167	0.00	0.00	0.000	O				0.00
9.250	0.00	0.00	0.000	O				0.00
9.333	0.00	0.00	0.000	O				0.00
9.417	0.00	0.00	0.000	O				0.00
9.500	0.00	0.00	0.000	O				0.00
9.583	0.00	0.00	0.000	O				0.00
9.667	0.00	0.00	0.000	O				0.00
9.750	0.00	0.00	0.000	O				0.00
9.833	0.00	0.00	0.000	O				0.00
9.917	0.00	0.00	0.000	O				0.00
10.000	0.00	0.00	0.000	O				0.00
10.083	0.00	0.00	0.000	O				0.00
10.167	0.00	0.00	0.000	O				0.00
10.250	0.00	0.00	0.000	O				0.00
10.333	0.00	0.00	0.000	O				0.00
10.417	0.00	0.00	0.000	O				0.00
10.500	0.00	0.00	0.000	O				0.00
10.583	0.00	0.00	0.000	O				0.00
10.667	0.00	0.00	0.000	O				0.00
10.750	0.00	0.00	0.000	O				0.00
10.833	0.00	0.00	0.000	O				0.00
10.917	0.00	0.00	0.000	O				0.00
11.000	0.00	0.00	0.000	O				0.00
11.083	0.00	0.00	0.000	O				0.00
11.167	0.00	0.00	0.000	O				0.00
11.250	0.00	0.00	0.000	O				0.00
11.333	0.00	0.00	0.000	O				0.00
11.417	0.00	0.00	0.000	O				0.00
11.500	0.00	0.00	0.000	O				0.00

11.583	0.00	0.00	0.000	O				0.00
11.667	0.00	0.00	0.000	O				0.00
11.750	0.00	0.00	0.000	O				0.00
11.833	0.00	0.00	0.000	O				0.00
11.917	0.00	0.00	0.000	O				0.00
12.000	0.00	0.00	0.000	O				0.00
12.083	0.00	0.00	0.000	O				0.00
12.167	0.00	0.00	0.000	O				0.00
12.250	0.00	0.00	0.000	O				0.00
12.333	0.00	0.00	0.000	O				0.00
12.417	0.00	0.00	0.000	O				0.00
12.500	0.00	0.00	0.000	O				0.00
12.583	0.00	0.00	0.000	O				0.00
12.667	0.00	0.00	0.000	O				0.00
12.750	0.00	0.00	0.000	O				0.00
12.833	0.00	0.00	0.000	O				0.00
12.917	0.00	0.00	0.000	O				0.00
13.000	0.00	0.00	0.000	O				0.00
13.083	0.00	0.00	0.000	O				0.00
13.167	0.00	0.00	0.000	O				0.00
13.250	0.00	0.00	0.000	O				0.00
13.333	0.00	0.00	0.000	O				0.00
13.417	0.00	0.00	0.000	O				0.00
13.500	0.00	0.00	0.000	O				0.00
13.583	0.00	0.00	0.000	O				0.00
13.667	0.00	0.00	0.000	O				0.00
13.750	0.00	0.00	0.000	O				0.00
13.833	0.00	0.00	0.000	O				0.00
13.917	0.00	0.00	0.000	O				0.00
14.000	0.00	0.00	0.000	O				0.00
14.083	0.00	0.00	0.000	O				0.00
14.167	0.00	0.00	0.000	O				0.00
14.250	0.00	0.00	0.000	O				0.00
14.333	0.00	0.00	0.000	O				0.00
14.417	0.00	0.00	0.000	O				0.00
14.500	0.00	0.00	0.000	O				0.00
14.583	0.00	0.00	0.000	O				0.00
14.667	0.00	0.00	0.000	O				0.00
14.750	0.00	0.00	0.000	O				0.00
14.833	0.00	0.00	0.000	O				0.00
14.917	0.00	0.00	0.000	O				0.00
15.000	0.00	0.00	0.000	O				0.00
15.083	0.00	0.00	0.000	O				0.00
15.167	0.00	0.00	0.000	O				0.00
15.250	0.00	0.00	0.000	O				0.00
15.333	0.00	0.00	0.000	O				0.00
15.417	0.03	0.02	0.000	O				0.00
15.500	0.19	0.13	0.000	OI				0.00
15.583	0.40	0.33	0.001	| O				0.01
15.667	0.51	0.41	0.001	| OI				0.05

15.750	0.59	0.41	0.002	| O I |					0.15
15.833	0.70	0.41	0.004	| O I |					0.38
15.917	0.89	0.41	0.007	| O I |					0.76
16.000	1.26	0.41	0.011	| O |I |					1.17
16.083	2.22	0.41	0.020	| O | I |					1.45
16.167	4.30	0.41	0.040	| O | |				I|	2.05
16.250	4.43	0.41	0.067	| O | |				I	2.84
16.333	2.16	0.41	0.087	| O | I|					3.29
16.417	1.00	0.41	0.095	| O I|					3.47
16.500	0.49	0.41	0.097	| OI |					3.52
16.583	0.12	0.41	0.097	I O |					3.51
16.667	0.03	0.41	0.094	I O |					3.46
16.750	0.01	0.41	0.092	I O |					3.40
16.833	0.00	0.41	0.089	I O |					3.33
16.917	0.00	0.41	0.086	I O |					3.27
17.000	0.00	0.41	0.083	I O |					3.21
17.083	0.00	0.41	0.081	I O |					3.14
17.167	0.00	0.41	0.078	I O |					3.08
17.250	0.00	0.41	0.075	I O |					3.02
17.333	0.00	0.41	0.072	I O |					2.95
17.417	0.00	0.41	0.069	I O |					2.89
17.500	0.00	0.41	0.066	I O |					2.83
17.583	0.00	0.41	0.064	I O |					2.76
17.667	0.00	0.41	0.061	I O |					2.68
17.750	0.00	0.41	0.058	I O |					2.60
17.833	0.00	0.41	0.055	I O |					2.51
17.917	0.00	0.41	0.052	I O |					2.42
18.000	0.00	0.41	0.050	I O |					2.34
18.083	0.00	0.41	0.047	I O |					2.25
18.167	0.00	0.41	0.044	I O |					2.17
18.250	0.00	0.41	0.041	I O |					2.08
18.333	0.00	0.41	0.038	I O |					1.99
18.417	0.00	0.41	0.035	I O |					1.91
18.500	0.00	0.41	0.033	I O |					1.82
18.583	0.00	0.41	0.030	I O |					1.73
18.667	0.00	0.41	0.027	I O |					1.65
18.750	0.00	0.41	0.024	I O |					1.56
18.833	0.00	0.41	0.021	I O |					1.48
18.917	0.00	0.41	0.018	I O |					1.39
19.000	0.00	0.41	0.016	I O |					1.30
19.083	0.00	0.41	0.013	I O |					1.22
19.167	0.00	0.41	0.010	I O |					1.13
19.250	0.00	0.41	0.007	I O |					0.84
19.333	0.00	0.41	0.004	I O |					0.44
19.417	0.00	0.41	0.002	I O |					0.06
19.500	0.00	0.02	0.000	O |					0.00
19.583	0.00	0.00	0.000	O |					0.00
19.667	0.00	0.00	0.000	O |					0.00
19.750	0.00	0.00	0.000	O |					0.00
19.833	0.00	0.00	0.000	O |					0.00

19.917	0.00	0.00	0.000	O				0.00
20.000	0.00	0.00	0.000	O				0.00
20.083	0.00	0.00	0.000	O				0.00
20.167	0.00	0.00	0.000	O				0.00
20.250	0.00	0.00	0.000	O				0.00
20.333	0.00	0.00	0.000	O				0.00
20.417	0.00	0.00	0.000	O				0.00
20.500	0.00	0.00	0.000	O				0.00
20.583	0.00	0.00	0.000	O				0.00
20.667	0.00	0.00	0.000	O				0.00
20.750	0.00	0.00	0.000	O				0.00
20.833	0.00	0.00	0.000	O				0.00
20.917	0.00	0.00	0.000	O				0.00
21.000	0.00	0.00	0.000	O				0.00
21.083	0.00	0.00	0.000	O				0.00
21.167	0.00	0.00	0.000	O				0.00
21.250	0.00	0.00	0.000	O				0.00
21.333	0.00	0.00	0.000	O				0.00
21.417	0.00	0.00	0.000	O				0.00
21.500	0.00	0.00	0.000	O				0.00
21.583	0.00	0.00	0.000	O				0.00
21.667	0.00	0.00	0.000	O				0.00
21.750	0.00	0.00	0.000	O				0.00
21.833	0.00	0.00	0.000	O				0.00
21.917	0.00	0.00	0.000	O				0.00
22.000	0.00	0.00	0.000	O				0.00
22.083	0.00	0.00	0.000	O				0.00
22.167	0.00	0.00	0.000	O				0.00
22.250	0.00	0.00	0.000	O				0.00
22.333	0.00	0.00	0.000	O				0.00
22.417	0.00	0.00	0.000	O				0.00
22.500	0.00	0.00	0.000	O				0.00
22.583	0.00	0.00	0.000	O				0.00
22.667	0.00	0.00	0.000	O				0.00
22.750	0.00	0.00	0.000	O				0.00
22.833	0.00	0.00	0.000	O				0.00
22.917	0.00	0.00	0.000	O				0.00
23.000	0.00	0.00	0.000	O				0.00
23.083	0.00	0.00	0.000	O				0.00
23.167	0.00	0.00	0.000	O				0.00
23.250	0.00	0.00	0.000	O				0.00
23.333	0.00	0.00	0.000	O				0.00
23.417	0.00	0.00	0.000	O				0.00
23.500	0.00	0.00	0.000	O				0.00
23.583	0.00	0.00	0.000	O				0.00
23.667	0.00	0.00	0.000	O				0.00
23.750	0.00	0.00	0.000	O				0.00
23.833	0.00	0.00	0.000	O				0.00
23.917	0.00	0.00	0.000	O				0.00
24.000	0.00	0.00	0.000	O				0.00

24.083	0.00	0.00	0.000	O	|	|	|	|	0.00
24.167	0.00	0.00	0.000	O	|	|	|	|	0.00
24.250	0.00	0.00	0.000	O	|	|	|	|	0.00
24.333	0.00	0.00	0.000	O	|	|	|	|	0.00
24.417	0.00	0.00	0.000	O	|	|	|	|	0.00
24.500	0.00	0.00	0.000	O	|	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 294
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.410 (CFS)
Total volume = 0.134 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

FLOOD HYDROGRAPH ROUTING PROGRAM
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Study date: 07/01/24

JN 4113 FLOOD ROUTING
10 YEAR 3 HOUR STORM

Program License Serial Number 5016

********** HYDROGRAPH INFORMATION **********
From study/file name: 4113UH10Y3H.rte
**********HYDROGRAPH DATA**********
Number of intervals = 41
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 8.156 (CFS)
Total volume = 0.261 (Ac.Ft)
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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++++++++++
Process from Point/Station 1.000 to Point/Station 2.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 41
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.010	0.001	0.410	-0.000	0.002
0.100	0.002	0.410	0.001	0.003
1.100	0.009	0.410	0.008	0.010
2.750	0.063	0.410	0.062	0.064
4.500	0.141	0.410	0.140	0.142
6.250	0.209	0.410	0.208	0.210
8.000	0.264	0.410	0.263	0.265

8.100	0.266	0.410	0.265	0.267
9.000	0.283	0.410	0.282	0.284
9.100	0.284	0.460	0.282	0.286
9.500	0.285	1.670	0.279	0.291
10.000	0.286	2.920	0.276	0.296

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	2.0	4.08	6.12	8.16	Depth (Ft.)
0.083	0.00	0.00	0.000	O	|	|	|	|	0.00
0.167	0.00	0.00	0.000	O	|	|	|	|	0.00
0.250	0.00	0.00	0.000	O	|	|	|	|	0.00
0.333	0.00	0.00	0.000	O	|	|	|	|	0.00
0.417	0.00	0.00	0.000	O	|	|	|	|	0.00
0.500	0.00	0.00	0.000	O	|	|	|	|	0.00
0.583	0.00	0.00	0.000	O	|	|	|	|	0.00
0.667	0.00	0.00	0.000	O	|	|	|	|	0.00
0.750	0.00	0.00	0.000	O	|	|	|	|	0.00
0.833	0.00	0.00	0.000	O	|	|	|	|	0.00
0.917	0.00	0.00	0.000	O	|	|	|	|	0.00
1.000	0.00	0.00	0.000	O	|	|	|	|	0.00
1.083	0.00	0.00	0.000	O	|	|	|	|	0.00
1.167	0.00	0.00	0.000	O	|	|	|	|	0.00
1.250	0.00	0.00	0.000	O	|	|	|	|	0.00
1.333	0.00	0.00	0.000	O	|	|	|	|	0.00
1.417	0.06	0.04	0.000	O	|	|	|	|	0.00
1.500	0.42	0.28	0.001	|O	|	|	|	|	0.01
1.583	0.86	0.41	0.003	|O I	|	|	|	|	0.20
1.667	1.12	0.41	0.007	|O I	|	|	|	|	0.77
1.750	1.32	0.41	0.012	|O I	|	|	|	|	1.20
1.833	1.58	0.41	0.019	|O I	|	|	|	|	1.42
1.917	1.95	0.41	0.029	|O I	|	|	|	|	1.70
2.000	2.61	0.41	0.042	|O | I	|	|	|	2.10
2.083	4.32	0.41	0.063	|O |	I	|	|	2.74
2.167	8.04	0.41	0.102	|O |	|	|	I|	3.64
2.250	8.16	0.41	0.155	|O |	|	|	I	4.87
2.333	4.12	0.41	0.195	|O |	I	|	|	5.89
2.417	2.02	0.41	0.213	|O I|	|	|	|	6.38
2.500	1.01	0.41	0.221	|O I |	|	|	|	6.63
2.583	0.26	0.41	0.222	|O |	|	|	|	6.68
2.667	0.06	0.41	0.221	IO |	|	|	|	6.62
2.750	0.02	0.41	0.218	IO |	|	|	|	6.54
2.833	0.00	0.41	0.215	IO |	|	|	|	6.45
2.917	0.00	0.41	0.213	IO |	|	|	|	6.36
3.000	0.00	0.41	0.210	IO |	|	|	|	6.27
3.083	0.00	0.41	0.207	IO |	|	|	|	6.20
3.167	0.00	0.41	0.204	IO |	|	|	|	6.12

3.250	0.00	0.41	0.201	IO				6.05
3.333	0.00	0.41	0.198	IO				5.98
3.417	0.00	0.41	0.196	IO				5.90
3.500	0.00	0.41	0.193	IO				5.83
3.583	0.00	0.41	0.190	IO				5.76
3.667	0.00	0.41	0.187	IO				5.69
3.750	0.00	0.41	0.184	IO				5.61
3.833	0.00	0.41	0.181	IO				5.54
3.917	0.00	0.41	0.179	IO				5.47
4.000	0.00	0.41	0.176	IO				5.40
4.083	0.00	0.41	0.173	IO				5.32
4.167	0.00	0.41	0.170	IO				5.25
4.250	0.00	0.41	0.167	IO				5.18
4.333	0.00	0.41	0.165	IO				5.11
4.417	0.00	0.41	0.162	IO				5.03
4.500	0.00	0.41	0.159	IO				4.96
4.583	0.00	0.41	0.156	IO				4.89
4.667	0.00	0.41	0.153	IO				4.81
4.750	0.00	0.41	0.150	IO				4.74
4.833	0.00	0.41	0.148	IO				4.67
4.917	0.00	0.41	0.145	IO				4.60
5.000	0.00	0.41	0.142	IO				4.52
5.083	0.00	0.41	0.139	IO				4.46
5.167	0.00	0.41	0.136	IO				4.39
5.250	0.00	0.41	0.133	IO				4.33
5.333	0.00	0.41	0.131	IO				4.27
5.417	0.00	0.41	0.128	IO				4.20
5.500	0.00	0.41	0.125	IO				4.14
5.583	0.00	0.41	0.122	IO				4.08
5.667	0.00	0.41	0.119	IO				4.01
5.750	0.00	0.41	0.117	IO				3.95
5.833	0.00	0.41	0.114	IO				3.89
5.917	0.00	0.41	0.111	IO				3.82
6.000	0.00	0.41	0.108	IO				3.76
6.083	0.00	0.41	0.105	IO				3.70
6.167	0.00	0.41	0.102	IO				3.63
6.250	0.00	0.41	0.100	IO				3.57
6.333	0.00	0.41	0.097	IO				3.51
6.417	0.00	0.41	0.094	IO				3.44
6.500	0.00	0.41	0.091	IO				3.38
6.583	0.00	0.41	0.088	IO				3.32
6.667	0.00	0.41	0.085	IO				3.25
6.750	0.00	0.41	0.083	IO				3.19
6.833	0.00	0.41	0.080	IO				3.13
6.917	0.00	0.41	0.077	IO				3.06
7.000	0.00	0.41	0.074	IO				3.00
7.083	0.00	0.41	0.071	IO				2.94
7.167	0.00	0.41	0.069	IO				2.87
7.250	0.00	0.41	0.066	IO				2.81
7.333	0.00	0.41	0.063	IO				2.75

7.417	0.00	0.41	0.060	IO	|	|	|	2.66
7.500	0.00	0.41	0.057	IO	|	|	|	2.57
7.583	0.00	0.41	0.054	IO	|	|	|	2.49
7.667	0.00	0.41	0.052	IO	|	|	|	2.40
7.750	0.00	0.41	0.049	IO	|	|	|	2.31
7.833	0.00	0.41	0.046	IO	|	|	|	2.23
7.917	0.00	0.41	0.043	IO	|	|	|	2.14
8.000	0.00	0.41	0.040	IO	|	|	|	2.06
8.083	0.00	0.41	0.037	IO	|	|	|	1.97
8.167	0.00	0.41	0.035	IO	|	|	|	1.88
8.250	0.00	0.41	0.032	IO	|	|	|	1.80
8.333	0.00	0.41	0.029	IO	|	|	|	1.71
8.417	0.00	0.41	0.026	IO	|	|	|	1.62
8.500	0.00	0.41	0.023	IO	|	|	|	1.54
8.583	0.00	0.41	0.021	IO	|	|	|	1.45
8.667	0.00	0.41	0.018	IO	|	|	|	1.37
8.750	0.00	0.41	0.015	IO	|	|	|	1.28
8.833	0.00	0.41	0.012	IO	|	|	|	1.19
8.917	0.00	0.41	0.009	IO	|	|	|	1.11
9.000	0.00	0.41	0.006	IO	|	|	|	0.73
9.083	0.00	0.41	0.004	IO	|	|	|	0.32
9.167	0.00	0.37	0.001	IO	|	|	|	0.01
9.250	0.00	0.00	0.000	O	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 111
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.410 (CFS)
Total volume = 0.262 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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                  FLOOD HYDROGRAPH ROUTING PROGRAM
            Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                        Study date: 07/01/24
------------------------------------------------------------------------
JN 4113 FLOOD ROUTING
10 YEAR 24 HOUR STORM
------------------------------------------------------------------------
Program License Serial Number 5016
------------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************
                From study/file name: 4113UH10Y24H.rte
****************************HYDROGRAPH DATA****************************
                Number of intervals =   293
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =        8.156 (CFS)
                Total volume =       0.262 (Ac.Ft)
        Status of hydrographs being held in storage
                    Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
************************************************************************
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** RETARDING BASIN ROUTING ****
________________________________________________________________________
User entry of depth-outflow-storage data
------------------------------------------------------------------------
Total number of inflow hydrograph intervals = 293
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
------------------------------------------------------------------------
------------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
------------------------------------------------------------------------
------------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
------------------------------------------------------------------------
  0.000      0.000      0.000      0.000        0.000
  0.010      0.001      0.410     -0.000        0.002
  0.100      0.002      0.410      0.001        0.003
  1.100      0.009      0.410      0.008        0.010
  2.750      0.063      0.410      0.062        0.064
  4.500      0.141      0.410      0.140        0.142
  6.250      0.209      0.410      0.208        0.210
  8.000      0.264      0.410      0.263        0.265
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8.100	0.266	0.410	0.265	0.267
9.000	0.283	0.410	0.282	0.284
9.100	0.284	0.460	0.282	0.286
9.500	0.285	1.670	0.279	0.291
10.000	0.286	2.920	0.276	0.296

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	2.0	4.08	6.12	8.16	Depth (Ft.)
0.083	0.00	0.00	0.000	O	|	|	|	|	0.00
0.167	0.00	0.00	0.000	O	|	|	|	|	0.00
0.250	0.00	0.00	0.000	O	|	|	|	|	0.00
0.333	0.00	0.00	0.000	O	|	|	|	|	0.00
0.417	0.00	0.00	0.000	O	|	|	|	|	0.00
0.500	0.00	0.00	0.000	O	|	|	|	|	0.00
0.583	0.00	0.00	0.000	O	|	|	|	|	0.00
0.667	0.00	0.00	0.000	O	|	|	|	|	0.00
0.750	0.00	0.00	0.000	O	|	|	|	|	0.00
0.833	0.00	0.00	0.000	O	|	|	|	|	0.00
0.917	0.00	0.00	0.000	O	|	|	|	|	0.00
1.000	0.00	0.00	0.000	O	|	|	|	|	0.00
1.083	0.00	0.00	0.000	O	|	|	|	|	0.00
1.167	0.00	0.00	0.000	O	|	|	|	|	0.00
1.250	0.00	0.00	0.000	O	|	|	|	|	0.00
1.333	0.00	0.00	0.000	O	|	|	|	|	0.00
1.417	0.00	0.00	0.000	O	|	|	|	|	0.00
1.500	0.00	0.00	0.000	O	|	|	|	|	0.00
1.583	0.00	0.00	0.000	O	|	|	|	|	0.00
1.667	0.00	0.00	0.000	O	|	|	|	|	0.00
1.750	0.00	0.00	0.000	O	|	|	|	|	0.00
1.833	0.00	0.00	0.000	O	|	|	|	|	0.00
1.917	0.00	0.00	0.000	O	|	|	|	|	0.00
2.000	0.00	0.00	0.000	O	|	|	|	|	0.00
2.083	0.00	0.00	0.000	O	|	|	|	|	0.00
2.167	0.00	0.00	0.000	O	|	|	|	|	0.00
2.250	0.00	0.00	0.000	O	|	|	|	|	0.00
2.333	0.00	0.00	0.000	O	|	|	|	|	0.00
2.417	0.00	0.00	0.000	O	|	|	|	|	0.00
2.500	0.00	0.00	0.000	O	|	|	|	|	0.00
2.583	0.00	0.00	0.000	O	|	|	|	|	0.00
2.667	0.00	0.00	0.000	O	|	|	|	|	0.00
2.750	0.00	0.00	0.000	O	|	|	|	|	0.00
2.833	0.00	0.00	0.000	O	|	|	|	|	0.00
2.917	0.00	0.00	0.000	O	|	|	|	|	0.00
3.000	0.00	0.00	0.000	O	|	|	|	|	0.00
3.083	0.00	0.00	0.000	O	|	|	|	|	0.00

3.167	0.00	0.00	0.000	O				0.00
3.250	0.00	0.00	0.000	O				0.00
3.333	0.00	0.00	0.000	O				0.00
3.417	0.00	0.00	0.000	O				0.00
3.500	0.00	0.00	0.000	O				0.00
3.583	0.00	0.00	0.000	O				0.00
3.667	0.00	0.00	0.000	O				0.00
3.750	0.00	0.00	0.000	O				0.00
3.833	0.00	0.00	0.000	O				0.00
3.917	0.00	0.00	0.000	O				0.00
4.000	0.00	0.00	0.000	O				0.00
4.083	0.00	0.00	0.000	O				0.00
4.167	0.00	0.00	0.000	O				0.00
4.250	0.00	0.00	0.000	O				0.00
4.333	0.00	0.00	0.000	O				0.00
4.417	0.00	0.00	0.000	O				0.00
4.500	0.00	0.00	0.000	O				0.00
4.583	0.00	0.00	0.000	O				0.00
4.667	0.00	0.00	0.000	O				0.00
4.750	0.00	0.00	0.000	O				0.00
4.833	0.00	0.00	0.000	O				0.00
4.917	0.00	0.00	0.000	O				0.00
5.000	0.00	0.00	0.000	O				0.00
5.083	0.00	0.00	0.000	O				0.00
5.167	0.00	0.00	0.000	O				0.00
5.250	0.00	0.00	0.000	O				0.00
5.333	0.00	0.00	0.000	O				0.00
5.417	0.00	0.00	0.000	O				0.00
5.500	0.00	0.00	0.000	O				0.00
5.583	0.00	0.00	0.000	O				0.00
5.667	0.00	0.00	0.000	O				0.00
5.750	0.00	0.00	0.000	O				0.00
5.833	0.00	0.00	0.000	O				0.00
5.917	0.00	0.00	0.000	O				0.00
6.000	0.00	0.00	0.000	O				0.00
6.083	0.00	0.00	0.000	O				0.00
6.167	0.00	0.00	0.000	O				0.00
6.250	0.00	0.00	0.000	O				0.00
6.333	0.00	0.00	0.000	O				0.00
6.417	0.00	0.00	0.000	O				0.00
6.500	0.00	0.00	0.000	O				0.00
6.583	0.00	0.00	0.000	O				0.00
6.667	0.00	0.00	0.000	O				0.00
6.750	0.00	0.00	0.000	O				0.00
6.833	0.00	0.00	0.000	O				0.00
6.917	0.00	0.00	0.000	O				0.00
7.000	0.00	0.00	0.000	O				0.00
7.083	0.00	0.00	0.000	O				0.00
7.167	0.00	0.00	0.000	O				0.00
7.250	0.00	0.00	0.000	O				0.00

7.333	0.00	0.00	0.000	O				0.00
7.417	0.00	0.00	0.000	O				0.00
7.500	0.00	0.00	0.000	O				0.00
7.583	0.00	0.00	0.000	O				0.00
7.667	0.00	0.00	0.000	O				0.00
7.750	0.00	0.00	0.000	O				0.00
7.833	0.00	0.00	0.000	O				0.00
7.917	0.00	0.00	0.000	O				0.00
8.000	0.00	0.00	0.000	O				0.00
8.083	0.00	0.00	0.000	O				0.00
8.167	0.00	0.00	0.000	O				0.00
8.250	0.00	0.00	0.000	O				0.00
8.333	0.00	0.00	0.000	O				0.00
8.417	0.00	0.00	0.000	O				0.00
8.500	0.00	0.00	0.000	O				0.00
8.583	0.00	0.00	0.000	O				0.00
8.667	0.00	0.00	0.000	O				0.00
8.750	0.00	0.00	0.000	O				0.00
8.833	0.00	0.00	0.000	O				0.00
8.917	0.00	0.00	0.000	O				0.00
9.000	0.00	0.00	0.000	O				0.00
9.083	0.00	0.00	0.000	O				0.00
9.167	0.00	0.00	0.000	O				0.00
9.250	0.00	0.00	0.000	O				0.00
9.333	0.00	0.00	0.000	O				0.00
9.417	0.00	0.00	0.000	O				0.00
9.500	0.00	0.00	0.000	O				0.00
9.583	0.00	0.00	0.000	O				0.00
9.667	0.00	0.00	0.000	O				0.00
9.750	0.00	0.00	0.000	O				0.00
9.833	0.00	0.00	0.000	O				0.00
9.917	0.00	0.00	0.000	O				0.00
10.000	0.00	0.00	0.000	O				0.00
10.083	0.00	0.00	0.000	O				0.00
10.167	0.00	0.00	0.000	O				0.00
10.250	0.00	0.00	0.000	O				0.00
10.333	0.00	0.00	0.000	O				0.00
10.417	0.00	0.00	0.000	O				0.00
10.500	0.00	0.00	0.000	O				0.00
10.583	0.00	0.00	0.000	O				0.00
10.667	0.00	0.00	0.000	O				0.00
10.750	0.00	0.00	0.000	O				0.00
10.833	0.00	0.00	0.000	O				0.00
10.917	0.00	0.00	0.000	O				0.00
11.000	0.00	0.00	0.000	O				0.00
11.083	0.00	0.00	0.000	O				0.00
11.167	0.00	0.00	0.000	O				0.00
11.250	0.00	0.00	0.000	O				0.00
11.333	0.00	0.00	0.000	O				0.00
11.417	0.00	0.00	0.000	O				0.00

11.500	0.00	0.00	0.000	O	|	|	|	0.00
11.583	0.00	0.00	0.000	O	|	|	|	0.00
11.667	0.00	0.00	0.000	O	|	|	|	0.00
11.750	0.00	0.00	0.000	O	|	|	|	0.00
11.833	0.00	0.00	0.000	O	|	|	|	0.00
11.917	0.00	0.00	0.000	O	|	|	|	0.00
12.000	0.00	0.00	0.000	O	|	|	|	0.00
12.083	0.00	0.00	0.000	O	|	|	|	0.00
12.167	0.00	0.00	0.000	O	|	|	|	0.00
12.250	0.00	0.00	0.000	O	|	|	|	0.00
12.333	0.00	0.00	0.000	O	|	|	|	0.00
12.417	0.00	0.00	0.000	O	|	|	|	0.00
12.500	0.00	0.00	0.000	O	|	|	|	0.00
12.583	0.00	0.00	0.000	O	|	|	|	0.00
12.667	0.00	0.00	0.000	O	|	|	|	0.00
12.750	0.00	0.00	0.000	O	|	|	|	0.00
12.833	0.00	0.00	0.000	O	|	|	|	0.00
12.917	0.00	0.00	0.000	O	|	|	|	0.00
13.000	0.00	0.00	0.000	O	|	|	|	0.00
13.083	0.00	0.00	0.000	O	|	|	|	0.00
13.167	0.00	0.00	0.000	O	|	|	|	0.00
13.250	0.00	0.00	0.000	O	|	|	|	0.00
13.333	0.00	0.00	0.000	O	|	|	|	0.00
13.417	0.00	0.00	0.000	O	|	|	|	0.00
13.500	0.00	0.00	0.000	O	|	|	|	0.00
13.583	0.00	0.00	0.000	O	|	|	|	0.00
13.667	0.00	0.00	0.000	O	|	|	|	0.00
13.750	0.00	0.00	0.000	O	|	|	|	0.00
13.833	0.00	0.00	0.000	O	|	|	|	0.00
13.917	0.00	0.00	0.000	O	|	|	|	0.00
14.000	0.00	0.00	0.000	O	|	|	|	0.00
14.083	0.00	0.00	0.000	O	|	|	|	0.00
14.167	0.00	0.00	0.000	O	|	|	|	0.00
14.250	0.00	0.00	0.000	O	|	|	|	0.00
14.333	0.00	0.00	0.000	O	|	|	|	0.00
14.417	0.00	0.00	0.000	O	|	|	|	0.00
14.500	0.00	0.00	0.000	O	|	|	|	0.00
14.583	0.00	0.00	0.000	O	|	|	|	0.00
14.667	0.00	0.00	0.000	O	|	|	|	0.00
14.750	0.00	0.00	0.000	O	|	|	|	0.00
14.833	0.00	0.00	0.000	O	|	|	|	0.00
14.917	0.00	0.00	0.000	O	|	|	|	0.00
15.000	0.00	0.00	0.000	O	|	|	|	0.00
15.083	0.00	0.00	0.000	O	|	|	|	0.00
15.167	0.00	0.00	0.000	O	|	|	|	0.00
15.250	0.00	0.00	0.000	O	|	|	|	0.00
15.333	0.00	0.00	0.000	O	|	|	|	0.00
15.417	0.06	0.04	0.000	O	|	|	|	0.00
15.500	0.42	0.28	0.001	|O	|	|	|	0.01
15.583	0.86	0.41	0.003	|O I	|	|	|	0.20

15.667	1.12	0.41	0.007	|O I |	|	|	|	0.77
15.750	1.32	0.41	0.012	|O I |	|	|	|	1.20
15.833	1.58	0.41	0.019	|O I |	|	|	|	1.42
15.917	1.95	0.41	0.029	|O I|	|	|	|	1.70
16.000	2.61	0.41	0.042	|O | I |	|	|	|	2.10
16.083	4.32	0.41	0.063	|O | | I |	|	|	2.74
16.167	8.04	0.41	0.102	|O | | |	|	I|	3.64
16.250	8.16	0.41	0.155	|O | | |	|	I |	4.87
16.333	4.12	0.41	0.195	|O | | I |	|	|	5.89
16.417	2.02	0.41	0.213	|O I|	|	|	|	6.38
16.500	1.01	0.41	0.221	|O I |	|	|	|	6.63
16.583	0.26	0.41	0.222	|O |	|	|	|	6.68
16.667	0.06	0.41	0.221	IO |	|	|	|	6.62
16.750	0.02	0.41	0.218	IO |	|	|	|	6.54
16.833	0.00	0.41	0.215	IO |	|	|	|	6.45
16.917	0.00	0.41	0.213	IO |	|	|	|	6.36
17.000	0.00	0.41	0.210	IO |	|	|	|	6.27
17.083	0.00	0.41	0.207	IO |	|	|	|	6.20
17.167	0.00	0.41	0.204	IO |	|	|	|	6.12
17.250	0.00	0.41	0.201	IO |	|	|	|	6.05
17.333	0.00	0.41	0.198	IO |	|	|	|	5.98
17.417	0.00	0.41	0.196	IO |	|	|	|	5.91
17.500	0.00	0.41	0.193	IO |	|	|	|	5.83
17.583	0.00	0.41	0.190	IO |	|	|	|	5.76
17.667	0.00	0.41	0.187	IO |	|	|	|	5.69
17.750	0.00	0.41	0.184	IO |	|	|	|	5.62
17.833	0.00	0.41	0.182	IO |	|	|	|	5.54
17.917	0.00	0.41	0.179	IO |	|	|	|	5.47
18.000	0.00	0.41	0.176	IO |	|	|	|	5.40
18.083	0.00	0.41	0.173	IO |	|	|	|	5.33
18.167	0.00	0.41	0.170	IO |	|	|	|	5.25
18.250	0.00	0.41	0.167	IO |	|	|	|	5.18
18.333	0.00	0.41	0.165	IO |	|	|	|	5.11
18.417	0.00	0.41	0.162	IO |	|	|	|	5.03
18.500	0.00	0.41	0.159	IO |	|	|	|	4.96
18.583	0.00	0.41	0.156	IO |	|	|	|	4.89
18.667	0.00	0.41	0.153	IO |	|	|	|	4.82
18.750	0.00	0.41	0.150	IO |	|	|	|	4.74
18.833	0.00	0.41	0.148	IO |	|	|	|	4.67
18.917	0.00	0.41	0.145	IO |	|	|	|	4.60
19.000	0.00	0.41	0.142	IO |	|	|	|	4.53
19.083	0.00	0.41	0.139	IO |	|	|	|	4.46
19.167	0.00	0.41	0.136	IO |	|	|	|	4.40
19.250	0.00	0.41	0.134	IO |	|	|	|	4.33
19.333	0.00	0.41	0.131	IO |	|	|	|	4.27
19.417	0.00	0.41	0.128	IO |	|	|	|	4.21
19.500	0.00	0.41	0.125	IO |	|	|	|	4.14
19.583	0.00	0.41	0.122	IO |	|	|	|	4.08
19.667	0.00	0.41	0.119	IO |	|	|	|	4.02
19.750	0.00	0.41	0.117	IO |	|	|	|	3.95

19.833	0.00	0.41	0.114	IO				3.89
19.917	0.00	0.41	0.111	IO				3.83
20.000	0.00	0.41	0.108	IO				3.76
20.083	0.00	0.41	0.105	IO				3.70
20.167	0.00	0.41	0.103	IO				3.64
20.250	0.00	0.41	0.100	IO				3.57
20.333	0.00	0.41	0.097	IO				3.51
20.417	0.00	0.41	0.094	IO				3.45
20.500	0.00	0.41	0.091	IO				3.38
20.583	0.00	0.41	0.088	IO				3.32
20.667	0.00	0.41	0.086	IO				3.26
20.750	0.00	0.41	0.083	IO				3.19
20.833	0.00	0.41	0.080	IO				3.13
20.917	0.00	0.41	0.077	IO				3.07
21.000	0.00	0.41	0.074	IO				3.00
21.083	0.00	0.41	0.071	IO				2.94
21.167	0.00	0.41	0.069	IO				2.88
21.250	0.00	0.41	0.066	IO				2.81
21.333	0.00	0.41	0.063	IO				2.75
21.417	0.00	0.41	0.060	IO				2.66
21.500	0.00	0.41	0.057	IO				2.58
21.583	0.00	0.41	0.055	IO				2.49
21.667	0.00	0.41	0.052	IO				2.40
21.750	0.00	0.41	0.049	IO				2.32
21.833	0.00	0.41	0.046	IO				2.23
21.917	0.00	0.41	0.043	IO				2.15
22.000	0.00	0.41	0.040	IO				2.06
22.083	0.00	0.41	0.038	IO				1.97
22.167	0.00	0.41	0.035	IO				1.89
22.250	0.00	0.41	0.032	IO				1.80
22.333	0.00	0.41	0.029	IO				1.71
22.417	0.00	0.41	0.026	IO				1.63
22.500	0.00	0.41	0.023	IO				1.54
22.583	0.00	0.41	0.021	IO				1.46
22.667	0.00	0.41	0.018	IO				1.37
22.750	0.00	0.41	0.015	IO				1.28
22.833	0.00	0.41	0.012	IO				1.20
22.917	0.00	0.41	0.009	IO				1.11
23.000	0.00	0.41	0.007	IO				0.75
23.083	0.00	0.41	0.004	IO				0.34
23.167	0.00	0.39	0.001	IO				0.01
23.250	0.00	0.00	0.000	O				0.00
23.333	0.00	0.01	0.000	O				0.00
23.417	0.00	0.00	0.000	O				0.00
23.500	0.00	0.00	0.000	O				0.00
23.583	0.00	0.00	0.000	O				0.00
23.667	0.00	0.00	0.000	O				0.00
23.750	0.00	0.00	0.000	O				0.00
23.833	0.00	0.00	0.000	O				0.00
23.917	0.00	0.00	0.000	O				0.00

24.000	0.00	0.00	0.000	O	|	|	|	|	0.00
24.083	0.00	0.00	0.000	O	|	|	|	|	0.00
24.167	0.00	0.00	0.000	O	|	|	|	|	0.00
24.250	0.00	0.00	0.000	O	|	|	|	|	0.00
24.333	0.00	0.00	0.000	O	|	|	|	|	0.00
24.417	0.00	0.00	0.000	O	|	|	|	|	0.00
24.500	0.00	0.00	0.000	O	|	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 294
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.410 (CFS)
Total volume = 0.262 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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                  FLOOD HYDROGRAPH ROUTING PROGRAM
            Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                        Study date: 07/24/24
------------------------------------------------------------------------
JN 4113 FLOOD ROUTING
25 YEAR 3 HOUR STORM
------------------------------------------------------------------------
Program License Serial Number 5016
------------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************
                From study/file name: 4113UH25Y3H.rte
****************************HYDROGRAPH DATA****************************
                Number of intervals =    41
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       10.272 (CFS)
                Total volume =       0.336 (Ac.Ft)
        Status of hydrographs being held in storage
                    Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
************************************************************************
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** RETARDING BASIN ROUTING ****
________________________________________________________________________
User entry of depth-outflow-storage data
------------------------------------------------------------------------
Total number of inflow hydrograph intervals = 41
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
------------------------------------------------------------------------
------------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
------------------------------------------------------------------------
------------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
------------------------------------------------------------------------
  0.000      0.000      0.000      0.000        0.000
  0.010      0.001      0.410     -0.000        0.002
  0.100      0.002      0.410      0.001        0.003
  1.100      0.009      0.410      0.008        0.010
  2.750      0.063      0.410      0.062        0.064
  4.500      0.141      0.410      0.140        0.142
  6.250      0.209      0.410      0.208        0.210
  8.000      0.264      0.410      0.263        0.265
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8.100	0.266	0.410	0.265	0.267
9.000	0.283	0.410	0.282	0.284
9.100	0.284	0.460	0.282	0.286
9.500	0.285	1.670	0.279	0.291
10.000	0.286	2.920	0.276	0.296

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 2.6 5.14 7.70 10.27	Depth (Ft.)
0.083	0.00	0.00	0.000	O | | | |	0.00
0.167	0.00	0.00	0.000	O | | | |	0.00
0.250	0.00	0.00	0.000	O | | | |	0.00
0.333	0.00	0.00	0.000	O | | | |	0.00
0.417	0.00	0.00	0.000	O | | | |	0.00
0.500	0.00	0.00	0.000	O | | | |	0.00
0.583	0.00	0.00	0.000	O | | | |	0.00
0.667	0.00	0.00	0.000	O | | | |	0.00
0.750	0.00	0.00	0.000	O | | | |	0.00
0.833	0.00	0.00	0.000	O | | | |	0.00
0.917	0.00	0.00	0.000	O | | | |	0.00
1.000	0.00	0.00	0.000	O | | | |	0.00
1.083	0.00	0.00	0.000	O | | | |	0.00
1.167	0.00	0.00	0.000	O | | | |	0.00
1.250	0.00	0.00	0.000	O | | | |	0.00
1.333	0.00	0.00	0.000	O | | | |	0.00
1.417	0.09	0.05	0.000	O | | | |	0.00
1.500	0.57	0.37	0.001	|O | | |	0.01
1.583	1.17	0.41	0.004	|O I | | |	0.41
1.667	1.51	0.41	0.011	|O I | | |	1.15
1.750	1.77	0.41	0.019	|O I | | |	1.41
1.833	2.10	0.41	0.030	|O I | | |	1.73
1.917	2.55	0.41	0.043	|O I| | |	2.13
2.000	3.39	0.41	0.060	|O | I | |	2.67
2.083	5.52	0.41	0.088	|O | |I | |	3.32
2.167	10.17	0.41	0.139	|O | | | I|	4.47
2.250	10.27	0.41	0.207	|O | | | I	6.20
2.333	5.24	0.41	0.258	|O | | I | |	7.80
2.417	2.62	0.41	0.282	|O | I | |	8.94
2.500	1.33	2.44	0.286	| I O| | |	9.81
2.583	0.34	0.41	0.282	|O | | |	8.92
2.667	0.08	0.41	0.280	IO | | |	8.85
2.750	0.02	0.41	0.278	IO | | |	8.72
2.833	0.00	0.41	0.275	IO | | |	8.58
2.917	0.00	0.41	0.272	IO | | |	8.43
3.000	0.00	0.41	0.269	IO | | |	8.28
3.083	0.00	0.41	0.267	IO | | |	8.13

3.167	0.00	0.41	0.264	IO				7.99
3.250	0.00	0.41	0.261	IO				7.90
3.333	0.00	0.41	0.258	IO				7.81
3.417	0.00	0.41	0.255	IO				7.72
3.500	0.00	0.41	0.252	IO				7.63
3.583	0.00	0.41	0.250	IO				7.54
3.667	0.00	0.41	0.247	IO				7.45
3.750	0.00	0.41	0.244	IO				7.36
3.833	0.00	0.41	0.241	IO				7.27
3.917	0.00	0.41	0.238	IO				7.18
4.000	0.00	0.41	0.235	IO				7.09
4.083	0.00	0.41	0.233	IO				7.00
4.167	0.00	0.41	0.230	IO				6.91
4.250	0.00	0.41	0.227	IO				6.82
4.333	0.00	0.41	0.224	IO				6.73
4.417	0.00	0.41	0.221	IO				6.64
4.500	0.00	0.41	0.219	IO				6.55
4.583	0.00	0.41	0.216	IO				6.46
4.667	0.00	0.41	0.213	IO				6.37
4.750	0.00	0.41	0.210	IO				6.28
4.833	0.00	0.41	0.207	IO				6.20
4.917	0.00	0.41	0.204	IO				6.13
5.000	0.00	0.41	0.202	IO				6.06
5.083	0.00	0.41	0.199	IO				5.99
5.167	0.00	0.41	0.196	IO				5.91
5.250	0.00	0.41	0.193	IO				5.84
5.333	0.00	0.41	0.190	IO				5.77
5.417	0.00	0.41	0.187	IO				5.70
5.500	0.00	0.41	0.185	IO				5.62
5.583	0.00	0.41	0.182	IO				5.55
5.667	0.00	0.41	0.179	IO				5.48
5.750	0.00	0.41	0.176	IO				5.41
5.833	0.00	0.41	0.173	IO				5.33
5.917	0.00	0.41	0.171	IO				5.26
6.000	0.00	0.41	0.168	IO				5.19
6.083	0.00	0.41	0.165	IO				5.11
6.167	0.00	0.41	0.162	IO				5.04
6.250	0.00	0.41	0.159	IO				4.97
6.333	0.00	0.41	0.156	IO				4.90
6.417	0.00	0.41	0.154	IO				4.82
6.500	0.00	0.41	0.151	IO				4.75
6.583	0.00	0.41	0.148	IO				4.68
6.667	0.00	0.41	0.145	IO				4.61
6.750	0.00	0.41	0.142	IO				4.53
6.833	0.00	0.41	0.139	IO				4.47
6.917	0.00	0.41	0.137	IO				4.40
7.000	0.00	0.41	0.134	IO				4.34
7.083	0.00	0.41	0.131	IO				4.28
7.167	0.00	0.41	0.128	IO				4.21
7.250	0.00	0.41	0.125	IO				4.15

7.333	0.00	0.41	0.123	IO	|	|	|	4.09
7.417	0.00	0.41	0.120	IO	|	|	|	4.02
7.500	0.00	0.41	0.117	IO	|	|	|	3.96
7.583	0.00	0.41	0.114	IO	|	|	|	3.90
7.667	0.00	0.41	0.111	IO	|	|	|	3.83
7.750	0.00	0.41	0.108	IO	|	|	|	3.77
7.833	0.00	0.41	0.106	IO	|	|	|	3.71
7.917	0.00	0.41	0.103	IO	|	|	|	3.64
8.000	0.00	0.41	0.100	IO	|	|	|	3.58
8.083	0.00	0.41	0.097	IO	|	|	|	3.52
8.167	0.00	0.41	0.094	IO	|	|	|	3.45
8.250	0.00	0.41	0.091	IO	|	|	|	3.39
8.333	0.00	0.41	0.089	IO	|	|	|	3.33
8.417	0.00	0.41	0.086	IO	|	|	|	3.26
8.500	0.00	0.41	0.083	IO	|	|	|	3.20
8.583	0.00	0.41	0.080	IO	|	|	|	3.14
8.667	0.00	0.41	0.077	IO	|	|	|	3.07
8.750	0.00	0.41	0.075	IO	|	|	|	3.01
8.833	0.00	0.41	0.072	IO	|	|	|	2.95
8.917	0.00	0.41	0.069	IO	|	|	|	2.88
9.000	0.00	0.41	0.066	IO	|	|	|	2.82
9.083	0.00	0.41	0.063	IO	|	|	|	2.76
9.167	0.00	0.41	0.060	IO	|	|	|	2.67
9.250	0.00	0.41	0.058	IO	|	|	|	2.58
9.333	0.00	0.41	0.055	IO	|	|	|	2.50
9.417	0.00	0.41	0.052	IO	|	|	|	2.41
9.500	0.00	0.41	0.049	IO	|	|	|	2.33
9.583	0.00	0.41	0.046	IO	|	|	|	2.24
9.667	0.00	0.41	0.043	IO	|	|	|	2.15
9.750	0.00	0.41	0.041	IO	|	|	|	2.07
9.833	0.00	0.41	0.038	IO	|	|	|	1.98
9.917	0.00	0.41	0.035	IO	|	|	|	1.89
10.000	0.00	0.41	0.032	IO	|	|	|	1.81
10.083	0.00	0.41	0.029	IO	|	|	|	1.72
10.167	0.00	0.41	0.027	IO	|	|	|	1.64
10.250	0.00	0.41	0.024	IO	|	|	|	1.55
10.333	0.00	0.41	0.021	IO	|	|	|	1.46
10.417	0.00	0.41	0.018	IO	|	|	|	1.38
10.500	0.00	0.41	0.015	IO	|	|	|	1.29
10.583	0.00	0.41	0.012	IO	|	|	|	1.20
10.667	0.00	0.41	0.010	IO	|	|	|	1.12
10.750	0.00	0.41	0.007	IO	|	|	|	0.78
10.833	0.00	0.41	0.004	IO	|	|	|	0.38
10.917	0.00	0.41	0.001	IO	|	|	|	0.02
11.000	0.00	0.00	0.000	O	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 132

Time interval = 5.0 (Min.)

Maximum/Peak flow rate = 2.437 (CFS)

```
                Total volume =       0.336 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
****************************************************************************

----------------------------------------------------------------------
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```
                  FLOOD HYDROGRAPH ROUTING PROGRAM
            Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                        Study date: 07/24/24
------------------------------------------------------------------------
JN 4113 FLOOD ROUTING
25 YEAR 24 HOUR STORM
------------------------------------------------------------------------
Program License Serial Number 5016
------------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************
                From study/file name: 4113UH25Y24H.rte
*****************************HYDROGRAPH DATA*****************************
                Number of intervals =   293
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       10.272 (CFS)
                Total volume =       0.336 (Ac.Ft)
        Status of hydrographs being held in storage
                    Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
************************************************************************
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** RETARDING BASIN ROUTING ****
________________________________________________________________________
User entry of depth-outflow-storage data
------------------------------------------------------------------------
Total number of inflow hydrograph intervals = 293
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
------------------------------------------------------------------------
------------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
------------------------------------------------------------------------
------------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
------------------------------------------------------------------------
  0.000      0.000      0.000      0.000        0.000
  0.010      0.001      0.410     -0.000        0.002
  0.100      0.002      0.410      0.001        0.003
  1.100      0.009      0.410      0.008        0.010
  2.750      0.063      0.410      0.062        0.064
  4.500      0.141      0.410      0.140        0.142
  6.250      0.209      0.410      0.208        0.210
  8.000      0.264      0.410      0.263        0.265
```

8.100	0.266	0.410	0.265	0.267
9.000	0.283	0.410	0.282	0.284
9.100	0.284	0.460	0.282	0.286
9.500	0.285	1.670	0.279	0.291
10.000	0.286	2.920	0.276	0.296

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	2.6	5.14	7.70	10.27	Depth (Ft.)
0.083	0.00	0.00	0.000	O	|	|	|	|	0.00
0.167	0.00	0.00	0.000	O	|	|	|	|	0.00
0.250	0.00	0.00	0.000	O	|	|	|	|	0.00
0.333	0.00	0.00	0.000	O	|	|	|	|	0.00
0.417	0.00	0.00	0.000	O	|	|	|	|	0.00
0.500	0.00	0.00	0.000	O	|	|	|	|	0.00
0.583	0.00	0.00	0.000	O	|	|	|	|	0.00
0.667	0.00	0.00	0.000	O	|	|	|	|	0.00
0.750	0.00	0.00	0.000	O	|	|	|	|	0.00
0.833	0.00	0.00	0.000	O	|	|	|	|	0.00
0.917	0.00	0.00	0.000	O	|	|	|	|	0.00
1.000	0.00	0.00	0.000	O	|	|	|	|	0.00
1.083	0.00	0.00	0.000	O	|	|	|	|	0.00
1.167	0.00	0.00	0.000	O	|	|	|	|	0.00
1.250	0.00	0.00	0.000	O	|	|	|	|	0.00
1.333	0.00	0.00	0.000	O	|	|	|	|	0.00
1.417	0.00	0.00	0.000	O	|	|	|	|	0.00
1.500	0.00	0.00	0.000	O	|	|	|	|	0.00
1.583	0.00	0.00	0.000	O	|	|	|	|	0.00
1.667	0.00	0.00	0.000	O	|	|	|	|	0.00
1.750	0.00	0.00	0.000	O	|	|	|	|	0.00
1.833	0.00	0.00	0.000	O	|	|	|	|	0.00
1.917	0.00	0.00	0.000	O	|	|	|	|	0.00
2.000	0.00	0.00	0.000	O	|	|	|	|	0.00
2.083	0.00	0.00	0.000	O	|	|	|	|	0.00
2.167	0.00	0.00	0.000	O	|	|	|	|	0.00
2.250	0.00	0.00	0.000	O	|	|	|	|	0.00
2.333	0.00	0.00	0.000	O	|	|	|	|	0.00
2.417	0.00	0.00	0.000	O	|	|	|	|	0.00
2.500	0.00	0.00	0.000	O	|	|	|	|	0.00
2.583	0.00	0.00	0.000	O	|	|	|	|	0.00
2.667	0.00	0.00	0.000	O	|	|	|	|	0.00
2.750	0.00	0.00	0.000	O	|	|	|	|	0.00
2.833	0.00	0.00	0.000	O	|	|	|	|	0.00
2.917	0.00	0.00	0.000	O	|	|	|	|	0.00
3.000	0.00	0.00	0.000	O	|	|	|	|	0.00
3.083	0.00	0.00	0.000	O	|	|	|	|	0.00

3.167	0.00	0.00	0.000	O				0.00
3.250	0.00	0.00	0.000	O				0.00
3.333	0.00	0.00	0.000	O				0.00
3.417	0.00	0.00	0.000	O				0.00
3.500	0.00	0.00	0.000	O				0.00
3.583	0.00	0.00	0.000	O				0.00
3.667	0.00	0.00	0.000	O				0.00
3.750	0.00	0.00	0.000	O				0.00
3.833	0.00	0.00	0.000	O				0.00
3.917	0.00	0.00	0.000	O				0.00
4.000	0.00	0.00	0.000	O				0.00
4.083	0.00	0.00	0.000	O				0.00
4.167	0.00	0.00	0.000	O				0.00
4.250	0.00	0.00	0.000	O				0.00
4.333	0.00	0.00	0.000	O				0.00
4.417	0.00	0.00	0.000	O				0.00
4.500	0.00	0.00	0.000	O				0.00
4.583	0.00	0.00	0.000	O				0.00
4.667	0.00	0.00	0.000	O				0.00
4.750	0.00	0.00	0.000	O				0.00
4.833	0.00	0.00	0.000	O				0.00
4.917	0.00	0.00	0.000	O				0.00
5.000	0.00	0.00	0.000	O				0.00
5.083	0.00	0.00	0.000	O				0.00
5.167	0.00	0.00	0.000	O				0.00
5.250	0.00	0.00	0.000	O				0.00
5.333	0.00	0.00	0.000	O				0.00
5.417	0.00	0.00	0.000	O				0.00
5.500	0.00	0.00	0.000	O				0.00
5.583	0.00	0.00	0.000	O				0.00
5.667	0.00	0.00	0.000	O				0.00
5.750	0.00	0.00	0.000	O				0.00
5.833	0.00	0.00	0.000	O				0.00
5.917	0.00	0.00	0.000	O				0.00
6.000	0.00	0.00	0.000	O				0.00
6.083	0.00	0.00	0.000	O				0.00
6.167	0.00	0.00	0.000	O				0.00
6.250	0.00	0.00	0.000	O				0.00
6.333	0.00	0.00	0.000	O				0.00
6.417	0.00	0.00	0.000	O				0.00
6.500	0.00	0.00	0.000	O				0.00
6.583	0.00	0.00	0.000	O				0.00
6.667	0.00	0.00	0.000	O				0.00
6.750	0.00	0.00	0.000	O				0.00
6.833	0.00	0.00	0.000	O				0.00
6.917	0.00	0.00	0.000	O				0.00
7.000	0.00	0.00	0.000	O				0.00
7.083	0.00	0.00	0.000	O				0.00
7.167	0.00	0.00	0.000	O				0.00
7.250	0.00	0.00	0.000	O				0.00

7.333	0.00	0.00	0.000	O				0.00
7.417	0.00	0.00	0.000	O				0.00
7.500	0.00	0.00	0.000	O				0.00
7.583	0.00	0.00	0.000	O				0.00
7.667	0.00	0.00	0.000	O				0.00
7.750	0.00	0.00	0.000	O				0.00
7.833	0.00	0.00	0.000	O				0.00
7.917	0.00	0.00	0.000	O				0.00
8.000	0.00	0.00	0.000	O				0.00
8.083	0.00	0.00	0.000	O				0.00
8.167	0.00	0.00	0.000	O				0.00
8.250	0.00	0.00	0.000	O				0.00
8.333	0.00	0.00	0.000	O				0.00
8.417	0.00	0.00	0.000	O				0.00
8.500	0.00	0.00	0.000	O				0.00
8.583	0.00	0.00	0.000	O				0.00
8.667	0.00	0.00	0.000	O				0.00
8.750	0.00	0.00	0.000	O				0.00
8.833	0.00	0.00	0.000	O				0.00
8.917	0.00	0.00	0.000	O				0.00
9.000	0.00	0.00	0.000	O				0.00
9.083	0.00	0.00	0.000	O				0.00
9.167	0.00	0.00	0.000	O				0.00
9.250	0.00	0.00	0.000	O				0.00
9.333	0.00	0.00	0.000	O				0.00
9.417	0.00	0.00	0.000	O				0.00
9.500	0.00	0.00	0.000	O				0.00
9.583	0.00	0.00	0.000	O				0.00
9.667	0.00	0.00	0.000	O				0.00
9.750	0.00	0.00	0.000	O				0.00
9.833	0.00	0.00	0.000	O				0.00
9.917	0.00	0.00	0.000	O				0.00
10.000	0.00	0.00	0.000	O				0.00
10.083	0.00	0.00	0.000	O				0.00
10.167	0.00	0.00	0.000	O				0.00
10.250	0.00	0.00	0.000	O				0.00
10.333	0.00	0.00	0.000	O				0.00
10.417	0.00	0.00	0.000	O				0.00
10.500	0.00	0.00	0.000	O				0.00
10.583	0.00	0.00	0.000	O				0.00
10.667	0.00	0.00	0.000	O				0.00
10.750	0.00	0.00	0.000	O				0.00
10.833	0.00	0.00	0.000	O				0.00
10.917	0.00	0.00	0.000	O				0.00
11.000	0.00	0.00	0.000	O				0.00
11.083	0.00	0.00	0.000	O				0.00
11.167	0.00	0.00	0.000	O				0.00
11.250	0.00	0.00	0.000	O				0.00
11.333	0.00	0.00	0.000	O				0.00
11.417	0.00	0.00	0.000	O				0.00

11.500	0.00	0.00	0.000	O	|	|	|	0.00
11.583	0.00	0.00	0.000	O	|	|	|	0.00
11.667	0.00	0.00	0.000	O	|	|	|	0.00
11.750	0.00	0.00	0.000	O	|	|	|	0.00
11.833	0.00	0.00	0.000	O	|	|	|	0.00
11.917	0.00	0.00	0.000	O	|	|	|	0.00
12.000	0.00	0.00	0.000	O	|	|	|	0.00
12.083	0.00	0.00	0.000	O	|	|	|	0.00
12.167	0.00	0.00	0.000	O	|	|	|	0.00
12.250	0.00	0.00	0.000	O	|	|	|	0.00
12.333	0.00	0.00	0.000	O	|	|	|	0.00
12.417	0.00	0.00	0.000	O	|	|	|	0.00
12.500	0.00	0.00	0.000	O	|	|	|	0.00
12.583	0.00	0.00	0.000	O	|	|	|	0.00
12.667	0.00	0.00	0.000	O	|	|	|	0.00
12.750	0.00	0.00	0.000	O	|	|	|	0.00
12.833	0.00	0.00	0.000	O	|	|	|	0.00
12.917	0.00	0.00	0.000	O	|	|	|	0.00
13.000	0.00	0.00	0.000	O	|	|	|	0.00
13.083	0.00	0.00	0.000	O	|	|	|	0.00
13.167	0.00	0.00	0.000	O	|	|	|	0.00
13.250	0.00	0.00	0.000	O	|	|	|	0.00
13.333	0.00	0.00	0.000	O	|	|	|	0.00
13.417	0.00	0.00	0.000	O	|	|	|	0.00
13.500	0.00	0.00	0.000	O	|	|	|	0.00
13.583	0.00	0.00	0.000	O	|	|	|	0.00
13.667	0.00	0.00	0.000	O	|	|	|	0.00
13.750	0.00	0.00	0.000	O	|	|	|	0.00
13.833	0.00	0.00	0.000	O	|	|	|	0.00
13.917	0.00	0.00	0.000	O	|	|	|	0.00
14.000	0.00	0.00	0.000	O	|	|	|	0.00
14.083	0.00	0.00	0.000	O	|	|	|	0.00
14.167	0.00	0.00	0.000	O	|	|	|	0.00
14.250	0.00	0.00	0.000	O	|	|	|	0.00
14.333	0.00	0.00	0.000	O	|	|	|	0.00
14.417	0.00	0.00	0.000	O	|	|	|	0.00
14.500	0.00	0.00	0.000	O	|	|	|	0.00
14.583	0.00	0.00	0.000	O	|	|	|	0.00
14.667	0.00	0.00	0.000	O	|	|	|	0.00
14.750	0.00	0.00	0.000	O	|	|	|	0.00
14.833	0.00	0.00	0.000	O	|	|	|	0.00
14.917	0.00	0.00	0.000	O	|	|	|	0.00
15.000	0.00	0.00	0.000	O	|	|	|	0.00
15.083	0.00	0.00	0.000	O	|	|	|	0.00
15.167	0.00	0.00	0.000	O	|	|	|	0.00
15.250	0.00	0.00	0.000	O	|	|	|	0.00
15.333	0.00	0.00	0.000	O	|	|	|	0.00
15.417	0.09	0.05	0.000	O	|	|	|	0.00
15.500	0.57	0.37	0.001	|O	|	|	|	0.01
15.583	1.17	0.41	0.004	|O I	|	|	|	0.41

15.667	1.51	0.41	0.011	|O I |	|	|	|	1.15
15.750	1.77	0.41	0.019	|O I |	|	|	|	1.41
15.833	2.10	0.41	0.030	|O I |	|	|	|	1.73
15.917	2.55	0.41	0.043	|O I|	|	|	|	2.13
16.000	3.39	0.41	0.060	|O | I	|	|	|	2.67
16.083	5.52	0.41	0.088	|O |	|I	|	|	3.32
16.167	10.17	0.41	0.139	|O |	|	|	I|	4.47
16.250	10.27	0.41	0.207	|O |	|	|	I	6.20
16.333	5.24	0.41	0.258	|O |	I	|	|	7.80
16.417	2.62	0.41	0.282	|O I	|	|	|	8.94
16.500	1.33	2.44	0.286	| I O|	|	|	|	9.81
16.583	0.34	0.41	0.282	|O |	|	|	|	8.92
16.667	0.08	0.41	0.280	IO |	|	|	|	8.85
16.750	0.02	0.41	0.278	IO |	|	|	|	8.72
16.833	0.00	0.41	0.275	IO |	|	|	|	8.58
16.917	0.00	0.41	0.272	IO |	|	|	|	8.43
17.000	0.00	0.41	0.269	IO |	|	|	|	8.28
17.083	0.00	0.41	0.267	IO |	|	|	|	8.13
17.167	0.00	0.41	0.264	IO |	|	|	|	7.99
17.250	0.00	0.41	0.261	IO |	|	|	|	7.90
17.333	0.00	0.41	0.258	IO |	|	|	|	7.81
17.417	0.00	0.41	0.255	IO |	|	|	|	7.72
17.500	0.00	0.41	0.252	IO |	|	|	|	7.63
17.583	0.00	0.41	0.250	IO |	|	|	|	7.54
17.667	0.00	0.41	0.247	IO |	|	|	|	7.45
17.750	0.00	0.41	0.244	IO |	|	|	|	7.36
17.833	0.00	0.41	0.241	IO |	|	|	|	7.27
17.917	0.00	0.41	0.238	IO |	|	|	|	7.18
18.000	0.00	0.41	0.236	IO |	|	|	|	7.09
18.083	0.00	0.41	0.233	IO |	|	|	|	7.00
18.167	0.00	0.41	0.230	IO |	|	|	|	6.92
18.250	0.00	0.41	0.227	IO |	|	|	|	6.83
18.333	0.00	0.41	0.224	IO |	|	|	|	6.74
18.417	0.00	0.41	0.221	IO |	|	|	|	6.65
18.500	0.00	0.41	0.219	IO |	|	|	|	6.56
18.583	0.00	0.41	0.216	IO |	|	|	|	6.47
18.667	0.00	0.41	0.213	IO |	|	|	|	6.38
18.750	0.00	0.41	0.210	IO |	|	|	|	6.29
18.833	0.00	0.41	0.207	IO |	|	|	|	6.21
18.917	0.00	0.41	0.205	IO |	|	|	|	6.13
19.000	0.00	0.41	0.202	IO |	|	|	|	6.06
19.083	0.00	0.41	0.199	IO |	|	|	|	5.99
19.167	0.00	0.41	0.196	IO |	|	|	|	5.92
19.250	0.00	0.41	0.193	IO |	|	|	|	5.84
19.333	0.00	0.41	0.190	IO |	|	|	|	5.77
19.417	0.00	0.41	0.188	IO |	|	|	|	5.70
19.500	0.00	0.41	0.185	IO |	|	|	|	5.63
19.583	0.00	0.41	0.182	IO |	|	|	|	5.55
19.667	0.00	0.41	0.179	IO |	|	|	|	5.48
19.750	0.00	0.41	0.176	IO |	|	|	|	5.41

19.833	0.00	0.41	0.173	IO				5.34
19.917	0.00	0.41	0.171	IO				5.26
20.000	0.00	0.41	0.168	IO				5.19
20.083	0.00	0.41	0.165	IO				5.12
20.167	0.00	0.41	0.162	IO				5.05
20.250	0.00	0.41	0.159	IO				4.97
20.333	0.00	0.41	0.157	IO				4.90
20.417	0.00	0.41	0.154	IO				4.83
20.500	0.00	0.41	0.151	IO				4.75
20.583	0.00	0.41	0.148	IO				4.68
20.667	0.00	0.41	0.145	IO				4.61
20.750	0.00	0.41	0.142	IO				4.54
20.833	0.00	0.41	0.140	IO				4.47
20.917	0.00	0.41	0.137	IO				4.41
21.000	0.00	0.41	0.134	IO				4.34
21.083	0.00	0.41	0.131	IO				4.28
21.167	0.00	0.41	0.128	IO				4.22
21.250	0.00	0.41	0.125	IO				4.15
21.333	0.00	0.41	0.123	IO				4.09
21.417	0.00	0.41	0.120	IO				4.03
21.500	0.00	0.41	0.117	IO				3.96
21.583	0.00	0.41	0.114	IO				3.90
21.667	0.00	0.41	0.111	IO				3.84
21.750	0.00	0.41	0.109	IO				3.77
21.833	0.00	0.41	0.106	IO				3.71
21.917	0.00	0.41	0.103	IO				3.65
22.000	0.00	0.41	0.100	IO				3.58
22.083	0.00	0.41	0.097	IO				3.52
22.167	0.00	0.41	0.094	IO				3.46
22.250	0.00	0.41	0.092	IO				3.39
22.333	0.00	0.41	0.089	IO				3.33
22.417	0.00	0.41	0.086	IO				3.27
22.500	0.00	0.41	0.083	IO				3.20
22.583	0.00	0.41	0.080	IO				3.14
22.667	0.00	0.41	0.077	IO				3.08
22.750	0.00	0.41	0.075	IO				3.01
22.833	0.00	0.41	0.072	IO				2.95
22.917	0.00	0.41	0.069	IO				2.89
23.000	0.00	0.41	0.066	IO				2.82
23.083	0.00	0.41	0.063	IO				2.76
23.167	0.00	0.41	0.061	IO				2.68
23.250	0.00	0.41	0.058	IO				2.59
23.333	0.00	0.41	0.055	IO				2.50
23.417	0.00	0.41	0.052	IO				2.42
23.500	0.00	0.41	0.049	IO				2.33
23.583	0.00	0.41	0.046	IO				2.24
23.667	0.00	0.41	0.044	IO				2.16
23.750	0.00	0.41	0.041	IO				2.07
23.833	0.00	0.41	0.038	IO				1.99
23.917	0.00	0.41	0.035	IO				1.90

24.000	0.00	0.41	0.032	IO	|	|	|	| 1.81
24.083	0.00	0.41	0.030	IO	|	|	|	| 1.73
24.167	0.00	0.41	0.027	IO	|	|	|	| 1.64
24.250	0.00	0.41	0.024	IO	|	|	|	| 1.55
24.333	0.00	0.41	0.021	IO	|	|	|	| 1.47
24.417	0.00	0.41	0.018	IO	|	|	|	| 1.38
24.500	0.00	0.41	0.015	IO	|	|	|	| 1.30
24.583	0.00	0.41	0.013	IO	|	|	|	| 1.21
24.667	0.00	0.41	0.010	IO	|	|	|	| 1.12
24.750	0.00	0.41	0.007	IO	|	|	|	| 0.80
24.833	0.00	0.41	0.004	IO	|	|	|	| 0.40
24.917	0.00	0.41	0.001	IO	|	|	|	| 0.03
25.000	0.00	0.00	0.000	O	|	|	|	| 0.00

**********HYDROGRAPH DATA**********

Number of intervals = 300
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 2.437 (CFS)
Total volume = 0.336 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 07/01/24

JN 4113 FLOOD ROUTING
100 YEAR 3 HOUR STORM

Program License Serial Number 5016

********** HYDROGRAPH INFORMATION **********
From study/file name: 4113UH100Y3H.rte
**********HYDROGRAPH DATA**********
Number of intervals = 41
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 13.573 (CFS)
Total volume = 0.457 (Ac.Ft)
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****
++++++++++
Process from Point/Station 1.000 to Point/Station 2.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 41
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.010	0.001	0.410	-0.000	0.002
0.100	0.002	0.410	0.001	0.003
1.100	0.009	0.410	0.008	0.010
2.750	0.063	0.410	0.062	0.064
4.500	0.141	0.410	0.140	0.142
6.250	0.209	0.410	0.208	0.210
8.000	0.264	0.410	0.263	0.265

8.100	0.266	0.410	0.265	0.267
9.000	0.283	0.410	0.282	0.284
9.100	0.284	0.460	0.282	0.286
9.500	0.285	1.670	0.279	0.291
10.000	0.286	2.920	0.276	0.296

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 3.4 6.79 10.18 13.57	Depth (Ft.)
0.083	0.00	0.00	0.000	O | | | |	0.00
0.167	0.00	0.00	0.000	O | | | |	0.00
0.250	0.00	0.00	0.000	O | | | |	0.00
0.333	0.00	0.00	0.000	O | | | |	0.00
0.417	0.00	0.00	0.000	O | | | |	0.00
0.500	0.00	0.00	0.000	O | | | |	0.00
0.583	0.00	0.00	0.000	O | | | |	0.00
0.667	0.00	0.00	0.000	O | | | |	0.00
0.750	0.00	0.00	0.000	O | | | |	0.00
0.833	0.00	0.00	0.000	O | | | |	0.00
0.917	0.00	0.00	0.000	O | | | |	0.00
1.000	0.00	0.00	0.000	O | | | |	0.00
1.083	0.00	0.00	0.000	O | | | |	0.00
1.167	0.00	0.00	0.000	O | | | |	0.00
1.250	0.00	0.00	0.000	O | | | |	0.00
1.333	0.00	0.00	0.000	O | | | |	0.00
1.417	0.13	0.08	0.000	O | | | |	0.00
1.500	0.84	0.41	0.002	OI | | | |	0.09
1.583	1.73	0.41	0.008	O I | | | |	0.94
1.667	2.20	0.41	0.019	O I | | | |	1.39
1.750	2.55	0.41	0.032	O I | | | |	1.81
1.833	2.98	0.41	0.048	O I| | | |	2.30
1.917	3.57	0.41	0.068	O I | | |	2.86
2.000	4.66	0.41	0.094	O | I | | |	3.44
2.083	7.44	0.41	0.132	O | |I | |	4.31
2.167	13.50	0.41	0.202	O | | | I|	6.06
2.250	13.57	2.34	0.286	| O | | | I	9.77
2.333	7.02	11.25	0.296	| | | I | | O	14.93
2.417	3.62	0.41	0.279	O | I | | |	8.76
2.500	1.86	2.91	0.286	| I O | | | |	9.99
2.583	0.49	0.41	0.283	OI | | | |	8.98
2.667	0.12	0.41	0.282	O | | | |	8.94
2.750	0.03	0.41	0.280	O | | | |	8.82
2.833	0.00	0.41	0.277	O | | | |	8.68
2.917	0.00	0.41	0.274	O | | | |	8.53
3.000	0.00	0.41	0.271	O | | | |	8.38
3.083	0.00	0.41	0.268	O | | | |	8.23

3.167	0.00	0.41	0.266	O	|	|	|	8.08
3.250	0.00	0.41	0.263	O	|	|	|	7.96
3.333	0.00	0.41	0.260	O	|	|	|	7.87
3.417	0.00	0.41	0.257	O	|	|	|	7.78
3.500	0.00	0.41	0.254	O	|	|	|	7.69
3.583	0.00	0.41	0.251	O	|	|	|	7.60
3.667	0.00	0.41	0.249	O	|	|	|	7.51
3.750	0.00	0.41	0.246	O	|	|	|	7.42
3.833	0.00	0.41	0.243	O	|	|	|	7.33
3.917	0.00	0.41	0.240	O	|	|	|	7.24
4.000	0.00	0.41	0.237	O	|	|	|	7.15
4.083	0.00	0.41	0.235	O	|	|	|	7.06
4.167	0.00	0.41	0.232	O	|	|	|	6.97
4.250	0.00	0.41	0.229	O	|	|	|	6.88
4.333	0.00	0.41	0.226	O	|	|	|	6.79
4.417	0.00	0.41	0.223	O	|	|	|	6.70
4.500	0.00	0.41	0.220	O	|	|	|	6.61
4.583	0.00	0.41	0.218	O	|	|	|	6.52
4.667	0.00	0.41	0.215	O	|	|	|	6.43
4.750	0.00	0.41	0.212	O	|	|	|	6.34
4.833	0.00	0.41	0.209	O	|	|	|	6.25
4.917	0.00	0.41	0.206	O	|	|	|	6.18
5.000	0.00	0.41	0.203	O	|	|	|	6.11
5.083	0.00	0.41	0.201	O	|	|	|	6.04
5.167	0.00	0.41	0.198	O	|	|	|	5.96
5.250	0.00	0.41	0.195	O	|	|	|	5.89
5.333	0.00	0.41	0.192	O	|	|	|	5.82
5.417	0.00	0.41	0.189	O	|	|	|	5.74
5.500	0.00	0.41	0.187	O	|	|	|	5.67
5.583	0.00	0.41	0.184	O	|	|	|	5.60
5.667	0.00	0.41	0.181	O	|	|	|	5.53
5.750	0.00	0.41	0.178	O	|	|	|	5.45
5.833	0.00	0.41	0.175	O	|	|	|	5.38
5.917	0.00	0.41	0.172	O	|	|	|	5.31
6.000	0.00	0.41	0.170	O	|	|	|	5.24
6.083	0.00	0.41	0.167	O	|	|	|	5.16
6.167	0.00	0.41	0.164	O	|	|	|	5.09
6.250	0.00	0.41	0.161	O	|	|	|	5.02
6.333	0.00	0.41	0.158	O	|	|	|	4.95
6.417	0.00	0.41	0.155	O	|	|	|	4.87
6.500	0.00	0.41	0.153	O	|	|	|	4.80
6.583	0.00	0.41	0.150	O	|	|	|	4.73
6.667	0.00	0.41	0.147	O	|	|	|	4.65
6.750	0.00	0.41	0.144	O	|	|	|	4.58
6.833	0.00	0.41	0.141	O	|	|	|	4.51
6.917	0.00	0.41	0.139	O	|	|	|	4.44
7.000	0.00	0.41	0.136	O	|	|	|	4.38
7.083	0.00	0.41	0.133	O	|	|	|	4.32
7.167	0.00	0.41	0.130	O	|	|	|	4.25
7.250	0.00	0.41	0.127	O	|	|	|	4.19

7.333	0.00	0.41	0.124	O	|	|	|	4.13
7.417	0.00	0.41	0.122	O	|	|	|	4.06
7.500	0.00	0.41	0.119	O	|	|	|	4.00
7.583	0.00	0.41	0.116	O	|	|	|	3.94
7.667	0.00	0.41	0.113	O	|	|	|	3.87
7.750	0.00	0.41	0.110	O	|	|	|	3.81
7.833	0.00	0.41	0.107	O	|	|	|	3.75
7.917	0.00	0.41	0.105	O	|	|	|	3.68
8.000	0.00	0.41	0.102	O	|	|	|	3.62
8.083	0.00	0.41	0.099	O	|	|	|	3.56
8.167	0.00	0.41	0.096	O	|	|	|	3.49
8.250	0.00	0.41	0.093	O	|	|	|	3.43
8.333	0.00	0.41	0.091	O	|	|	|	3.37
8.417	0.00	0.41	0.088	O	|	|	|	3.30
8.500	0.00	0.41	0.085	O	|	|	|	3.24
8.583	0.00	0.41	0.082	O	|	|	|	3.18
8.667	0.00	0.41	0.079	O	|	|	|	3.11
8.750	0.00	0.41	0.076	O	|	|	|	3.05
8.833	0.00	0.41	0.074	O	|	|	|	2.99
8.917	0.00	0.41	0.071	O	|	|	|	2.92
9.000	0.00	0.41	0.068	O	|	|	|	2.86
9.083	0.00	0.41	0.065	O	|	|	|	2.80
9.167	0.00	0.41	0.062	O	|	|	|	2.73
9.250	0.00	0.41	0.059	O	|	|	|	2.64
9.333	0.00	0.41	0.057	O	|	|	|	2.56
9.417	0.00	0.41	0.054	O	|	|	|	2.47
9.500	0.00	0.41	0.051	O	|	|	|	2.38
9.583	0.00	0.41	0.048	O	|	|	|	2.30
9.667	0.00	0.41	0.045	O	|	|	|	2.21
9.750	0.00	0.41	0.043	O	|	|	|	2.12
9.833	0.00	0.41	0.040	O	|	|	|	2.04
9.917	0.00	0.41	0.037	O	|	|	|	1.95
10.000	0.00	0.41	0.034	O	|	|	|	1.87
10.083	0.00	0.41	0.031	O	|	|	|	1.78
10.167	0.00	0.41	0.028	O	|	|	|	1.69
10.250	0.00	0.41	0.026	O	|	|	|	1.61
10.333	0.00	0.41	0.023	O	|	|	|	1.52
10.417	0.00	0.41	0.020	O	|	|	|	1.43
10.500	0.00	0.41	0.017	O	|	|	|	1.35
10.583	0.00	0.41	0.014	O	|	|	|	1.26
10.667	0.00	0.41	0.011	O	|	|	|	1.18
10.750	0.00	0.41	0.009	O	|	|	|	1.05
10.833	0.00	0.41	0.006	O	|	|	|	0.65
10.917	0.00	0.41	0.003	O	|	|	|	0.24
11.000	0.00	0.27	0.001	O	|	|	|	0.01
11.083	0.00	0.00	0.000	O	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 133

Time interval = 5.0 (Min.)

```
                Maximum/Peak flow rate =       11.254 (CFS)
                Total volume =       0.457 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
****************************************************************************

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```

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                  FLOOD HYDROGRAPH ROUTING PROGRAM
            Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                        Study date: 07/01/24
------------------------------------------------------------------------
JN 4113 FLOOD ROUTING
100 YEAR 24 HOUR STORM
------------------------------------------------------------------------
Program License Serial Number 5016
------------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************
                From study/file name: 4113UH100Y24H.rte
****************************HYDROGRAPH DATA****************************
                Number of intervals =   293
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       13.573 (CFS)
                Total volume =       0.457 (Ac.Ft)
        Status of hydrographs being held in storage
                    Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
************************************************************************
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** RETARDING BASIN ROUTING ****
________________________________________________________________________
User entry of depth-outflow-storage data
------------------------------------------------------------------------
Total number of inflow hydrograph intervals = 293
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
------------------------------------------------------------------------
------------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
------------------------------------------------------------------------
------------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
------------------------------------------------------------------------
  0.000      0.000      0.000      0.000        0.000
  0.010      0.001      0.410     -0.000        0.002
  0.100      0.002      0.410      0.001        0.003
  1.100      0.009      0.410      0.008        0.010
  2.750      0.063      0.410      0.062        0.064
  4.500      0.141      0.410      0.140        0.142
  6.250      0.209      0.410      0.208        0.210
  8.000      0.264      0.410      0.263        0.265
```

8.100	0.266	0.410	0.265	0.267
9.000	0.283	0.410	0.282	0.284
9.100	0.284	0.460	0.282	0.286
9.500	0.285	1.670	0.279	0.291
10.000	0.286	2.920	0.276	0.296

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	3.4	6.79	10.18	13.57	Depth (Ft.)
0.083	0.00	0.00	0.000	O	|	|	|	|	0.00
0.167	0.00	0.00	0.000	O	|	|	|	|	0.00
0.250	0.00	0.00	0.000	O	|	|	|	|	0.00
0.333	0.00	0.00	0.000	O	|	|	|	|	0.00
0.417	0.00	0.00	0.000	O	|	|	|	|	0.00
0.500	0.00	0.00	0.000	O	|	|	|	|	0.00
0.583	0.00	0.00	0.000	O	|	|	|	|	0.00
0.667	0.00	0.00	0.000	O	|	|	|	|	0.00
0.750	0.00	0.00	0.000	O	|	|	|	|	0.00
0.833	0.00	0.00	0.000	O	|	|	|	|	0.00
0.917	0.00	0.00	0.000	O	|	|	|	|	0.00
1.000	0.00	0.00	0.000	O	|	|	|	|	0.00
1.083	0.00	0.00	0.000	O	|	|	|	|	0.00
1.167	0.00	0.00	0.000	O	|	|	|	|	0.00
1.250	0.00	0.00	0.000	O	|	|	|	|	0.00
1.333	0.00	0.00	0.000	O	|	|	|	|	0.00
1.417	0.00	0.00	0.000	O	|	|	|	|	0.00
1.500	0.00	0.00	0.000	O	|	|	|	|	0.00
1.583	0.00	0.00	0.000	O	|	|	|	|	0.00
1.667	0.00	0.00	0.000	O	|	|	|	|	0.00
1.750	0.00	0.00	0.000	O	|	|	|	|	0.00
1.833	0.00	0.00	0.000	O	|	|	|	|	0.00
1.917	0.00	0.00	0.000	O	|	|	|	|	0.00
2.000	0.00	0.00	0.000	O	|	|	|	|	0.00
2.083	0.00	0.00	0.000	O	|	|	|	|	0.00
2.167	0.00	0.00	0.000	O	|	|	|	|	0.00
2.250	0.00	0.00	0.000	O	|	|	|	|	0.00
2.333	0.00	0.00	0.000	O	|	|	|	|	0.00
2.417	0.00	0.00	0.000	O	|	|	|	|	0.00
2.500	0.00	0.00	0.000	O	|	|	|	|	0.00
2.583	0.00	0.00	0.000	O	|	|	|	|	0.00
2.667	0.00	0.00	0.000	O	|	|	|	|	0.00
2.750	0.00	0.00	0.000	O	|	|	|	|	0.00
2.833	0.00	0.00	0.000	O	|	|	|	|	0.00
2.917	0.00	0.00	0.000	O	|	|	|	|	0.00
3.000	0.00	0.00	0.000	O	|	|	|	|	0.00
3.083	0.00	0.00	0.000	O	|	|	|	|	0.00
3.167	0.00	0.00	0.000	O	|	|	|	|	0.00

3.250	0.00	0.00	0.000	O	|	|	|	0.00
3.333	0.00	0.00	0.000	O	|	|	|	0.00
3.417	0.00	0.00	0.000	O	|	|	|	0.00
3.500	0.00	0.00	0.000	O	|	|	|	0.00
3.583	0.00	0.00	0.000	O	|	|	|	0.00
3.667	0.00	0.00	0.000	O	|	|	|	0.00
3.750	0.00	0.00	0.000	O	|	|	|	0.00
3.833	0.00	0.00	0.000	O	|	|	|	0.00
3.917	0.00	0.00	0.000	O	|	|	|	0.00
4.000	0.00	0.00	0.000	O	|	|	|	0.00
4.083	0.00	0.00	0.000	O	|	|	|	0.00
4.167	0.00	0.00	0.000	O	|	|	|	0.00
4.250	0.00	0.00	0.000	O	|	|	|	0.00
4.333	0.00	0.00	0.000	O	|	|	|	0.00
4.417	0.00	0.00	0.000	O	|	|	|	0.00
4.500	0.00	0.00	0.000	O	|	|	|	0.00
4.583	0.00	0.00	0.000	O	|	|	|	0.00
4.667	0.00	0.00	0.000	O	|	|	|	0.00
4.750	0.00	0.00	0.000	O	|	|	|	0.00
4.833	0.00	0.00	0.000	O	|	|	|	0.00
4.917	0.00	0.00	0.000	O	|	|	|	0.00
5.000	0.00	0.00	0.000	O	|	|	|	0.00
5.083	0.00	0.00	0.000	O	|	|	|	0.00
5.167	0.00	0.00	0.000	O	|	|	|	0.00
5.250	0.00	0.00	0.000	O	|	|	|	0.00
5.333	0.00	0.00	0.000	O	|	|	|	0.00
5.417	0.00	0.00	0.000	O	|	|	|	0.00
5.500	0.00	0.00	0.000	O	|	|	|	0.00
5.583	0.00	0.00	0.000	O	|	|	|	0.00
5.667	0.00	0.00	0.000	O	|	|	|	0.00
5.750	0.00	0.00	0.000	O	|	|	|	0.00
5.833	0.00	0.00	0.000	O	|	|	|	0.00
5.917	0.00	0.00	0.000	O	|	|	|	0.00
6.000	0.00	0.00	0.000	O	|	|	|	0.00
6.083	0.00	0.00	0.000	O	|	|	|	0.00
6.167	0.00	0.00	0.000	O	|	|	|	0.00
6.250	0.00	0.00	0.000	O	|	|	|	0.00
6.333	0.00	0.00	0.000	O	|	|	|	0.00
6.417	0.00	0.00	0.000	O	|	|	|	0.00
6.500	0.00	0.00	0.000	O	|	|	|	0.00
6.583	0.00	0.00	0.000	O	|	|	|	0.00
6.667	0.00	0.00	0.000	O	|	|	|	0.00
6.750	0.00	0.00	0.000	O	|	|	|	0.00
6.833	0.00	0.00	0.000	O	|	|	|	0.00
6.917	0.00	0.00	0.000	O	|	|	|	0.00
7.000	0.00	0.00	0.000	O	|	|	|	0.00
7.083	0.00	0.00	0.000	O	|	|	|	0.00
7.167	0.00	0.00	0.000	O	|	|	|	0.00
7.250	0.00	0.00	0.000	O	|	|	|	0.00
7.333	0.00	0.00	0.000	O	|	|	|	0.00

7.417	0.00	0.00	0.000	O				0.00
7.500	0.00	0.00	0.000	O				0.00
7.583	0.00	0.00	0.000	O				0.00
7.667	0.00	0.00	0.000	O				0.00
7.750	0.00	0.00	0.000	O				0.00
7.833	0.00	0.00	0.000	O				0.00
7.917	0.00	0.00	0.000	O				0.00
8.000	0.00	0.00	0.000	O				0.00
8.083	0.00	0.00	0.000	O				0.00
8.167	0.00	0.00	0.000	O				0.00
8.250	0.00	0.00	0.000	O				0.00
8.333	0.00	0.00	0.000	O				0.00
8.417	0.00	0.00	0.000	O				0.00
8.500	0.00	0.00	0.000	O				0.00
8.583	0.00	0.00	0.000	O				0.00
8.667	0.00	0.00	0.000	O				0.00
8.750	0.00	0.00	0.000	O				0.00
8.833	0.00	0.00	0.000	O				0.00
8.917	0.00	0.00	0.000	O				0.00
9.000	0.00	0.00	0.000	O				0.00
9.083	0.00	0.00	0.000	O				0.00
9.167	0.00	0.00	0.000	O				0.00
9.250	0.00	0.00	0.000	O				0.00
9.333	0.00	0.00	0.000	O				0.00
9.417	0.00	0.00	0.000	O				0.00
9.500	0.00	0.00	0.000	O				0.00
9.583	0.00	0.00	0.000	O				0.00
9.667	0.00	0.00	0.000	O				0.00
9.750	0.00	0.00	0.000	O				0.00
9.833	0.00	0.00	0.000	O				0.00
9.917	0.00	0.00	0.000	O				0.00
10.000	0.00	0.00	0.000	O				0.00
10.083	0.00	0.00	0.000	O				0.00
10.167	0.00	0.00	0.000	O				0.00
10.250	0.00	0.00	0.000	O				0.00
10.333	0.00	0.00	0.000	O				0.00
10.417	0.00	0.00	0.000	O				0.00
10.500	0.00	0.00	0.000	O				0.00
10.583	0.00	0.00	0.000	O				0.00
10.667	0.00	0.00	0.000	O				0.00
10.750	0.00	0.00	0.000	O				0.00
10.833	0.00	0.00	0.000	O				0.00
10.917	0.00	0.00	0.000	O				0.00
11.000	0.00	0.00	0.000	O				0.00
11.083	0.00	0.00	0.000	O				0.00
11.167	0.00	0.00	0.000	O				0.00
11.250	0.00	0.00	0.000	O				0.00
11.333	0.00	0.00	0.000	O				0.00
11.417	0.00	0.00	0.000	O				0.00
11.500	0.00	0.00	0.000	O				0.00

11.583	0.00	0.00	0.000	O	|	|	|	0.00
11.667	0.00	0.00	0.000	O	|	|	|	0.00
11.750	0.00	0.00	0.000	O	|	|	|	0.00
11.833	0.00	0.00	0.000	O	|	|	|	0.00
11.917	0.00	0.00	0.000	O	|	|	|	0.00
12.000	0.00	0.00	0.000	O	|	|	|	0.00
12.083	0.00	0.00	0.000	O	|	|	|	0.00
12.167	0.00	0.00	0.000	O	|	|	|	0.00
12.250	0.00	0.00	0.000	O	|	|	|	0.00
12.333	0.00	0.00	0.000	O	|	|	|	0.00
12.417	0.00	0.00	0.000	O	|	|	|	0.00
12.500	0.00	0.00	0.000	O	|	|	|	0.00
12.583	0.00	0.00	0.000	O	|	|	|	0.00
12.667	0.00	0.00	0.000	O	|	|	|	0.00
12.750	0.00	0.00	0.000	O	|	|	|	0.00
12.833	0.00	0.00	0.000	O	|	|	|	0.00
12.917	0.00	0.00	0.000	O	|	|	|	0.00
13.000	0.00	0.00	0.000	O	|	|	|	0.00
13.083	0.00	0.00	0.000	O	|	|	|	0.00
13.167	0.00	0.00	0.000	O	|	|	|	0.00
13.250	0.00	0.00	0.000	O	|	|	|	0.00
13.333	0.00	0.00	0.000	O	|	|	|	0.00
13.417	0.00	0.00	0.000	O	|	|	|	0.00
13.500	0.00	0.00	0.000	O	|	|	|	0.00
13.583	0.00	0.00	0.000	O	|	|	|	0.00
13.667	0.00	0.00	0.000	O	|	|	|	0.00
13.750	0.00	0.00	0.000	O	|	|	|	0.00
13.833	0.00	0.00	0.000	O	|	|	|	0.00
13.917	0.00	0.00	0.000	O	|	|	|	0.00
14.000	0.00	0.00	0.000	O	|	|	|	0.00
14.083	0.00	0.00	0.000	O	|	|	|	0.00
14.167	0.00	0.00	0.000	O	|	|	|	0.00
14.250	0.00	0.00	0.000	O	|	|	|	0.00
14.333	0.00	0.00	0.000	O	|	|	|	0.00
14.417	0.00	0.00	0.000	O	|	|	|	0.00
14.500	0.00	0.00	0.000	O	|	|	|	0.00
14.583	0.00	0.00	0.000	O	|	|	|	0.00
14.667	0.00	0.00	0.000	O	|	|	|	0.00
14.750	0.00	0.00	0.000	O	|	|	|	0.00
14.833	0.00	0.00	0.000	O	|	|	|	0.00
14.917	0.00	0.00	0.000	O	|	|	|	0.00
15.000	0.00	0.00	0.000	O	|	|	|	0.00
15.083	0.00	0.00	0.000	O	|	|	|	0.00
15.167	0.00	0.00	0.000	O	|	|	|	0.00
15.250	0.00	0.00	0.000	O	|	|	|	0.00
15.333	0.00	0.00	0.000	O	|	|	|	0.00
15.417	0.13	0.08	0.000	O	|	|	|	0.00
15.500	0.84	0.41	0.002	OI	|	|	|	0.09
15.583	1.73	0.41	0.008	O I	|	|	|	0.94
15.667	2.20	0.41	0.019	O I	|	|	|	1.39

15.750	2.55	0.41	0.032	O	I	|	|	|	1.81
15.833	2.98	0.41	0.048	O	I	|	|	|	2.30
15.917	3.57	0.41	0.068	O	I	|	|	|	2.86
16.000	4.66	0.41	0.094	O	| I	|	|	|	3.44
16.083	7.44	0.41	0.132	O	|	|I	|	|	4.31
16.167	13.50	0.41	0.202	O	|	|	|	I|	6.06
16.250	13.57	2.34	0.286	|	O |	|	|	I	9.77
16.333	7.02	11.25	0.296	|	|	I	|	O	14.93
16.417	3.62	0.41	0.279	O	I	|	|	|	8.76
16.500	1.86	2.91	0.286	|	I O |	|	|	|	9.99
16.583	0.49	0.41	0.283	OI	|	|	|	|	8.98
16.667	0.12	0.41	0.282	O	|	|	|	|	8.94
16.750	0.03	0.41	0.280	O	|	|	|	|	8.82
16.833	0.00	0.41	0.277	O	|	|	|	|	8.68
16.917	0.00	0.41	0.274	O	|	|	|	|	8.53
17.000	0.00	0.41	0.271	O	|	|	|	|	8.38
17.083	0.00	0.41	0.268	O	|	|	|	|	8.23
17.167	0.00	0.41	0.266	O	|	|	|	|	8.08
17.250	0.00	0.41	0.263	O	|	|	|	|	7.96
17.333	0.00	0.41	0.260	O	|	|	|	|	7.87
17.417	0.00	0.41	0.257	O	|	|	|	|	7.78
17.500	0.00	0.41	0.254	O	|	|	|	|	7.69
17.583	0.00	0.41	0.252	O	|	|	|	|	7.60
17.667	0.00	0.41	0.249	O	|	|	|	|	7.51
17.750	0.00	0.41	0.246	O	|	|	|	|	7.42
17.833	0.00	0.41	0.243	O	|	|	|	|	7.33
17.917	0.00	0.41	0.240	O	|	|	|	|	7.24
18.000	0.00	0.41	0.237	O	|	|	|	|	7.16
18.083	0.00	0.41	0.235	O	|	|	|	|	7.07
18.167	0.00	0.41	0.232	O	|	|	|	|	6.98
18.250	0.00	0.41	0.229	O	|	|	|	|	6.89
18.333	0.00	0.41	0.226	O	|	|	|	|	6.80
18.417	0.00	0.41	0.223	O	|	|	|	|	6.71
18.500	0.00	0.41	0.221	O	|	|	|	|	6.62
18.583	0.00	0.41	0.218	O	|	|	|	|	6.53
18.667	0.00	0.41	0.215	O	|	|	|	|	6.44
18.750	0.00	0.41	0.212	O	|	|	|	|	6.35
18.833	0.00	0.41	0.209	O	|	|	|	|	6.26
18.917	0.00	0.41	0.206	O	|	|	|	|	6.18
19.000	0.00	0.41	0.204	O	|	|	|	|	6.11
19.083	0.00	0.41	0.201	O	|	|	|	|	6.04
19.167	0.00	0.41	0.198	O	|	|	|	|	5.97
19.250	0.00	0.41	0.195	O	|	|	|	|	5.89
19.333	0.00	0.41	0.192	O	|	|	|	|	5.82
19.417	0.00	0.41	0.189	O	|	|	|	|	5.75
19.500	0.00	0.41	0.187	O	|	|	|	|	5.68
19.583	0.00	0.41	0.184	O	|	|	|	|	5.60
19.667	0.00	0.41	0.181	O	|	|	|	|	5.53
19.750	0.00	0.41	0.178	O	|	|	|	|	5.46
19.833	0.00	0.41	0.175	O	|	|	|	|	5.38

19.917	0.00	0.41	0.173	O	|	|	|	5.31
20.000	0.00	0.41	0.170	O	|	|	|	5.24
20.083	0.00	0.41	0.167	O	|	|	|	5.17
20.167	0.00	0.41	0.164	O	|	|	|	5.09
20.250	0.00	0.41	0.161	O	|	|	|	5.02
20.333	0.00	0.41	0.158	O	|	|	|	4.95
20.417	0.00	0.41	0.156	O	|	|	|	4.88
20.500	0.00	0.41	0.153	O	|	|	|	4.80
20.583	0.00	0.41	0.150	O	|	|	|	4.73
20.667	0.00	0.41	0.147	O	|	|	|	4.66
20.750	0.00	0.41	0.144	O	|	|	|	4.59
20.833	0.00	0.41	0.142	O	|	|	|	4.51
20.917	0.00	0.41	0.139	O	|	|	|	4.45
21.000	0.00	0.41	0.136	O	|	|	|	4.38
21.083	0.00	0.41	0.133	O	|	|	|	4.32
21.167	0.00	0.41	0.130	O	|	|	|	4.26
21.250	0.00	0.41	0.127	O	|	|	|	4.19
21.333	0.00	0.41	0.125	O	|	|	|	4.13
21.417	0.00	0.41	0.122	O	|	|	|	4.07
21.500	0.00	0.41	0.119	O	|	|	|	4.00
21.583	0.00	0.41	0.116	O	|	|	|	3.94
21.667	0.00	0.41	0.113	O	|	|	|	3.88
21.750	0.00	0.41	0.110	O	|	|	|	3.81
21.833	0.00	0.41	0.108	O	|	|	|	3.75
21.917	0.00	0.41	0.105	O	|	|	|	3.69
22.000	0.00	0.41	0.102	O	|	|	|	3.62
22.083	0.00	0.41	0.099	O	|	|	|	3.56
22.167	0.00	0.41	0.096	O	|	|	|	3.50
22.250	0.00	0.41	0.094	O	|	|	|	3.43
22.333	0.00	0.41	0.091	O	|	|	|	3.37
22.417	0.00	0.41	0.088	O	|	|	|	3.31
22.500	0.00	0.41	0.085	O	|	|	|	3.24
22.583	0.00	0.41	0.082	O	|	|	|	3.18
22.667	0.00	0.41	0.079	O	|	|	|	3.12
22.750	0.00	0.41	0.077	O	|	|	|	3.05
22.833	0.00	0.41	0.074	O	|	|	|	2.99
22.917	0.00	0.41	0.071	O	|	|	|	2.93
23.000	0.00	0.41	0.068	O	|	|	|	2.86
23.083	0.00	0.41	0.065	O	|	|	|	2.80
23.167	0.00	0.41	0.062	O	|	|	|	2.73
23.250	0.00	0.41	0.060	O	|	|	|	2.65
23.333	0.00	0.41	0.057	O	|	|	|	2.56
23.417	0.00	0.41	0.054	O	|	|	|	2.47
23.500	0.00	0.41	0.051	O	|	|	|	2.39
23.583	0.00	0.41	0.048	O	|	|	|	2.30
23.667	0.00	0.41	0.046	O	|	|	|	2.22
23.750	0.00	0.41	0.043	O	|	|	|	2.13
23.833	0.00	0.41	0.040	O	|	|	|	2.04
23.917	0.00	0.41	0.037	O	|	|	|	1.96
24.000	0.00	0.41	0.034	O	|	|	|	1.87

24.083	0.00	0.41	0.031	O	|	|	|	1.78
24.167	0.00	0.41	0.029	O	|	|	|	1.70
24.250	0.00	0.41	0.026	O	|	|	|	1.61
24.333	0.00	0.41	0.023	O	|	|	|	1.53
24.417	0.00	0.41	0.020	O	|	|	|	1.44
24.500	0.00	0.41	0.017	O	|	|	|	1.35
24.583	0.00	0.41	0.014	O	|	|	|	1.27
24.667	0.00	0.41	0.012	O	|	|	|	1.18
24.750	0.00	0.41	0.009	O	|	|	|	1.07
24.833	0.00	0.41	0.006	O	|	|	|	0.67
24.917	0.00	0.41	0.003	O	|	|	|	0.27
25.000	0.00	0.30	0.001	O	|	|	|	0.01
25.083	0.00	0.00	0.000	O	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 301
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 11.254 (CFS)
Total volume = 0.458 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

Appendix F

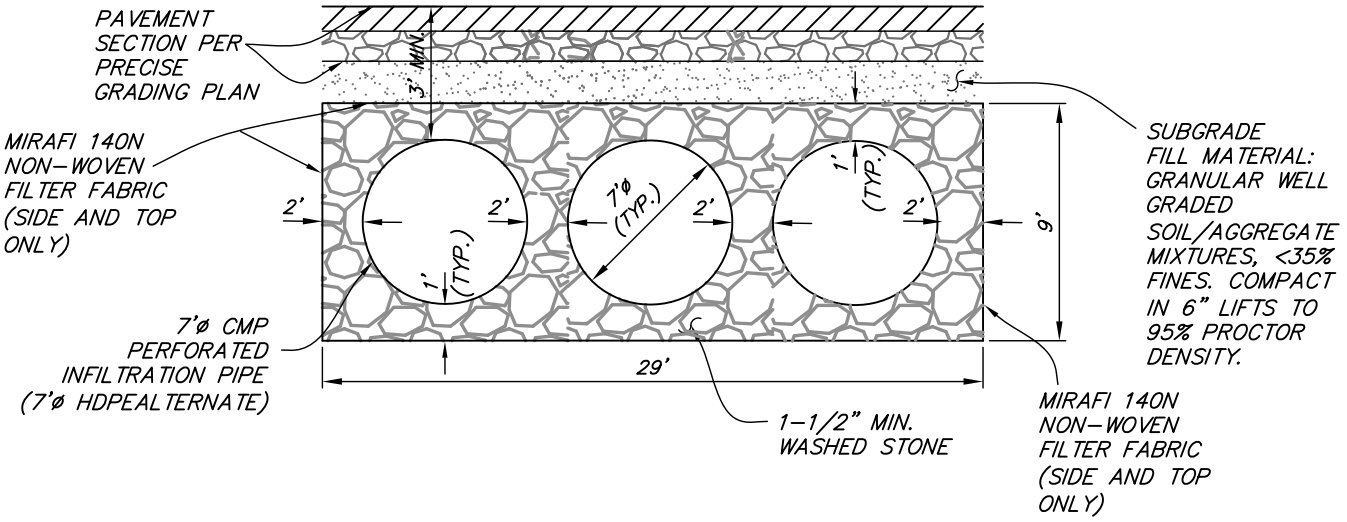
UNDERGROUND INFILTRATION SYSTEM

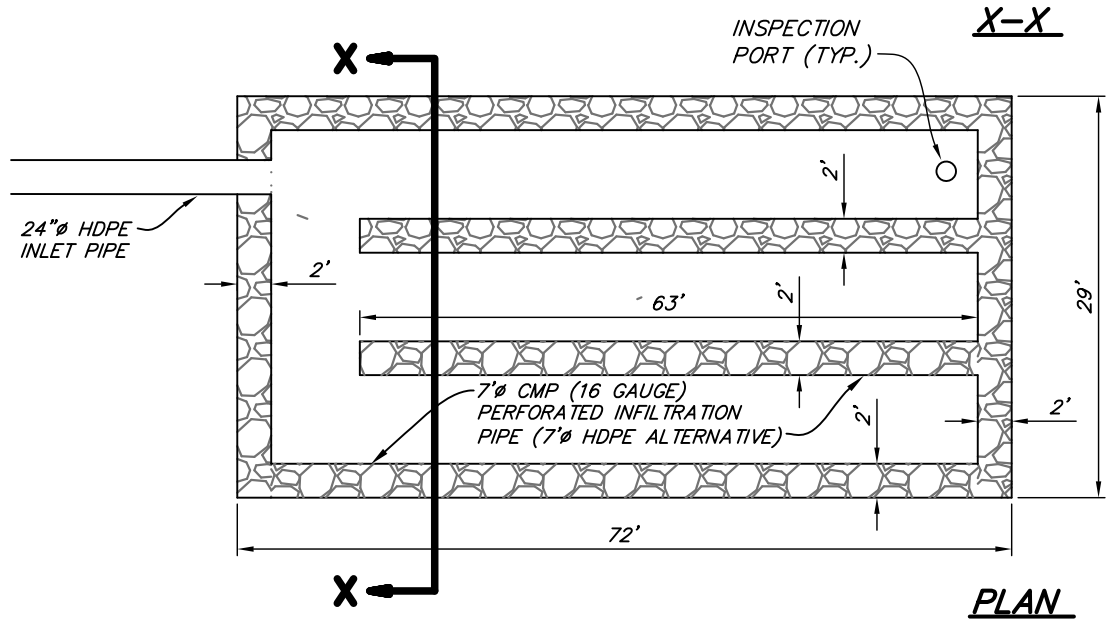
$$V_{TRENCH} = (9\ LF)(29\ LF)(72\ LF) = 18{,}792\ CF$$

$$V_{PIPES} = \frac{3.14\ (7\ LF)^2}{4}(208\ LF) = 8{,}000.7\ CF$$

$$V_{GRAVEL} = (40\%)(18{,}792 - 8{,}000.7) = 4{,}316.5\ CF$$

$$STORAGE = 8{,}000.7 + 4{,}316.5 = 12{,}317.2\ CF$$





Geotechnical Engineering Investigation

Proposed Industrial Warehouse Development
West of 14900 Hilton Avenue
Fontana, California

McCan Partners
15 Orion
Irvine, California 92603

Attn.: Mr. George McCan

Project Number 12343-05
October 6, 2017

NorCal Engineering

Soils and Geotechnical Consultants
10641 Humbolt Street Los Alamitos, CA 90720
(562) 799-9469 Fax (562) 799-9459

October 6, 2017 Project Number 12343-05

McCan Partners
15 Orion
Irvine, California 92603

Attn.: Mr. George McCan

RE: **Geotechnical Engineering Investigation** - Proposed Industrial Warehouse Development - Located west of 14900 Hilton Avenue, in the City of Fontana, California

Dear Mr. McCan:

Pursuant to your request, this firm has performed an updated Geotechnical Engineering Investigation in accordance with your authorization of signed proposal dated August 17, 2017 for the above referenced project. The purpose of this investigation is to evaluate the subsurface conditions of the subject site and to provide recommendations for the proposed industrial warehouse development.

The scope of work included the following: 1) site reconnaissance; 2) subsurface geotechnical exploration and sampling; 3) laboratory testing; 4) engineering analysis of field and laboratory data; 5) and preparation of a geotechnical engineering report. It is the opinion of this firm that the proposed development is feasible from a geotechnical standpoint provided that the recommendations presented in this report are followed in the design and construction of the project.

1.0 Project Description

It is proposed to construct an industrial warehouse development consisting of two warehouse buildings totaling 32,000 and 44,000 square feet as shown on the attached Site Plan. The concrete tilt-up structures will be supported by a conventional slab-on-grade foundation system with perimeter-spread footings and isolated interior footings. Other improvements will consist of asphalt/concrete pavement, hardscape and landscaping. It is assumed that the grading for the development will include minor cut and fill procedures to achieve finished grade elevations. Final building plans shall be reviewed by this firm prior to submittal for city approval to determine the need for any additional study and revised recommendations pertinent to the proposed development, if necessary.

2.0 Site Description

The 4.0-acre subject property is located within the 14900 block and north side of Hilton Drive, in the City of Fontana. The generally rectangular-shaped parcel is elongated in a north to south direction with topography of the relatively level property descending gradually from front to rear on the order of a few feet. The site is currently undeveloped land covered with a low growth of vegetation cover consisting of natural grasses and weeds.

3.0 Site Exploration

The investigation consisted of the placement of seven (7) subsurface exploratory trenches by a backhoe to depths ranging between 5 and 15 feet below current ground elevations. The explorations were visually classified and logged by a field engineer with locations of the subsurface explorations shown on the attached Site Plan. The exploratory trenches revealed the existing earth materials to consist of a fill and natural soil. A detailed description of the subsurface conditions is listed on the excavation logs in Appendix A.

Fill: A surficial fill and disturbed top soils classifying as a brown, fine to medium grained, silty SAND with some cobbles was encountered to a depth of 1 to 1½ feet. These soils were noted to be loose and dry to damp.

Natural: An undisturbed alluvium soil classifying as a light brown to brown, fine to coarse grained, silty SAND with gravel was encountered directly beneath the fill and observed to be medium dense and damp. These gravelly soils were noted to be slightly silty with cobbles.

The overall engineering characteristics of the earth material were relatively uniform with each excavation. No groundwater was encountered to the depth of our trenches and caving did occur in the deeper cohesionless soils.

4.0 Laboratory Tests

Relatively undisturbed samples of the subsurface soils were obtained to perform laboratory testing and analysis for direct shear, consolidation tests, and to determine in-place moisture/densities. These relatively undisturbed ring samples were obtained by driving a thin-walled steel sampler lined with one inch long brass rings with an inside diameter of 2.42 inches into the undisturbed soils. Bulk bag samples were obtained in the upper soils for expansion index tests and maximum density tests. All test results are included in Appendix B, unless otherwise noted.

4.1 **Field moisture content** (ASTM: D 2216) and the dry density of the ring samples were determined in the laboratory. This data is listed on the logs of explorations.

4.2 **Maximum density tests** (ASTM: D 1557) were performed on typical samples of the upper soils. Results of these tests are shown on Table I.

4.3 **Expansion index tests** (ASTM: D 4829) were performed on remolded samples of the upper soils. Results of these tests are provided on Table II.

4.4 **Corrosion tests** consisting of sulfate, pH, resistivity and chloride analysis to determine potential corrosive effects of soils on concrete and underground utilities. Test results are provided on Table III.

4.5 **R-Value test** per California Test Method 301 was performed on a representative sample, which may be anticipated to be near subgrade to determine pavement design. Result provided within pavement section design section of report.

4.6 **Direct shear tests** (ASTM: D 3080) were performed on undisturbed and disturbed samples of the subsurface soils. The test is performed under saturated conditions at loads of 1,000 lbs./sq.ft., 2,000 lbs./sq.ft., and 2,000 lbs./sq.ft. with results shown on Plate A.

4.7 **Consolidation tests** (ASTM: D 2435) were performed on undisturbed samples to determine the differential and total settlement which may be anticipated based upon the proposed loads. Water was added to the samples at a surcharge of one KSF and the settlement curves are plotted on Plates B and C.

5.0 Infiltration Characteristics

Infiltration tests within the site were performed to provide preliminary infiltration rates for the purpose of planning and design of an on-site water disposal system. The infiltration tests consisted of the double ring infiltration test per ASTM Method D 3385. Based upon the results of our testing, the soils encountered in the planned on-site drainage disposal system area exhibit the following infiltration rates with our calculations given in Appendix C.

Test No.	Depth	Infiltration Rate
T-6	5	25.6 in/hr
T-7	10'	48.0 in/hr

The correction factors CF_t, CF_v and CF_s are given below based on soils at 5 and 10 feet below ground surface from our field tests.

a) $CF_t = R_f = 1.0$ for our double ring infiltration test holes.

b) $CF_v = 1.0$ based on uniform soils encountered in two trenches for infiltration tests.

c) $CF_s = 2.0$ for long-term siltation, plugging and maintenance. The subsurface soils are likely to have some plugging and regular maintenance of storm water discharge devices is required.

Based upon the results of our field testing, the subsurface soils encountered in the proposed on-site drainage disposal system from 5 to 10 feet below ground surface shall utilize a design infiltration rate of 18 in/hr. All systems must meet the latest city and/or county specifications and California Regional Water Quality Control Board (CRWQCB) requirements.

Foundations shall be set back a minimum distance of 10 feet from the drainage disposal system and the bottom of footing shall be a minimum of 10 feet from the expected zone of saturation. The boundary of the zone of saturation may be assumed to project downward from the top of the permeable portion of the disposal system at an inclination of 1 to 1 or flatter, as determined by the soils engineer.

5.0 Seismicity Evaluation

The proposed development lies outside of any Alquist Priolo Special Studies Zone and the potential for damage due to direct fault rupture is considered very remote. The site is located in an area of high regional seismicity and the Cucamonga fault is located 7 kilometers from the site. Ground shaking originating from earthquakes along other active faults in the region is expected to induce lower horizontal accelerations due to smaller anticipated earthquakes and/or greater distances to other faults.

The seismic design of the project has been updated to the latest 2010 ASCE 7-10 (with July 2013 errata) standards and the mapped seismic ground motions were provided by using the Java based program available from the United States Geological Survey (USGS) website: http://geohazards.usgs.gov/designmaps/us/application.php. The earthquake design parameters are listed on the following page.

Seismic Design Parameters

Site Location	Latitude	34.109°
	Longitude	-117.481°
Site Class		D
Maximum Spectral Response Acceleration	S_S	1.500g
	S_1	0.600g
Adjusted Maximum Acceleration	S_{MS}	1.500g
	S_{M1}	0.900g
Design Spectral Response Acceleration Parameters	S_{DS}	1.000g
	S_{D1}	0.600g

6.0 Liquefaction Evaluation

The site is expected to experience ground shaking and earthquake activity that is typical of Southern California area. It is during severe ground shaking that loose, granular soils below the groundwater table can liquefy. Our analysis indicates the potential for liquefaction at this site is considered to be very low due to the depth of groundwater in excess of 400 feet within the vicinity area based on review of ground water maps of the Upper Santa Ana River Basin. (Carson and Matti, 1982). Thus, the design of the proposed construction in conformance with the latest Building Code provisions for earthquake design is expected to provide mitigation of ground shaking hazards that are typical to Southern California.

7.0 Conclusions and Recommendations

Based upon our evaluations, the proposed development is acceptable from a geotechnical engineering standpoint. By following the recommendations and guidelines set forth in our report, the structures will be safe from excessive settlements under the anticipated design loadings and conditions. The proposed development shall meet all requirements of the City Building Ordinance and will not impose any adverse effect on existing adjacent structures.

The following recommendations are based upon geotechnical conditions encountered in our field investigation and laboratory data. Therefore, these surface and subsurface conditions could vary across the site. Variations in these conditions may not become evident until the commencement of grading operations and any unusual conditions which may be encountered in the course of the project development may require the need for additional study and revised recommendations.

It is recommended that site inspections be performed by a representative of this firm during all grading and construction of the development to verify the findings and recommendations documented in this report. The following sections present a discussion of geotechnical related requirements for specific design recommendations of different aspects of the project.

7.1 Site Grading Recommendations

Any vegetation and or demolition debris shall be removed and hauled from proposed grading areas prior to the start of grading operations. Existing vegetation shall not be mixed or disced into the soils. Any removed soils may be reutilized as compacted fill once any deleterious material or oversized materials (in excess of eight inches) is removed. Grading operations shall be performed in accordance with the attached "Specifications for Compacted Fill Operations".

7.1.1 Removal and Recompaction Recommendations

All disturbed soils and/or surficial fill (about 1 to 1½ feet) shall be removed to competent material, the exposed surface scarified to a depth of 12 inches, brought to within 2% of optimum moisture content and compacted to a minimum of 90% of the laboratory standard (ASTM: D 1557) prior to placement of any additional compacted fill soils, foundations, slabs-on-grade and pavement. Grading shall extend a minimum of five horizontal feet outside the edges of foundations or equidistant to the depth of fill placed, whichever is greater.

It is possible that isolated areas of undiscovered fill not described in this report are present on site. If found, these areas should be treated as discussed earlier. A diligent search shall also be conducted during grading operations in an effort to uncover any underground structures, irrigation or utility lines. If encountered, these structures and lines shall be either removed or properly abandoned prior to the proposed construction.

Any imported fill material should be preferably soil similar to the upper soils encountered at the subject site. All soils shall be approved by this firm prior to importing at the site and will be subjected to additional laboratory testing to assure concurrence with the recommendations stated in this report. Care should be taken to provide or maintain adequate lateral support for all adjacent improvements and structures at all times during the grading operations and construction phase. Adequate drainage away from the structures, pavement and slopes should be provided at all times.

If placement of slabs-on-grade and pavement is not completed immediately upon completion of grading operations, additional testing and grading of the areas may be necessary prior to continuation of construction operations. Likewise, if adverse weather conditions occur which may damage the subgrade soils, additional assessment by the geotechnical engineer as to the suitability of the supporting soils may be needed.

7.1.2 Fill Blanket Recommendations

Due to the potential for differential settlement of foundations placed on compacted fill and the medium dense native materials, it is recommended that all foundations including floor slab areas be underlain by a uniform compacted fill blanket at least two feet in thickness. This fill blanket shall extend a minimum of five horizontal feet outside the edges of foundations or equidistant to the depth of fill placed, whichever is greater.

7.2 Shrinkage and Subsidence

Results of our in-place density tests reveal that the soil shrinkage will be on the order of 10 to 15% due to excavation and recompaction, based upon the assumption that the fill is compacted to 92% of the maximum dry density per ASTM standards. Subsidence should be 0.2 feet due to earthwork operations. The volume change does not include any allowance for vegetation or organic stripping, removal of subsurface improvements or topographic approximations. Although these values are only approximate, they represent our best estimate of lost yardage, which will likely occur during grading. If more accurate shrinkage and subsidence factors are needed, it is recommended that field testing using the actual equipment and grading techniques should be conducted.

7.3 Temporary Excavations

Temporary unsurcharged excavations in the existing site materials less than 4 feet high may be made at a vertical gradient unless cohesionless soils are encountered. In areas where soils with little or no binder are encountered, where adverse geological conditions are exposed, or where excavations are adjacent to existing structures, shoring, slot-cutting, or flatter excavations may be required. The temporary cut slope gradients given do not preclude local raveling and sloughing. All excavations shall be made in accordance with the requirements of CAL-OSHA and other public agencies having jurisdiction. Care should be taken to provide or maintain adequate lateral support for all adjacent improvements and structures at all times during the grading operations and construction phase.

7.4 Foundation Design

All foundations may be designed utilizing the following safe bearing capacities for an embedded depth of 18 inches into approved fill materials with the corresponding widths:

Allowable Safe Bearing Capacity (psf)

Width (ft)	Continuous Foundation	Isolated Foundation
1.5	2000	2500
2.0	2075	2575
4.0	2375	2875
6.0	2500	3000

The bearing value may be increased by 500 psf for each additional foot of depth in excess of the 18-inch minimum depth, up to a maximum of 4,000 psf. A one third increase may be used when considering short term loading and seismic forces. Any foundations located along the property lines or where lateral overexcavation is not possible may utilize a safe bearing capacity of 1,500 psf. A representative of this firm shall inspect all foundation excavations prior to pouring concrete.

7.5 Settlement Analysis

Resultant pressure curves for the consolidation tests are shown on Plates B and C. Computations utilizing these curves and the recommended safe bearing capacities reveal that the foundations will experience settlements on the order of 3/4 inch and differential settlements of less than 1/4 inch.

7.6 Lateral Resistance

The following values may be utilized in resisting lateral loads imposed on the structure. Requirements of the California Building Code should be adhered to when the coefficient of friction and passive pressures are combined.

Coefficient of Friction – 0.40

Equivalent Passive Fluid Pressure = 250 lbs./cu.ft.

Maximum Passive Pressure = 2,500 lbs./cu.ft.

The passive pressure recommendations are valid only for approved compacted fill soils.

7.7 **Retaining Wall Design Parameters**

Active earth pressures against retaining wall will be equal to the pressures developed by the following fluid densities. These values are for **granular backfill material** placed behind the walls at various ground slopes above the walls.

Surface Slope of Retained Materials (Horizontal to Vertical)	Equivalent Fluid Density (lb./cu.ft.)
Level	30
5 to 1	35
4 to 1	38
3 to 1	40
2 to 1	45

Any applicable short-term construction surcharges and seismic forces should be added to the above lateral pressure values. An equivalent fluid pressure of 45 pcf may be utilized for the restrained wall condition with a level grade behind the wall.

All walls shall be waterproofed as needed and protected from hydrostatic pressure by a reliable permanent subdrain system. The subsurface drainage system shall consist of 4-inch diameter perforated PVC pipe encased with gravel and wrapped with filter fabric. The granular backfill to be utilized immediately adjacent to the retaining/basement walls shall consist of an approved granular soils with a sand equivalency greater than 30. This backfill zone of free draining material shall consist of a wedge beginning a minimum of one horizontal foot from the base of the wall extending upward at an inclination of no less than 3/4 to 1 (horizontal to vertical).

The seismic-induced lateral soil pressure for walls greater than 6 feet shall be computed using a triangular pressure distribution with the maximum value at the top of the wall. The maximum lateral pressure of (20 pcf) H, where H is the height of the retained soils above the wall footing should be utilized in final design of retaining walls. Sliding resistance values and passive fluid pressures given in our referenced report may be increased by 1/3 during short-term wind and seismic loading conditions.

7.8 Slab Design

All concrete slabs-on-grade shall be at least four inches in office and hardscape areas, six inches in warehouse and placed on approved subgrade soils. Additional reinforcement requirements and an increase in thickness of the slabs-on-grade may be necessary based upon soils expansion potential and proposed loading conditions in the structures and should be evaluated further by the project engineers and/or architect.

A vapor retarder (10-mil minimum thickness) should be utilized in areas which would be sensitive to the infiltration of moisture. This retarder shall meet requirements of ASTM E 96, *Water Vapor Transmission of Materials* and ASTM E 1745, *Standard Specification for Water Vapor Retarders used in Contact with Soil or Granular Fill Under Concrete Slabs.* The vapor retarder shall be installed in accordance with procedures stated in ASTM E 1643, *Standard practice for Installation of Water Vapor Retarders used in Contact with Earth or Granular Fill Under Concrete Slabs.*

The moisture retarder may be placed directly upon approved subgrade soils, although one to two inches of sand beneath the membrane is desirable. The subgrade upon which the retarder is placed shall be smooth and free of rocks, gravel or other protrusions which may damage the retarder. Use of sand above the retarder is under the purview of the structural engineer; if sand is used over the retarder, it should be placed in a dry condition.

7.9 Pavement Section Design

The table below provides a preliminary pavement design based upon an R-Value of 74 for the proposed pavement areas.

Type of Traffic	Traffic Index	Asphaltic Concrete (in)	Base Material (in)
Automobile Parking Stalls and Circulation Areas	4.0/5.0	3.0	3.0
Medium Truck Access Areas (GVW < 42,000 lbs.; 3 axle)	6.0	3.5	4.5

All concrete slabs to be utilized for pavement shall be a minimum of six inches in thickness and placed on approved subgrade soils. The above recommendations are based upon estimated traffic loads. Client should submit anticipated traffic loadings, when available, so that pavement sections may be reviewed to determine adequacy to support these loads. Final pavement design may need to be based on R-Value testing of the subgrade soils near the conclusion of rough grading to assure that these soils are consistent with those assumed in this preliminary design.

Any approved base material shall consist of a Class II aggregate or equivalent and should be compacted to a minimum of 95% relative compaction. All pavement materials shall conform to the requirements set forth by the City of Fontana. The base material and asphaltic concrete should be tested prior to delivery to the site and during placement to determine conformance with the project specifications. A pavement engineer shall designate the specific asphalt mix design to meet the required project specifications.

All pavement areas shall have positive drainage toward an approved outlet from the site. Drain lines behind curbs and/or adjacent to landscape areas should be considered by client and the appropriate design engineers to prevent water from infiltrating beneath pavement. If such infiltration occurs, damage to pavement, curbs and flow lines, especially on sites with expansive soils, may occur during the life of the project.

7.10 Utility Trench and Excavation Backfill

Trenches from installation of utility lines and other excavations may be backfilled with on-site soils or approved imported soils compacted to a minimum of 90% relative compaction. All utility lines shall be properly bedded with clean sand having a sand equivalency rating of 30 (SE > 30) or more. This bedding material shall be thoroughly water jetted around the pipe structure prior to placement of compacted backfill soils.

7.11 Corrosion Design Criteria

Representative samples of the surficial soils, typical of the subgrade soils expected to be encountered within foundation excavations and underground utilities were tested for corrosion potential. The minimum resistivity value obtained for the samples tested is representative of an environment that may be corrosive to metals. The soil pH value was considered mildly acidic and may have a significant effect on soil corrosivity. Consideration should be given to corrosion protection systems for buried metal such as protective coatings, wrappings or the use of PVC where permitted by local building codes.

According to Table 4.3.1, ACI 318 Building Code and Commentary, these contents revealed negligible levels of sulfate exposure. Therefore, a Type II cement according to latest UBC specifications may be utilized for building foundations at this time. Additional sulfate tests shall be performed at the completion of site grading to assure that these soils are consistent with the recommendations stated in this design. Sulfate test results may be found on the attached Table III.

7.12 Expansive Soil

If any expansive soils are encountered, special attention should be given to the project design and maintenance. The attached *Expansive Soil Guidelines* should be reviewed by the engineers, architects, owner, maintenance personnel and other interested parties and considered during the design of the project and future property maintenance.

8.0 Closure

The recommendations and conclusions contained in this report are based upon the soil conditions uncovered in our test excavations. No warranty of the soil condition between our excavations is implied. NorCal Engineering should be notified for possible further recommendations if unexpected to unfavorable conditions are encountered during construction phase.

It is the responsibility of the owner to ensure that all information within this report is submitted to the Architect and appropriate Engineers for the project. This firm should have the opportunity to review the final plans to verify that all our recommendations are incorporated. This report and all conclusions are subject to the review of the controlling authorities for the project.

A preconstruction conference should be held between the developer, general contractor, grading contractor, city inspector, architect, and soil engineer to clarify any questions relating to the grading operations and subsequent construction. Our representative should be present during the grading operations and construction phase to certify that such recommendations are complied within the field.

This geotechnical investigation has been conducted in a manner consistent with the level of care and skill exercised by members of our profession currently practicing under similar conditions in the Southern California area. No other warranty, expressed or implied is made.

We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,
NORCAL ENGINEERING

Keith D. Tucker
Project Engineer
R.G.E. 841

Scott D. Spensiero
Project Manager

SPECIFICATIONS FOR PLACEMENT OF COMPACTED FILL

Excavation

Any existing low density soils and/or saturated soils shall be removed to competent natural soil under the inspection of the Soils Engineering Firm. After the exposed surface has been cleansed of debris and/or vegetation, it shall be scarified until it is uniform in consistency, brought to the proper moisture content and compacted to a minimum of 90% relative compaction (in accordance with ASTM: D-1557).

In any area where a transition between fill and native soil or between bedrock and soil are encountered, additional excavation beneath foundations and slabs will be necessary in order to provide uniform support and avoid differential settlement of the structure.

Material For Fill

The on-site soils or approved import soils may be utilized for the compacted fill provided they are free of any deleterious materials and shall not contain any rocks, brick, asphaltic concrete, concrete or other hard materials greater than eight inches in maximum dimensions. Any import soil must be approved by the Soils Engineering firm a minimum of 24 hours prior to importation of site.

Placement of Compacted Fill Soils

The approved fill soils shall be placed in layers not excess of six inches in thickness. Each lift shall be uniform in thickness and thoroughly blended. The fill soils shall be brought to within 2% of the optimum moisture content, unless otherwise specified by the Soils Engineering firm. Each lift shall be compacted to a minimum of 90% relative compaction (in accordance with ASTM: D-1557) and approved prior to the placement of the next layer of soil. Compaction tests shall be obtained at the discretion of the Soils Engineering firm but to a minimum of one test for every 500 cubic yards placed and/or for every 2 feet of compacted fill placed.

The minimum relative compaction shall be obtained in accordance with accepted methods in the construction industry. The final grade of the structural areas shall be in a dense and smooth condition prior to placement of slabs-on-grade or pavement areas. No fill soils shall be placed, spread or compacted during unfavorable weather conditions. When the grading is interrupted by heavy rains, compaction operations shall not be resumed until approved by the Soils Engineering firm.

Grading Observations

The controlling governmental agencies should be notified prior to commencement of any grading operations. This firm recommends that the grading operations be conducted under the observation of a Soils Engineering firm as deemed necessary. A 24 hour notice must be provided to this firm prior to the time of our initial inspection.

Observation shall include the clearing and grubbing operations to assure that all unsuitable materials have been properly removed; approve the exposed subgrade in areas to receive fill and in areas where excavation has resulted in the desired finished grade and designate areas of overexcavation; and perform field compaction tests to determine relative compaction achieved during fill placement. In addition, all foundation excavations shall be observed by the Soils Engineering firm to confirm that appropriate bearing materials are present at the design grades and recommend any modifications to construct footings.

Expansive Soil Guidelines

The following expansive soil guidelines are provided for your project. The intent of these guidelines is to inform you, the client, of the importance of proper design and maintenance of projects supported on expansive soils. ***You, as the owner or other interested party, should be warned that you have a duty to provide the information contained in the soil report including these guidelines to your design engineers, architects, landscapers and other design parties in order to enable them to provide a design that takes into consideration expansive soils.***

In addition, you should provide the soil report with these guidelines to any property manager, lessee, property purchaser or other interested party that will have or assume the responsibility of maintaining the development in the future.

Expansive soils are fine-grained silts and clays which are subject to swelling and contracting. The amount of this swelling and contracting is subject to the amount of fine-grained clay materials present in the soils and the amount of moisture either introduced or extracted from the soils. Expansive soils are divided into five categories ranging from "very low" to "very high". Expansion indices are assigned to each classification and are included in the laboratory testing section of this report. *If the expansion index of the soils on your site, as stated in this report, is 21 or higher, you have expansive soils.* The classifications of expansive soils are as follows:

Classification of Expansive Soil*

Expansion Index	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
Above 130	Very High

When expansive soils are compacted during site grading operations, care is taken to place the materials at or slightly above optimum moisture levels and perform proper compaction operations. Any subsequent excessive wetting and/or drying of expansive soils will cause the soil materials to expand and/or contract. These actions are likely to cause distress of foundations, structures, slabs-on-grade, sidewalks and pavement over the life of the structure. ***It is therefore imperative that even after construction of improvements, the moisture contents are maintained at relatively constant levels, allowing neither excessive wetting or drying of soils.***

Evidence of excessive wetting of expansive soils may be seen in concrete slabs, both interior and exterior. Slabs may lift at construction joints producing a trip hazard or may crack from the pressure of soil expansion. Wet clays in foundation areas may result in lifting of the structure causing difficulty in the opening and closing of doors and windows, as well as cracking in exterior and interior wall surfaces. In extreme wetting of soils to depth, settlement of the structure may eventually result. Excessive wetting of soils in landscape areas adjacent to concrete or asphaltic pavement areas may also result in expansion of soils beneath pavement and resultant distress to the pavement surface.

Excessive drying of expansive soils is initially evidenced by cracking in the surface of the soils due to contraction. Settlement of structures and on-grade slabs may also eventually result along with problems in the operation of doors and windows.

Projects located in areas of expansive clay soils will be subject to more movement and "hairline" cracking of walls and slabs than similar projects situated on non-expansive sandy soils. There are, however, measures that developers and property owners may take to reduce the amount of movement over the life the development. The following guidelines are provided to assist you in both design and maintenance of projects on expansive soils:

- Drainage away from structures and pavement is essential to prevent excessive wetting of expansive soils. Grades should be designed to the latest building code and maintained to allow flow of irrigation and rain water to approved drainage devices or to the street. Any "ponding" of water adjacent to buildings, slabs and pavement after rains is evidence of poor drainage; the installation of drainage devices or regrading of the area may be required to assure proper drainage. Installation of rain gutters is also recommended to control the introduction of moisture next to buildings. Gutters should discharge into a drainage device or onto pavement which drains to roadways.

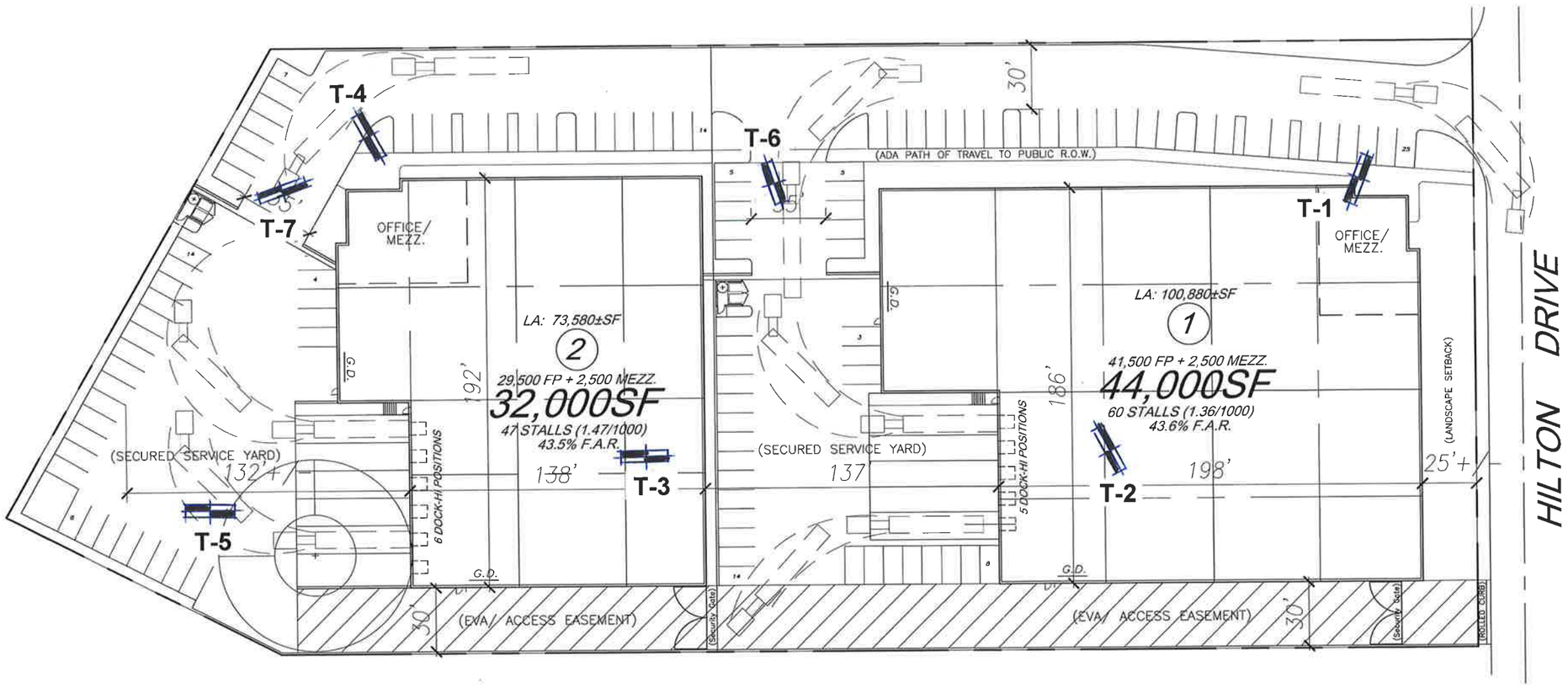
- Irrigation should be strictly controlled around building foundations, slabs and pavement and may need to be adjusted depending upon season. This control is essential to maintain a relatively uniform moisture content in the expansive soils and to prevent swelling and contracting. Over-watering adjacent to improvements may result in damage to those improvements. NorCal Engineering makes no specific recommendations regarding landscape irrigation schedules.

- Planting schemes for landscaping around structures and pavement should be analyzed carefully. Plants (including sod) requiring high amounts of water may result in excessive wetting of soils. Trees and large shrubs may actually extract moisture from the expansive soils, thus causing contraction of the fine-grained soils.

- Thickened edges on exterior slabs will assist in keeping excessive moisture from entering directly beneath the concrete. A six-inch thick or greater deepened edge on slabs may be considered. Underlying interior and exterior slabs with 6 to 12 inches or more of non-expansive soils and providing presaturation of the underlying clayey soils as recommended in the soil report will improve the overall performance of on-grade slabs.

- Increase the amount of steel reinforcing in concrete slabs, foundations and other structures to resist the forces of expansive soils. The precise amount of reinforcing should be determined by the appropriate design engineers and/or architects.

- Recommendations of the soil report should always be followed in the development of the project. Any recommendations regarding presaturation of the upper subgrade soils in slab areas should be performed in the field and verified by the Soil Engineer.



N

0 20' 40'

1 INCH = 60 FEET

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

PROJECT	12343-05	DATE	OCTOBER 2017

SITE PLAN

List of Appendices

(in order of appearance)

Appendix A - Log of Excavations

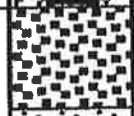
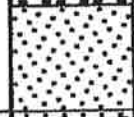
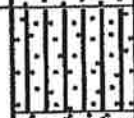
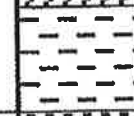
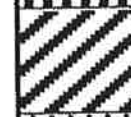
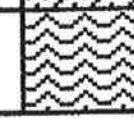
- Log of Trenches T-1 to T-7

- **Appendix B - Laboratory Tests**
- Table I - Maximum Dry Density
  - Table II – Expansion
  - Table III – Corrosion
    - R Value

  - Plate A - Direct Shear
- Plates B and C – Consolidation

Appendix C – Soil Infiltration Data

Appendix A

MAJOR DIVISION			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL. SAND MIXTURES, 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 (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVEL-LY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINE (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				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, FAT CLAYS
				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

UNIFIED SOIL CLASSIFICATION SYSTEM

KEY:

- Indicates 2.5-inch Inside Diameter. Ring Sample.
- Indicates 2-inch OD Split Spoon Sample (SPT).
- Indicates Shelby Tube Sample.
- Indicates No Recovery.
- Indicates SPT with 140# Hammer 30 in. Drop.
- Indicates Bulk Sample.
- Indicates Small Bag Sample.
- Indicates Non-Standard
- Indicates Core Run.

COMPONENT PROPORTIONS

DESCRIPTIVE TERMS	RANGE OF PROPORTION
Trace	1 - 5%
Few	5 - 10%
Little	10 - 20%
Some	20 - 35%
And	35 - 50%

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5mm) to No. 200 (0.074mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074 mm)

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
DAMP	Some perceptible moisture; below optimum
MOIST	No visible water; near optimum moisture content
WET	Visible free water, usually soil is below water table.

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N -VALUE

COHESIONLESS SOILS		COHESIVE SOILS		
Density	N (blows/ft)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	Very Soft	0 to 2	< 250
Loose	4 to 10	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	Very Stiff	15 to 30	2000 - 4000
		Hard	over 30	> 4000

Log of Trench T-1

Project: Hilton Lane, LLC/Fontana	
Date of Drilling: 7/29/05	Groundwater Depth: None Encountered
Drilling Method: Backhoe	
Hammer Weight:	Drop:

Depth (feet)	Geotechnical Description	Lith-ology	Samples: Type	Samples: Blow counts	Laboratory: Moisture (%)	Laboratory: Dry Density (pcf)	Laboratory: Fines (%)
	Surface Elevation Not Measured						
0	DISTURBED TOP/FILL Silty SAND with gravel Grey-brown, loose, dry		■		1.3	111.5	
	NATURAL Silty SAND with gravel and some cobbles (<12" diameter) Brown, medium dense, damp						
5	fine to coarse grained; silty to slightly silty		■		1.5	113.0	
10			■		3.3	116.2	
	Gravelly SAND Grey-brown, medium dense, damp						
15	Boring completed at depth of 15'		■		1.7	114.0	
20							
25							
30							
35							

SuperLog v2.2 CivilTech Software www.civiltech.com

NorCal Engineering

Project No. 12343-05

Log of Trench T-2

Project Hilton Lane, LLC/Fontana

Date of Drilling: 7/29/05 | **Groundwater Depth: None Encountered**

Drilling Method: Backhoe

Hammer Weight: | **Drop:**

Depth (feet)	Geotechnical Description	Lith-ology	Samples: Type	Samples: Blow counts	Laboratory: Moisture (%)	Laboratory: Dry Density (pcf)	Laboratory: Fines (%)
	Surface Elevation Not Measured						
0	DISTURBED TOP/FILL Silty SAND with gravel Grey-brown, loose, dry						
	NATURAL Silty SAND with gravel and some cobbles (<12" diameter) Brown, medium dense, damp		■		3.3	113.7	
5	fine to coarse grained; silty to slightly silty		■		4.0	115.1	
10	Boring completed at depth of 10'						
15							
20							
25							
30							
35							

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NorCal Engineering

Project No. 12343-05

Log of Trench T-3

Project: Hilton Lane, LLC/Fontana	
Date of Drilling: 7/29/05	Groundwater Depth: None Encountered
Drilling Method: Backhoe	
Hammer Weight:	Drop:

Depth (feet)	Geotechnical Description	Lith-ology	Samples: Type	Samples: Blow counts	Laboratory: Moisture (%)	Laboratory: Dry Density (pcf)	Laboratory: Fines (%)
	Surface Elevation Not Measured						
0	DISTURBED TOP/FILL Silty SAND with gravel Grey-brown, loose, dry		■		2.9	110.7	
	NATURAL Silty SAND with gravel and some cobbles (<12" diameter) Brown, medium dense, damp						
5	fine to coarse grained; silty to slightly silty		■		3.7	112.8	
10	Boring completed at depth of 10'						
15							
20							
25							
30							
35							

NorCal Engineering

Project No. 12343-05

3

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Log of Trench T-4

Project Hilton Lane, LLC/Fontana

Date of Drilling: 7/29/05 | **Groundwater Depth: None Encountered**

Drilling Method: Backhoe

Hammer Weight: | **Drop:**

Depth (feet)	Geotechnical Description	Lith-ology	Samples: Type	Samples: Blow counts	Laboratory: Moisture (%)	Laboratory: Dry Density (pcf)	Laboratory: Fines (%)
	Surface Elevation Not Measured						
0	DISTURBED TOP/FILL Silty SAND with gravel Grey-brown, loose, dry		■		2.8	111.2	
	NATURAL Silty SAND with gravel and some cobbles (<12" diameter) Brown, medium dense, damp						
5	fine to coarse grained; silty to slightly silty		■		2.5	114.0	
10	Boring completed at depth of 10'		■		3.1	114.5	
15							
20							
25							
30							
35							

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NorCal Engineering

Project No. 12343-05

Log of Trench T-5

Project	Hilton Lane, LLC/Fontana
Date of Drilling: 7/29/05	Groundwater Depth: None Encountered
Drilling Method: Backhoe	
Hammer Weight:	Drop:

Depth (feet)	Geotechnical Description	Lith-ology	Samples		Laboratory		
			Type	Blow counts	Moisture (%)	Dry Density (pcf)	Fines (%)
	Surface Elevation Not Measured						
0	DISTURBED TOP/FILL Silty SAND with gravel Grey-brown, loose, dry						
	NATURAL Silty SAND with gravel and some cobbles (<12" diameter) Brown, medium dense, damp						
5	fine to coarse grained; silty to slightly silty		■		2.7	112.5	
10	Gravelly SAND Grey-brown, medium dense, damp		■		2.3	115.2	
	Boring completed at depth of 12'						
15							
20							
25							
30							
35							

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McCan Partners 12343-05	Log of Trench T-6
Boring Location: W of 14900 Hilton Dr, Fontana	
Date of Drilling: 9/29/17	Groundwater Depth: None Encountered
Drilling Method: Backhoe	
Hammer Weight:	Drop:
Surface Elevation: Not Measured	

Depth (feet)	Lith-ology	Material Description	Samples: Type	Samples: Blow Counts	Laboratory: Moisture	Laboratory: Dry Density	Laboratory: Fines Content %
0		FILL Silty (fine to coarse grained) SAND Brown, loose, dry					
		NATURAL Silty (fine to coarse grained) SAND Brown, medium dense, damp; slightly silty with gravel and cobbles					
5		Trench completed at depth of 5'					
10							
15							
20							
25							
30							
35							

GWT not encountered

SuperLog CiviliTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\12343-05.log Date: 10/11/2017

NorCal Engineering

McCan Partners
12343-05

Log of Trench T-7

Boring Location: W of 14900 Hilton Dr, Fontana

Date of Drilling: 9/29/17

Groundwater Depth: None Encountered

Drilling Method: Backhoe

Hammer Weight:

Drop:

Surface Elevation: Not Measured

Depth (feet)	Lith-ology	Material Description	Samples: Type	Samples: Blow Counts	Laboratory: Moisture	Laboratory: Dry Density	Laboratory: Fines Content %
0		FILL Silty SAND Brown, loose, dry					
		NATURAL Silty (fine to coarse grained) SAND Brown, medium dense, dry to damp; slightly silty with gravel and cobbles					
5							
10		Trench completed at depth of 10'					
15							
20							
25							
30							
35							

GWT not encountered

Date: 10/11/2017 File: C:\Superlog4\PROJECT\12343-05.log SuperLog CivilTech Software, USA www.civiltech.com

NorCal Engineering

Appendix B

TABLE I
MAXIMUM DENSITY TESTS

Sample	Classification	Optimum Moisture	Maximum Dry Density (lbs./cu.ft.)
T-1 @ 2'	Gravelly SAND	9.5	129.0

TABLE II
EXPANSION INDEX TESTS

Soil Type	Classification	Expansion Index
T-1 @ 2'	Gravelly SAND	3

TABLE III
CORROSION TESTS

Sample	pH	Electrical Resistivity (ohm-cm)	Sulfate (%)	Chloride (ppm)
T-1 @ 2'	7.9	20,660	0.009	41

ND denotes not detected
% by weight
ppm – mg/kg

'R' VALUE CA 301

Project Norcal # Nofhilton - Fontana **Job No.** 2003-072

Sample TE 3 @ 1' **By:** LD

Soil Type Brown, F.M. Silty Sand w. Gravel **Date** 8/2/2005

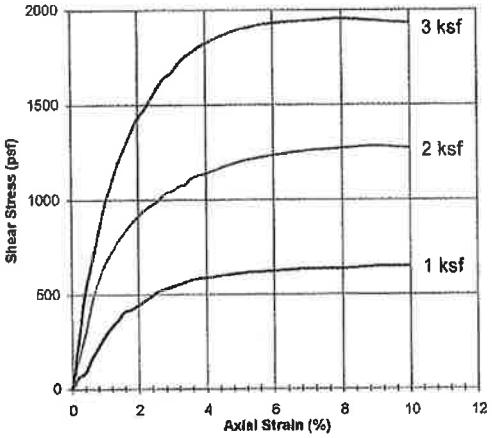
TEST SPECIMEN		A	B	C	Grain Size Distribution		
Compactor Air Pressure	psi	**350**	**350**	**350**	Sieve	As Rec'vd. (%Pass.)	As Tested (%Pass.)
Initial Moisture Content	%	**1.2**	**1.2**	**1.2**	3"		
Water Added	ml	**105**	**110**	**115**	2 1/2"		
Moisture at Compaction	%	10.1	10.5	10.9	2"		
Sample & Mold Weight	gms	**3162**	**3159**	**3172**	1 1/2"		
Mold Weight	gms	**2102**	**2106**	**2112**	1"		
Net Sample Weight	gms	1060	1053	1060	3/4"		
Sample Height	in.	**2.55**	**2.522**	**2.51**	1/2"		
Dry Density	pcf	114.4	114.5	115.4	3/8"		
Pressure	lbs	**9000**	**3980**	**2120**	#4		
Exudation Pressure	psi	717	317	169	#8		
Expansion Dial	x 0.0001	**0**	**0**	**0**	#16		
Expansion Pressure	psf	0	0	0	#30		
Ph at 1000lbs	psi	**17**	**19**	**21**	#50		
Ph at 2000lbs	psi	**26**	**32**	**33**	#100		
Displacement	turns	**3.46**	**3.59**	**4.09**	#200		
R' Value		79	74	70	**Sand Equivalent**		
Corrected 'R' Value		**79**	**74**	**70**	(CTM 217)		

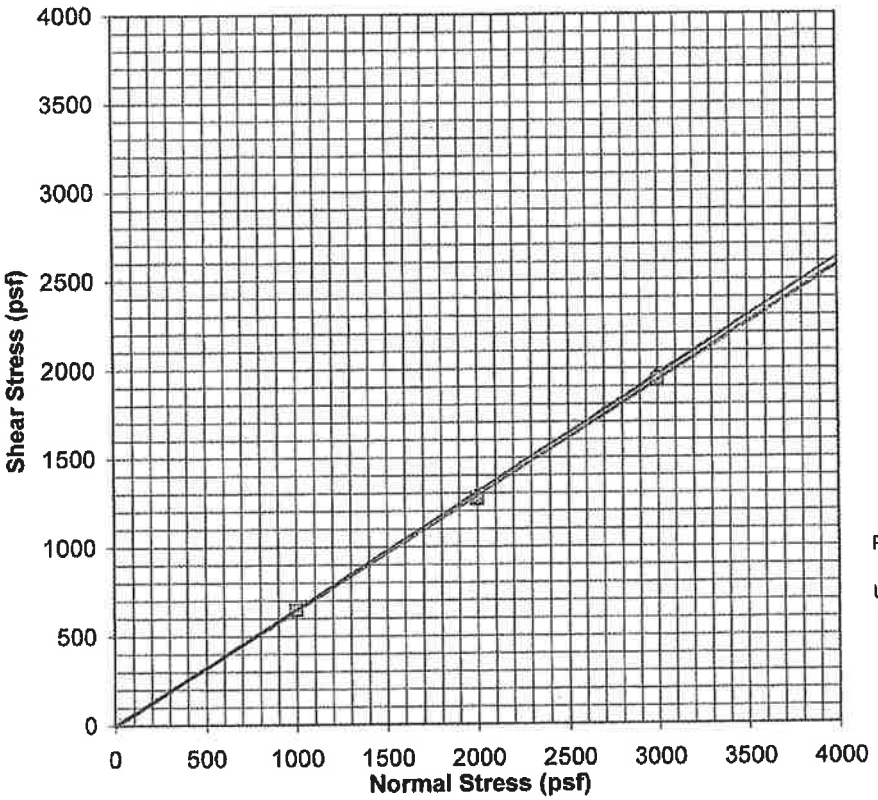
FINAL 'R' VALUE	
By Exudation Pressure (@ 300 psi):	**74**
By Epansion Pressure :	**N/A**
TI =	

GeoLogic Associates

Sample No.	TE4@2'
Sample Type:	Undisturbed-Saturated
Soil Description:	F-C Silty Sand

	1	2	3
Normal Stress, psf	1000	2000	3000
Peak Stress, psf	648	1284	1956
Displacement, in.	0.225	0.225	0.200
Ultimate Stress, psf	648	1272	1932
Displacement, in.	0.250	0.250	0.250
Initial Dry Density, pcf	111.2	111.2	111.2
Initial Water Content, %	2.8	2.8	2.8
Strain Rate, in/min.	0.020	0.020	0.020





	ϕ (Deg)	C (psf)
Peak	33	0
Ultimate	32.5	0

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

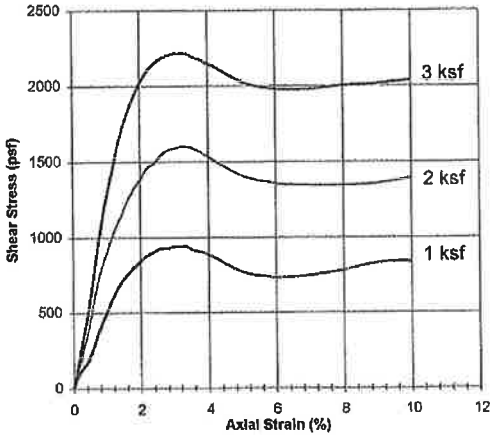
Hilton Lane - Lee & Hemlock - Fontana

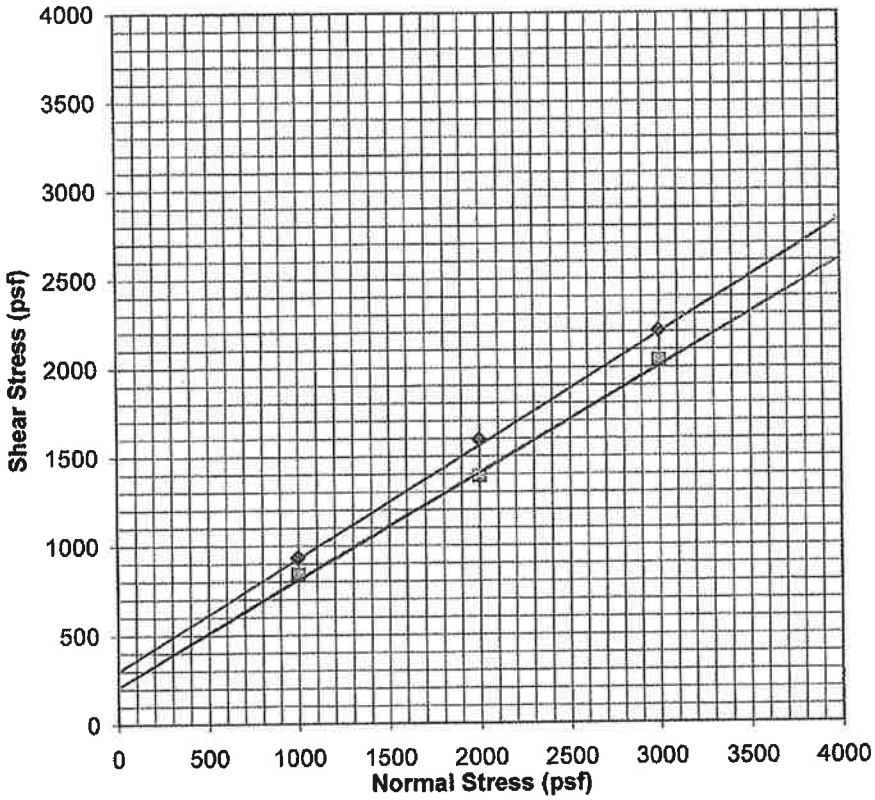
PROJECT: 12343-05 DATE: 8/8/2005

DIRECT SHEAR TEST
Plate B

Sample No.	TE1@1-2'
Sample Type:	Remolded-Saturated
Soil Description:	F-C Silty Sand

	1	2	3
Normal Stress, psf	1000	2000	3000
Peak Stress, psf	936	1596	2208
Displacement, in.	0.075	0.080	0.075
Ultimate Stress, psf	840	1392	2040
Displacement, in.	0.250	0.250	0.250
Initial Dry Density, pcf	117.0	117.0	117.0
Initial Water Content, %	9.5	9.5	9.5
Strain Rate, in/min.	0.020	0.020	0.020





	ϕ (Deg)	C (psf)
Peak	32.5	310
Ultimate	31	220

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

Hilton Lane - Lee & Hemlock - Fontana

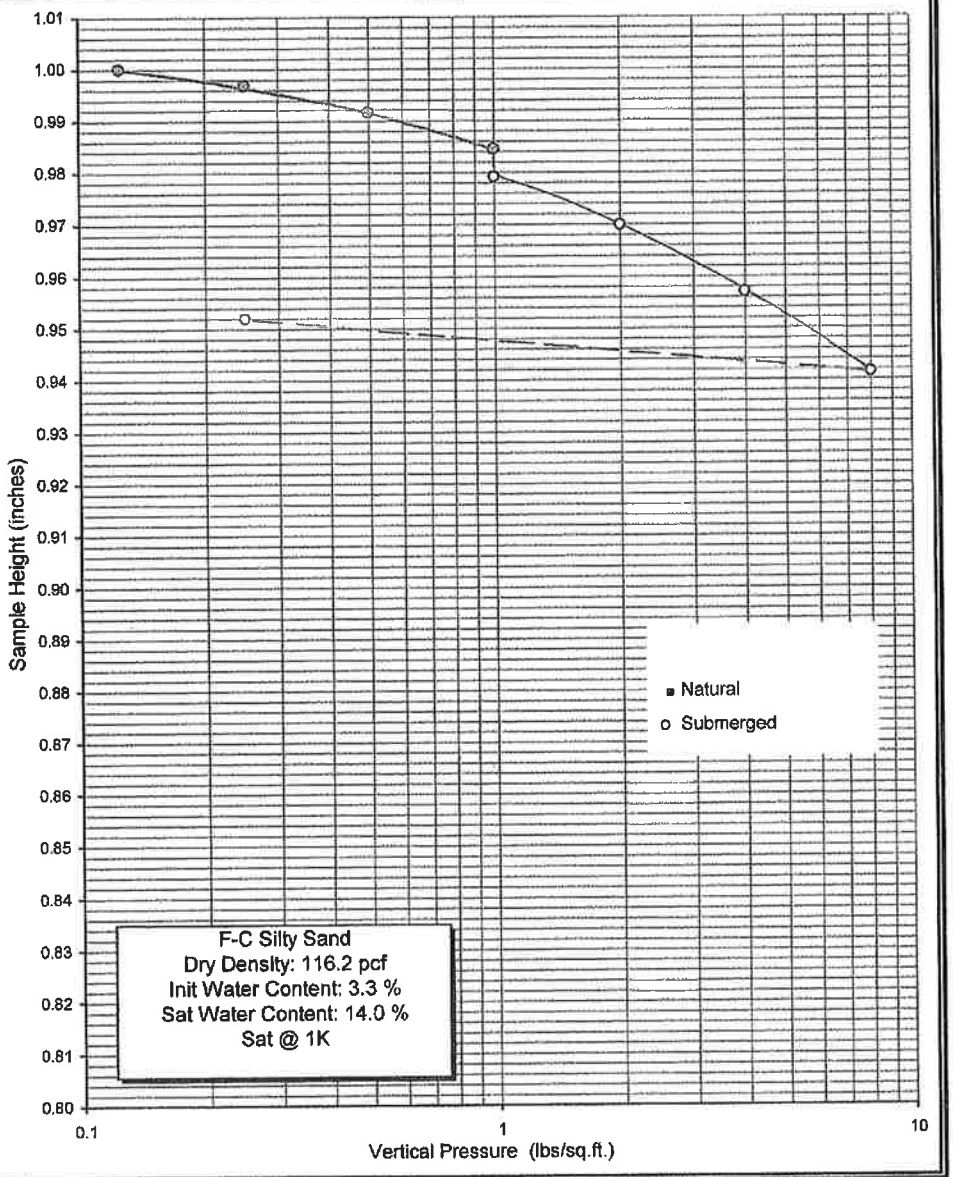
PROJECT: 12343-05 DATE: 8/9/2005

DIRECT SHEAR TEST
Plate A

Sample No.	TE1	Depth	8'	Date	08-08-05

Vertical Pressure (kips/sq.ft.)	Sample Height (inches)	Consol-idation (percent)	
	1		
			Saturated
0.125	**1.0000**	**0.0**	
0.25	**0.9969**	**0.3**	
0.5	**0.9915**	**0.8**	
1	**0.9845**	**1.6**	
1	**0.9791**	**2.1**	S
2	**0.9699**	**3.0**	
4	**0.9570**	**4.3**	
8	**0.9415**	**5.9**	
0.25	**0.9520**	**4.8**	

Tested: **8/8/2005**
Sample No: **TE1**
Depth: **8'**



NorCal Engineering

SOILS AND GEOTECHNICAL CONSULTANTS

Hilton Lane - Lee & Hemlock - Fontana

PROJECT: 12343-05 DATE: 8/9/2005

CONSOLIDATION TEST

Plate C

Appendix C

NORCAL ENGINEERING

SOILS AND GEOTECHNICAL CONSULTANTS

Project:	**McCan Partners**
Project No:	12343-05
Date:	9/29/17
Test No.	T-6
Depth:	5'
Tested By:	J.S.

	TIME (hr/min)	CHANGE TIME (min)	CUMULATIVE TIME (min)	INNER RING READING (cm)	INNER RING CHANGE	INNER RING FLOW (cc)	OUTER RING READING (cm)	OUTER RING CHANGE (cm)	OUTER RING FLOW (cc)	INNER RING INF RATE (cm/hr)	OUTER RING INF RATE (cm/hr)	INNER RING INF RATE (ft/hr)
1	8:55			99.2			44.0					
	9:00	5	5	109.5	10.3		53.6	9.6				
2	9:00			97.7			41.8					
	9:05	5	10	106.6	8.9		50.8	9.0				
3	9:05			97.9			41.8					
	9:10	5	15	105.6	7.7		49.7	7.9				
4	9:10			98.3			42.3					
	9:15	5	20	105.3	7.0		49.3	7.0				
5	9:15			100.5			44.3					
	9:20	5	25	106.7	6.2		50.8	10.5				
6	9:20			100.0			43.9					
	9:25	5	30	106.2	6.2		50.1	6.2				
7	9:25			99.6			43.8					
	9:30	5	35	105.6	6.0		49.7	5.9		72.0	70.8	
8	9:30			98.8			43.0					
	9:35	5	40	104.6	5.8		49.0	6.0		69.6	72.0	
9	9:35			98.5			42.1					
	9:40	5	45	104.4	5.9		48.4	6.3		70.8	75.6	
10	9:40			97.8			42.0					
	9:45	5	50	103.0	5.2		47.3	5.3		62.4	63.6	
11	9:45			98.4			42.5					
	9:50	5	55	103.4	5.0		47.4	4.9		60.0	59.4	
12	9:50			103.4			47.4					
	9:55	5	60	107.5	4.1		51.7	4.3		49.2	51.6	

Average = 64.0 / 65.5

NORCAL ENGINEERING

SOILS AND GEOTECHNICAL CONSULTANTS

Project: McCan Partners
Project No: 12343-05
Date: 9/29/17
Test No. T-7
Depth: 10'
Tested By: J.S.

	TIME (hr/min)	CHANGE TIME (min)	CUMULATIVE TIME (min)	INNER RING READING (cm)	INNER RING CHANGE	INNER RING FLOW (cc)	OUTER RING READING (cm)	OUTER RING CHANGE (cm)	OUTER RING FLOW (cc)	INNER RING INF RATE (cm/hr)	OUTER RING INF RATE (cm/hr)	INNER RING INF RATE (ft/hr)
1	12:14			99.5			42.5					
	12:17	3	3	109.5	10.0		52.3	9.8				
2	12:17			99.3			40.0					
	12:20	3	6	109.4	10.1		48.1	8.1				
3	12:20			99.0			42.5					
	12:23	3	9	107.2	8.2		50.1	7.6				
4	12:23			98.8			42.4					
	12:26	3	12	106.0	7.2		49.1	6.7				
5	12:26			98.4			42.3					
	12:29	3	15	106.2	7.8		48.3	6.0				
6	12:29			101.0			44.0					
	12:32	3	18	107.1	6.1		50.0	6.0		122	120	
7	12:32			98.5			42.2					
	12:35	3	21	105.3	6.8		48.3	6.1		136	122	
8	12:35			99.3			43.3					
	12:38	3	24	106.0	6.7		49.0	5.7		134	114	
9	12:38			99.3			43.2					
	12:41	3	27	105.3	6.0		48.7	5.5		120	110	
10	12:41			99.0			42.7					
	12:44	3	30	105.0	6.0		48.5	5.8		120	116	
11	12:44			98.4			42.1					
	12:47	3	33	104.1	5.7		47.8	5.7		114	114	
12	12:47			104.1			47.8					
	12:50	3	36	108.7	4.6		52.5	4.7		92	94	

Average = 120 / 113

Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, S_A = Lp			1.00
B	Design	Tributary area size	0.25	2	0.50
		Level of pretreatment/ expected sediment loads	0.25	1	0.25
		Redundancy	0.25	3	0.75
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, S_B = Lp			1.75
Combined Safety Factor, S_{TOT}= S_A x S_B					1.75; USE 2.0
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)					25.6 (lowest tested rate)
Design Infiltration Rate, in/hr, K_{DESIGN} = S_{TOT} × K_M					Use 12.8

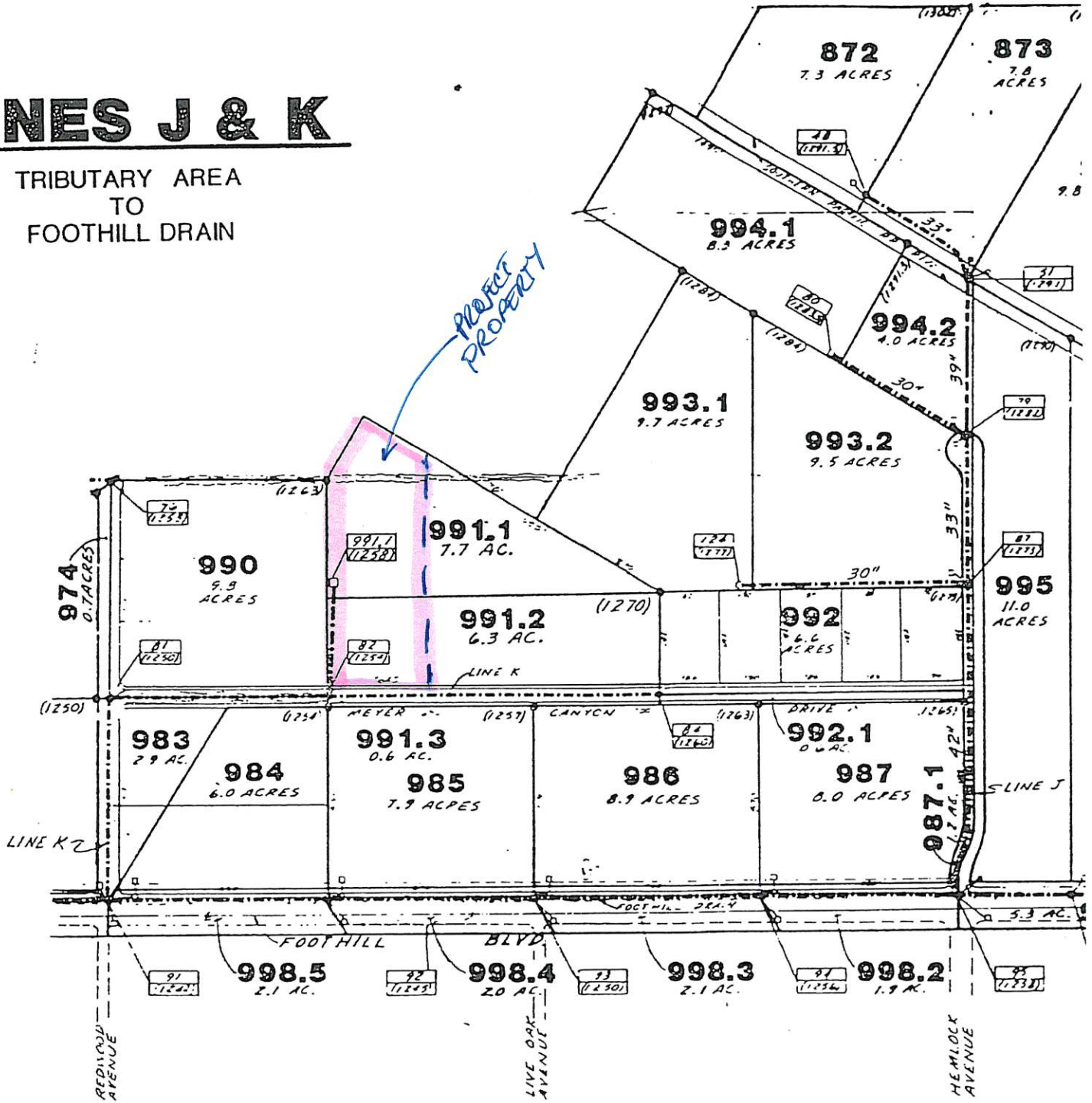
Supporting Data

Briefly describe infiltration test and provide reference to test forms:
See Section 6.4 of the project WQMP for project Soil Infiltration Testing by Norcal Engineering, Project No. 12343-05, dated 10/6/2017. Two locations were tested within the limits of the proposed underground infiltration system and the lowest value is to be used in the design of proposed infiltration BMPs.

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

LINES J & K

TRIBUTARY AREA
TO
FOOTHILL DRAIN



MASTER PLAN HYDROLOGY (LINE K)

The project site is 3.98 ACRES OF THE 14.0 ACRES comprising area 991.1 & 991.2 SHOWN ON MAP on next sheet.

Q_{10} FOR 991.1 = 16.85 cfs
Q_{10} FOR 991.2 = 12.27 cfs
29.12 CFS

Area for 991.1 & 991.2 = 14.0 AC
Area for project = 3.98 AC

Q/AC = 29.12/14.0 = 2.08 cfs/ACRE.

Q_{10} FOR PROJECT SITE PER MASTER PLAN =
3.98 (2.08) CFS = 8.28 cfs ← Q_{10}

$Q_{.25}$ FOR 991.1 = 19.69 cfs
$Q_{.25}$ FOR 991.2 = 14.44 cfs
34.13 cfs

Q/AC = 34.13/14 = 2.44 cfs/ACRE

$Q_{.25}$ FOR PROJECT SITE PER MASTER PLAN =
(3.98)(2.44) = 9.71 cfs ← Q_{25}

Q_{100} FOR 991.1 = 25.26 cfs
Q_{100} FOR 991.2 = 18.61 cfs
43.87 cfs

Q/AC = 43.87/14 = 3.13 cfs/ACRE

Q_{100} FOR PROJECT SITE PER MASTER PLAN =
(3.98)(3.13) = 12.46 cfs ← Q_{100}

LAND DEVELOPMENT DESIGN COMPANY, LLC
2313 E. Philadelphia St., Ste. F
ONTARIO, CA 91761
(909) 930-1466
FAX (909) 930-1468
PLANNING • CIVIL • SURVEYING

DATE:	SCALE:	SHEET:	JOB NO.	

APPENDIX F
CULTURAL RESOURCES STUDY

CULTURAL RESOURCES ASSESSMENT

HILTON INDUSTRIAL FACILITY BUSINESS PARK PROJECT

CITY OF FONTANA

SAN BERNARDINO COUNTY, CALIFORNIA

LSA

March 2022

CULTURAL RESOURCES ASSESSMENT

HILTON INDUSTRIAL FACILITY BUSINESS PARK PROJECT

CITY OF FONTANA

SAN BERNARDINO COUNTY, CALIFORNIA

Prepared for:

Jon Dille
Associate Planner
City of Fontana
Community Development Department
8353 Sierra Avenue
Fontana, California 92335

Prepared by:

Riordan Goodwin, RA
LSA Associates, Inc.
1500 Iowa Avenue, Suite 200
Riverside, California 92507
(951) 781-9310

LSA Project No. CFN2005.06

National Archaeological Database Information:
Type of Study: Reconnaissance Survey
Sites Recorded: None
USGS 7.5' Quadrangle: *Fontana, California*
Acreage: ~4 acres
Keywords: Phase I, negative results, no monitoring recommended.

LSA

March 2022

MANAGEMENT SUMMARY

LSA was retained by the City of Fontana to conduct a cultural resources assessment for the proposed Hilton Industrial Facility Business Park Project in the City of Fontana, San Bernardino County, California. This cultural resources assessment was completed pursuant to the California Environmental Quality Act (CEQA).

A cultural resources records search, additional research, and a field survey were conducted for the project area. No cultural resources are documented within the project parcel, and none were identified by the survey. No prehistoric resources were documented within a mile, and sensitivity for in situ undocumented subsurface resources is low. Therefore, no further investigation or archaeological monitoring is recommended.

In the event previously undocumented archaeological resources are identified during earthmoving activities, further work in the area should be halted until the nature and significance of the find can be assessed by a qualified archaeologist.

If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to State Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be Native American, the County Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection and make recommendations or preferences for treatment within 48 hours of being granted access to the site. The MLD recommendations may include scientific removal and nondestructive analysis of human remains and items associated with Native American burials, preservation of Native American human remains and associated items in place, relinquishment of Native American human remains and associated items to the descendants for treatment, or any other culturally appropriate treatment.

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Appendix

A: Records Search Bibliography

INTRODUCTION

LSA was retained by the City of Fontana to conduct a cultural resources assessment for the proposed Hilton Industrial Facility Business Park Project in the City of Fontana, San Bernardino County, California. This assessment was completed pursuant to the California Environmental Quality Act (CEQA), Public Resources Code Chapter 2.6, Section 21083.2, and California Code of Regulations Title 14, Chapter 3, Article 5, Section 15064.5. The research and field surveys were conducted to determine whether the proposed project could adversely affect any resources considered historical resources per CEQA. The project area (Assessor's Parcel Number 1110-151-03) is located on the north side of Hilton Drive between Hemlock Avenue and Redwood Avenue. The project is depicted on the United States Geological Survey (USGS) *Fontana*, *California* topographic quadrangle map in Township 1 South, Range 6 West in Section 2, San Bernardino Baseline and Meridian (USGS 1980; Figure 1). The project area is a currently vacant 4-acre lot. The proposed project is an industrial/business park with associated parking.

NATURAL SETTING

Climate and Watershed

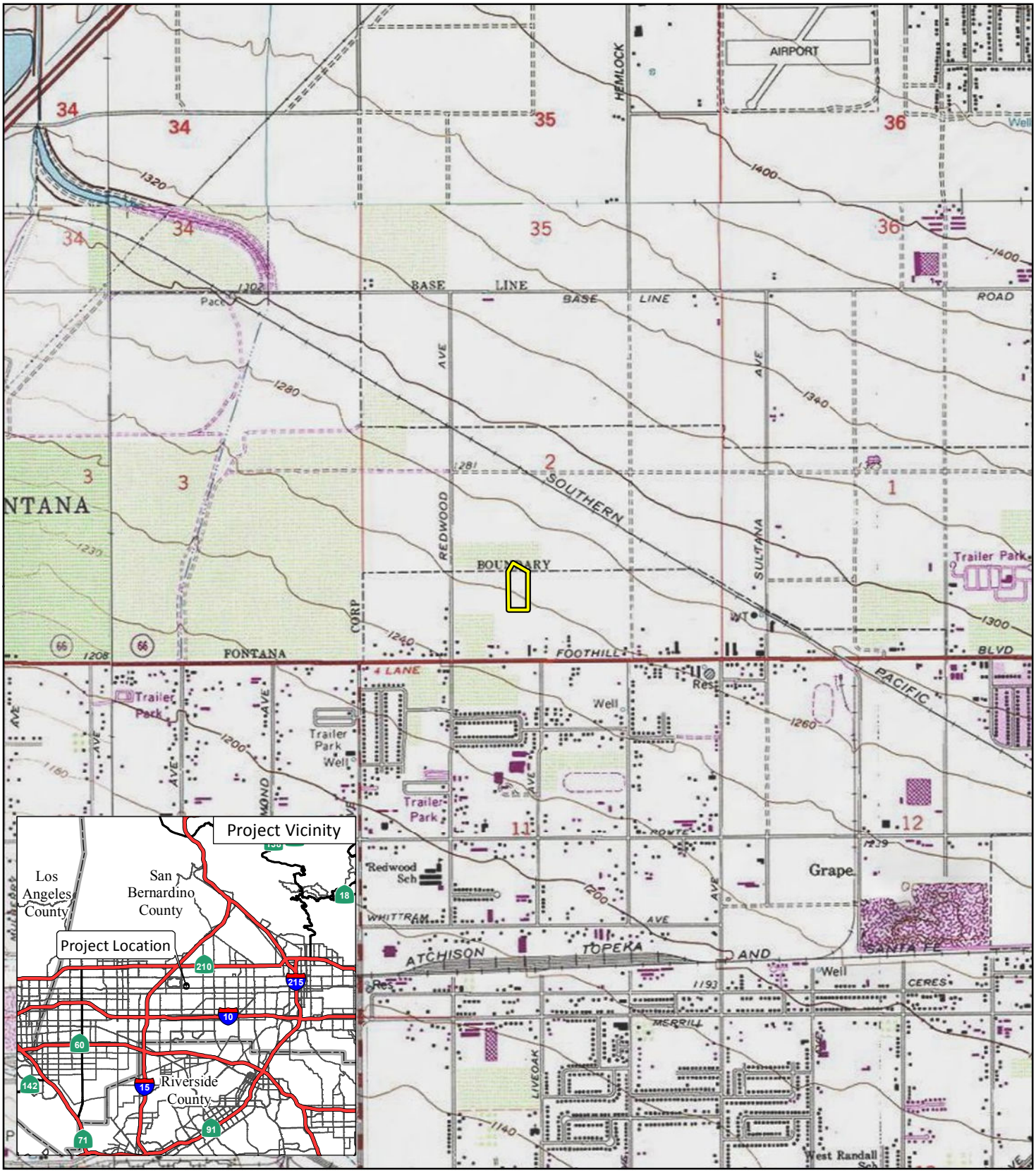
The project region is characterized by a temperate climate, with dry, hot summers and moderate winters. Rainfall ranges from 12 to 16 inches annually (Beck and Haase 1974). Precipitation usually occurs in the form of winter rain, with warm monsoonal showers in summer. The project area is approximately 1.5 miles east of the former course of East Etiwanda Creek (prior to channelization), which drains south.

Biology

At an average elevation of approximately 1,260 feet, the project is within the Lower Sonoran Life Zone of California (Schoenherr 1992), which ranges from below sea level to 3,500 feet in elevation. Species such as datura, foxtail brome, mustard, along with xeric grasses were noted on the property. Extensive fauna are known locally, including many endemic species of reptiles, birds, and insects.

Geology

The project area is located at the northern end of the Peninsular Ranges Geomorphic Province, a 900-mile-long northwest-southeast trending structural block that extends from the Transverse Ranges to the tip of Baja California and includes the Los Angeles Basin (California Geological Survey 2002; Norris and Webb 1976). The province is approximately 225 miles wide, extending from the Colorado Desert in the east, across the continental shelf to the Southern Channel Islands (Santa Barbara, San Nicolas, Santa Catalina, and San Clemente) in the west (Sharp 1976). This region is characterized by a series of mountain ranges separated by northwest-trending valleys subparallel to faults branching from the San Andreas Fault. The geology of this province is similar to that of the Sierra Nevada, with numerous rock outcroppings useful to the Native Americans for resource milling, shelter, and ceremonial art.



LSA

LEGEND

Project Location

FIGURE 1

N

0 1000 2000

FEET

SOURCE: USGS 7.5' Quad - *Fontana* (1980), *Guasti* (1981), *Cucamonga Peak* (1988), *Devore* (1988), CA

I:\CFN2005.06\GIS\MXD\ProjLoc_USGS.mxd (1/4/2022)

Hilton Logistics Business Park

Regional and Project Location

CULTURAL SETTING

Prehistory

Chronologies of prehistoric cultural change in Southern California have been attempted numerous times, and several are reviewed in Moratto (2004). No single description is universally accepted as the various chronologies are based primarily on material developments identified by researchers familiar with sites in a particular region and variation exists essentially due to the differences in those items found at the sites. Small differences occur over time and space, which combine to form patterns that are variously interpreted.

Currently, two primary regional culture chronology syntheses are commonly referenced in the archaeological literature. The first, Wallace (1955), describes four cultural horizons or time periods: Horizon I – Early Man (9000–6000 BC), Horizon II – Milling Stone Assemblages (6000–3000 BC), Horizon III – Intermediate Cultures (3000 BC–AD 500), and Horizon IV – Late Prehistoric Cultures (AD 500–historic contact). This chronology was refined (Wallace 1978) using absolute chronological dates obtained after 1955.

The second cultural chronology (Warren 1968) is based broadly on Southern California prehistoric cultures and was also revised (Warren 1984; Warren and Crabtree 1986). Warren's (1984) chronology includes five periods in prehistory: Lake Mojave (7000–5000 BC), Pinto (5000–2000 BC), Gypsum (2000 BC–AD 500), Saratoga Springs (AD 500–1200), and Protohistoric (AD 1200–historic contact). Changes in settlement pattern and subsistence focus are viewed as cultural adaptations to a changing environment, which begins with gradual environmental warming in the late Pleistocene, continues with the desiccation of the desert lakes, followed by a brief return to pluvial conditions, and concludes with a general warming and drying trend, with periodic reversals that continue to the present (Warren and Crabtree 1986).

Ethnography

The project area is near the intersection of the traditional cultural territories of the Cahuilla, Gabrielino, and Serrano (Kroeber 1925; Heizer 1968). Tribal territories were somewhat fluid and changed over time. The first written accounts of these Southern California tribes are attributed to the mission fathers, and later documentation was by others as indicated below.

Cahuilla

The territory of the Cahuilla ranged from the San Bernardino Mountains south to Borrego Springs and the Chocolate Mountains, from Orocopia Mountain to the east, to the San Jacinto Plain and Palomar Mountain to the west (Bean 1978). Cahuilla territory lies within the geographic center of Southern California and encompassed diverse environments ranging from inland river valleys and foothills to mountains and desert (Bean and Shipek 1978).

Cahuilla villages, generally located near water sources within canyons or near alluvial fans, comprised groups of related individuals, generally from a single lineage, and the territory around the village was owned by the villagers (Bean 1978). Like other Native American groups in Southern

California, the Cahuilla were semi-nomadic peoples leaving their villages and utilizing temporary campsites to exploit seasonably available plant and animal resources (James 1960).

Cahuilla subsistence was based primarily on acorns, honey mesquite, screw beans, piñon nuts, and cactus fruit, supplemented by a variety of wild fruits and berries, tubers, roots, and greens (Kroeber 1925; Heizer and Elsasser 1980). Hunting deer, rabbit, antelope, bighorn sheep, reptiles, small rodents, quail, doves, ducks, and reptiles by means of bows, throwing sticks, traps, and communal drives is documented (James 1960).

The Cahuilla were documented by Barrows (1900), Hooper (1920), and Strong (1929) among others.

Gabrielino

The territory of the Gabrielino included portions of Los Angeles, Orange, and San Bernardino Counties during ethnohistoric times, and also extended inland into northwestern Riverside County (Kroeber 1925; Heizer 1968). It encompassed an extremely diverse environment that included coastal beaches, lagoons and marshes, inland river valleys, foothills and mountains (Bean and Shipek 1978).

The Gabrielino caught and collected seasonally available food resources, and led a semi-sedentary lifestyle, living in permanent communities along inland watercourses and coastal estuaries. Individuals from these villages took advantage of the varied resources available. Seasonally, as foods became available, native groups moved to temporary camps to collect plant foods such as acorns, buckwheat, chía, berries, and fruits, and to conduct communal rabbit and deer hunts. They also established seasonal camps along the coast and near bays and estuaries to gather shellfish and hunt waterfowl (Hudson 1971).

The Gabrielino lived in small communities, which were the focus of family life. Patrilineally linked, extended families occupied each village (Kroeber 1925; Bean and Smith 1978a). Both clans and villages were apparently exogamous, marrying individuals from outside the clan or village (Heizer 1968). Gabrielino villages were politically independent and were administered by a chief, who inherited his position from his father. Shamans guided religious and medical activities, while group hunting or fishing was supervised by individual male specialists (Bean and Smith 1978a).

The nearest historically known Native American community was the Gabrielino community of *Horuuvunga* (also known to the Serrano as *Jurupet* and described to Alfred Kroeber as *Hurumpa*) located approximately 7 miles south of the project area somewhere in the Jurupa Valley (Kroeber 1925; Kirkman 1938; McCawley 1996).

The Gabrielino were described by Johnston (1962), Blackburn (1962–1963), Hudson (1971), and others.

Serrano

The Serrano lived in the area generally north of Cahuilla territory (western Riverside County), occupying much of present-day San Bernardino County and northeastern Los Angeles County, but

there is some overlap in the ancestral areas. The term Serrano is Spanish for "mountaineer" or "highlander" and is derived from *sierra*, meaning "mountain range" and was given to people who inhabited the areas of the San Bernardino Mountains that had no associated mission (Bean and Smith 1978b). The Serrano culture group actually incorporates two divisions, a mountain division (referred to as the Mountain Serrano) and a desert division, referred to as the Desert Serrano (Sutton and Earle 2017).

The Serrano were hunter-gatherers who exploited whatever flora was available in the area they happened to be, generally it was acorns, pinion nuts, honey, mesquite, yucca, and cactus fruits, in addition to various seeds, bulbs, and roots. Plants were consumed both raw and cooked. Food processing involved the use of manos, metates, mortars, and pestles. Antelope, deer, mountain sheep, rabbits, and rodents were hunted and captured, and the most common hunting implements were the bow and arrow, throwing stick, traps, snares, and deadfalls. Meat was prepared in earth ovens, by boiling in watertight baskets, or by parching (Bean and Smith 1978b).

The Serrano had a patrilineal society composed of clans and families linked by both ancestry and ceremony, and most lived in small communities near reliable sources of water (springs, perennial seeps, streams, and small lakes) (Benedict 1924). The basic settlement unit of the Serrano was a village with a number of small satellite resource-gathering camps.

The Serrano were described by Benedict (1924), Bright (1975), Strong (1929), and others.

History

In California, the historic era is generally divided into three periods: the Spanish Period (1769 to 1821), the Mexican Period (1821 to 1848), and the American Period (1848 to present). As there were no resources within the project area, the historic context will focus on the County and the local community.

San Bernardino County

San Bernardino County was created in 1853 from portions of Los Angeles and San Diego Counties due to mineral wealth, and the City of San Bernardino was incorporated as the County Seat the following year. Gold was discovered in Holcomb and Bear Valleys in the San Bernardino Mountains in 1860, and placer mining began in Lytle Creek. Silver was mined at Ivanpah in 1870 and the silver mines of the Calico district were developed in the 1880s. Borax was first discovered in 1862 in the Searles Dry Lake area near Trona (Hoover et al. 1990). Agriculture ultimately replaced mining as the County's economic base, with thousands of acres under cultivation by the beginning of World War I (McGroarty 1914).

Fontana

The area that would later become Fontana was part of a land grant to Don Antonio Maria Lugo from the Spanish Governor of California (Pio Pico) in 1813. Lugo's sons sold a portion of the land (including part of what is now Fontana) to a group of Mormon settlers in 1851 (Richards 1966), and the Semi-Tropical Land & Water Company subsequently acquired the Fontana portion of the Rancho and laid out a townsite in 1887 (Gudde 1998). In the early 1900s, the Fontana Development

Company acquired the land and established a community called Rosena, changed to Fontana in 1913 (Gudde 1998). Fontana was selected as the site for the Kaiser Company's steel mill in 1942 and was incorporated 10 years later with a population of 13,695 as Southern California's leading producer of steel and related products (Goodwin 2003). The steel industry dominated the City's economy until the late 1970s, when Kaiser Steel began to reduce production and manpower, and the mill was closed in 1983 (Goodwin 2003). The plate steel and rolling mill plant was subsequently acquired by California Steel Company, which continues to produce steel products.

METHODS

Records Search

On February 23, 2022, the cultural resources records search was completed for the project area by the South Central Coastal Information Center (SCCIC) located at California State University, Fullerton. It included a review of all recorded historic and prehistoric archaeological sites within 1 mile of the project, as well as a review of known cultural resource reports. Appendix A contains the records search bibliography.

Additional Research

In January 2022, Senior Cultural Resources Manager/Archaeologist Riordan Goodwin reviewed the Built Environment Resource Directory (BERD) along with LSA project files, online historic period maps, and aerial photographs.

Field Survey

On January 13, 2022, Mr. Goodwin surveyed the project area by walking transects spaced approximately 10 meters apart, with particular attention given to exposed areas and rodent dirt apron for cultural residues.

RESULTS

Records Search

Data from the SCCIC indicate there have been 23 cultural resource studies previously conducted within 1 mile of the proposed project, three of which included the entirety of the project area (Swope and McDonald 1985; Alexandrowicz et al. 1992; Tang et al. 2013). Although no cultural resources are documented within the project area, 21 built environment resources are recorded within 1 mile (Table A). The nearest (36-020310, a motel property) is approximately 100 feet south of the project. Only one of the resources is listed in the BERD (36-015392). No prehistoric resources are documented within a mile.

Table A: Cultural Resources Within 1 Mile

Primary #	Trinomial #	Site Description	Status Codes
36-002910	CA-SBR-0002910/H	Historic period road (National Old Trails Highway/Route 66)	—
36-012239		Historic period bridge (both prehistoric and historic elements) site	—
36-013921	CA-SBR-012735/H	8396 Cherry Avenue (c. 1951 residence)	—
36-015392		8631 Sierra Avenue (historic period residence)	6Y
36-015497		Base Line Road	—
36-020137	CA-SBR-015904/H	Historic period railroad alignment (Pacific Electric/Southern Pacific)	—
36-020309		14718 Foothill Blvd. (c. 1943 residence)	—
36-020310		14888 Foothill Blvd. (c. 1944 Redwing Motel)	—
36-020311		14127–14129 Foothill Blvd. & 8155 Banana Ave. (c. 1944 residential/commercial building)	—
36-020312		14293 Foothill Blvd. (c. 1944 residence)	—
36-021695		8566 Cherry Avenue (c. 1927 residence)	—
36-021696		8657 Cherry Avenue (c. 1924 residence)	—
36-024084	CA-SBR-015269/H	Historic period road (Cherry Avenue)	—
36-024087	CA-SBR-015272/H	Historic period road (Beech Avenue)	—
36-024088	CA-SBR-015273H	Historic period road (Oak Avenue)	—
36-024621	CA-SBR-015662H	Historic period road (Sultana Avenue)	—
36-024622	CA-SBR-015663H	Historic period road (Redwood Avenue)	—
36-024623	CA-SBR-015664H	Historic period road (Lime Avenue?)	—
36-024624	CA-SBR-015665H	Historic period road (unnamed road)	—
36-024625	CA-SBR-015666H	National Old Trails Highway/Route 66	—
36-024698	CA-SBR-015739H	Historic period road (Hemlock Avenue)	—
36-029538		Historic period water conveyance system (West Fontana Flood Control Channel)	—

Additional Research

Online research revealed that with the possible exception of the concrete slab/ramp (constructed sometime after 1966 - see below), there were never any buildings or structures within the project area during the historic period. However, a segment of a eucalyptus windrow transected the northern portion of the project area from the late 1930s into the mid-2000s (HistoricAerials.com 2021).

Field Survey

Mr. Goodwin conducted the pedestrian survey of the entire project area utilizing transects spaced approximately 10 meters apart. Visibility was excellent, with only approximately 10 percent of the ground surface obscured by xeric vegetation. Soils are rocky alluvium with pervasive concrete and

fine (small) macadam fragments. A temporally ambiguous concrete slab/ramp along with imported gravel (apparently a driveway/parking area) was noted in the southwestern quarter of the property, and a remnant of a segment of a eucalyptus windrow (a row of stumps) was noted transecting the northern portion of the project. Trace modern refuse was noted throughout the site. No cultural resources were identified.

FINDINGS AND RECOMMENDATIONS

A cultural resources records search, additional research, and a field survey were conducted for the project area. No cultural resources are documented within the project parcel and none was identified by the survey. No prehistoric resources were documented within a mile, and sensitivity for in situ undocumented subsurface resources is low. Therefore, no further investigation or archaeological monitoring is recommended.

In the event previously undocumented archaeological resources are identified during earthmoving activities, further work in the area should be halted until the nature and significance of the find can be assessed by a qualified archaeologist.

In the event human remains are encountered, State Health and Safety Code Section 7050.5. states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to State Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be Native American, the County Coroner will notify the NAHC, which will determine and notify an MLD. With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection and make recommendations or preferences for treatment within 48 hours of being granted access to the site. The MLD recommendations may include scientific removal and nondestructive analysis of human remains and items associated with Native American burials, preservation of Native American human remains and associated items in place, relinquishment of Native American human remains and associated items to the descendants for treatment, or any other culturally appropriate treatment.

REFERENCES

Alexandrowicz, J. Steven, Anne Q. Duffield-Stoll, Jeanette A. Mckenna, Susan R. Alexandrowicz, Arthur A. Kuhner, and Eric Scott
1992 Cultural and Paleontological Resources Investigations Within the North Fontana Infrastructure Area, City of Fontana, San Bernardino County, California. Archaeological Consulting Services.

Barrows, David Prescott
1900 *The Ethno-botany of the Coahilla* [sic] *Indians of Southern California*. Chicago: University of Chicago Press.

Bean, Lowell John
1978 Cahuilla. In *California*, edited by R.F. Heizer, pp. 575–587. *Handbook of North American Indians*, vol. 8, W.C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Bean, Lowell John, and Charles R. Smith
1978a Gabrielino. In *California*, edited by R.F. Heizer, pp. 538–549. *Handbook of North American Indians,* vol. 8, W.C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

1978b Serrano. In *California*, edited by R.F. Heizer, pp. 570–574. *Handbook of North American Indians,* vol. 8, W.C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Bean, Lowell John, and Florence C. Shipek
1978 Luiseño. In *California*, edited by R.F. Heizer, pp. 550–563. *Handbook of North American Indians,* vol. 8, W.C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Beck, Warren A., and Ynez D. Haase
1974 *Historical Atlas of California.* Oklahoma City: University of Oklahoma Press.

Benedict, Ruth F.
1924 A Brief Sketch of Serrano Culture. *American Anthropologist* 26 (3).

Betts, William F.
2014 Tracking the Trackless Trolley: An Archaeological Examination of the Lone Pine Canyon Trolley.

Blackburn, Thomas C.
1962–1963 Ethnohistoric Descriptions of Gabrielino Material Culture. *Annual Reports of the University of California Archaeological Survey 5*: 1–50.

Bright, William
1975 Two Notes on Takic Classification: Paper read at the Third Annual Uto-Aztecan Conference, Flagstaff, June 19–20, 1975. (Copy, Manuscript No. 76–66 in National Anthropological Archives, Smithsonian Institution, Washington.)

California Geological Survey
2002 *California Geomorphic Provinces.* California Geologic Survey Note 36. California Department of Conservation.

Goodwin, Riordan
2003 Cultural and Paleontological Resources Assessment, J.W. Mitchell Specific Plan, City of Fontana, San Bernardino County, California. Unpublished report on file at the AIC.

Gudde, Erwin G.
1998 California Place Names: The Origin and Etymology of Current Geographical Names. Fourth edition, revised and enlarged by William Bright. Berkeley and Los Angeles: University of California Press.

Harley, R. Bruce
1988 Rev. Juan Caballeria: Historian or Storyteller? Rethinking the 1810 Dumetz Expedition. San Bernardino County Museum Quarterly 35(2), 42 p.

Harrington, John Peabody
1913 Ethnographic Notes of John Peabody Harrington, p. 12.

Heizer, Robert F.
1968 The Indians of Los Angeles County. Hugo Reid's Letters of 1852. *Southwest Museum Papers 21*. Los Angeles, California.

Heizer, Robert F., and Albert B. Elsasser
1980 *The Natural World of the California Indians*. University of California Press, Berkeley and Los Angeles.

HistoricAerials.com
2021 Various aerial photographs including the project area from 1948-2005.

Hooper, Lucile
1920 *The Cahuilla Indians.* University of California Publication in American Archaeology and Ethnology. Vol. 16 No. 6. Reprinted by Malki Museum Press. Banning, California.

Hoover, Mildred Brooke, Hero Eugene Rensch, Ethel Grace Rensch, William N. Abeloe, and revised by Douglas E. Kyle
1990 *Historic Spots in California*, Stanford University Press, Stanford, California.

Hudson, D. Travis
1971 Proto-Gabrielino Patterns of Territorial Organization in Southern Coastal California. *Pacific Coast Archaeological Society Quarterly* 7(2):49–76.

James, Harry C.
1960 *The Cahuilla Indians*. Los Angeles: Westernlore Press. Reprinted in 1969 and 1985 by Malki Museum Press. Banning, California.

Johnston, Bernice E.
1962 *California's Gabrielino Indians*. Frederick Webb Hodge Anniversary Publication Fund 8, Los Angeles: Southwest Museum.

Kirkman, George W.
1938 The Kirkman-Harriman Pictorial and Historical Map of Los Angeles County: 1860 A.D.

Kroeber, A.L.
1925 *Handbook of the Indians of California*. Bulletin No. 78, Bureau of American Ethnology, Smithsonian Institution, Washington, D.C.

McCawley, William
1996 *The First Angelinos: The Gabrielino Indians of Los Angeles.* Banning and Novato: Malki Museum Press and Ballena Press.

McGroarty, John Steve
1914 Southern California. Southern California Panama Exposition Commission.

Moratto, Michael J.
2004 *California Archaeology*. Orlando, Florida: Academic Press. Originally published 1984.

Norris, R.M., and R.W. Webb
1976 *Geology of California,* John Wiley and Sons, Inc., Santa Barbara.

Richards, Elizabeth W.
1966 Guideposts to History: Concerning Origins of Place and Street Names in San Bernardino County. Santa Fe Federal Savings.

Schoenherr, Allan A.
1992 *A Natural History of California*. University of California Press, Berkeley and Los Angeles.

Sharp, R.P.
1976 *Geology: Field Guide to Southern California*. Kendall/Hunt Publishing Company, Second Edition: 181.

Strong, William D.
1929 Aboriginal Society in Southern California. *University of California Publications in American Archaeology and Ethnology* 26(1): 1–358. Berkeley.

Swope, Karen, and Meg McDonald
1985 Environmental Impact Evaluation: Archaeological Assessment of Tentative Tract 13000, City of Fontana, San Bernardino County, California. ARU UCR.

Tang, Bai "Tom," Deirdre Encarnacion, Terri Jacquemain, and Daniel Ballester
2013 Historical/Archaeological Resources Survey Report: Vulcan Conservation and Flood Control Project, in and near the City of Fontana, San Bernardino County, California. CRM Tech.

USGS (United States Geological Survey)
1980 *Fontana, California* 7.5-minute topographic quadrangle map.

Wallace, William J.
1955 A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology* 11(3):214–230.

1978 Post-Pleistocene Archaeology. In California, edited by R. Heizer, pp. 550–563. *Handbook of North American Indians,* Vol. 8. W.C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Warren, Claude N.
1968 Cultural Tradition and Ecological Adaptation on the Southern California Coast. Eastern New Mexico University Contributions in Anthropology 1(3). Portales.

1984 The Desert Region. In *California Archaeology*, by M. Moratto with contributions by D.A. Fredrickson, C. Raven, and C. N. Warren, pp. 339–430. Academic Press, Orlando, Florida.

Warren, Claude N., and Robert H. Crabtree
1986 Prehistory of the Southwestern Area. *In* W.L. D'Azevedo ed., *Handbook of the North American Indians,* Vol. 11, *Great Basin*, pp. 183–193. Washington D.C.: Smithsonian Institution.

APPENDIX A

RECORDS SEARCH BIBLIOGRAPHY

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
SB-01189	NADB-R - 1061189; Voided - 81-9.7	1981	SCIENTIFIC RESOURCE SURVEYS, INC.	CULTURAL RESOURCES REPORT ON THE RANCHO FONTANA PROJECT LOCATED IN THE FONTANA AREA OF THE COUNTY OF SAN BERNARDINO	SCIENTIFIC RESOURCE SURVEYS, INC.	
SB-01501	NADB-R - 1061501; Voided - 85-7.6	1985	MASON, ROGER D.	CULTURAL RESOURCE SURVEY REPORT FOR THE ETIWANDA PIPELINE AND POWER PLANT EIR	SCIENTIFIC RESOURCES SURVEYS, INC.	
SB-01506	NADB-R - 1061506; Voided - 85-9.2	1985	SWOPE, KAREN K. and MEG MCDONALD	ENVIRONMENTAL IMPACT EVALUATION: ARCHAEOLOGICAL ASSESSMENT OF TENTATIVE TRACT 13000, CITY OF FONTANA, SAN BERNARDINO COUNTY, CALIFORNIA	ARCHAEOLOGICAL RESEARCH UNIT, UCR	
SB-02033	NADB-R - 1062033; Voided - 90-5.2	1990	MCKENNA, JEANETTE A.	A PHASE I ARCHAEOLOGICAL INVESTIGATION OF THE PROPOSED LEWIS HOMES' PROJECT AREA, FONTANA, SAN BERNARDINO COUNTY, CALIFORNIA	MCKENNA ET AL.	
SB-02502	NADB-R - 1062502; Voided - 92-2.3	1992	SWOPE, KAREN K.	CULTURAL RESOURCES SURVEY OF A FIVE-ACRE PARCEL NEAR FONTANA, SAN BERNARDINO COUNTY, CALIFORNIA	RESEARCH ASSOCIATES	
SB-02621	NADB-R - 1062621; Voided - 92-2.20A-B	1992	ALEXANDROWICZ, J. STEVEN, ANNE Q. DUFFIELD-STOLL, JEANETTE A. MCKENNA, SUSAN R. ALEXANDROWICZ, ARTHUR A. KUHNER, and ERIC SCOTT	CULTURAL AND PALEONTOLOGICAL RESOURCES INVESTIGATIONS WITHIN THE NORTH FONTANA INFRASTRUCTURE AREA, CITY OF FONTANA, SAN BERNARDINO COUNTY, CALIFORNIA	ARCHAEOLOGICAL CONSULTING SERVICES	36-004296, 36-006110, 36-006111, 36-006251, 36-006583, 36-006584, 36-006585, 36-006586, 36-006587, 36-006588, 36-006589, 36-006807, 36-006808, 36-006809, 36-006810, 36-006811, 36-006812, 36-006813, 36-006814, 36-006815, 36-006816
SB-03050	NADB-R - 1063050	1995	MCKENNA, JEANETTE A.	A CULTURAL RESOURCES RECONNAISSANCE SURVEY OF WESTGATE PROPERTY (1000 +/- ACRES) IN THE CITY OF FONTANA, SAN BERNARDINO COUNTY, CA	MCKENNA ET AL	36-006901
SB-04176	NADB-R - 1064176	2003	COTTERMAN, CARY D., EVELYN N. CHANDLER, and ROGER D. MASON	CULTURAL RESOURCES INVESTIGATION OF STATE ROUTE 66 (FOOTHILL BLVD) WIDENING PROJECT, PHASE II, CITY OF FONTANA, SAN BERNARDINO COUNTY, CA. 72PP	CHAMBERS GROUP, INC	
SB-04244	NADB-R - 1064244	2004	MCKENNA, JEANETTE A.	CA 8525 (SNOWBALL), FONTANA. 10PP	MCKENNA ET AL	

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
SB-04538	NADB-R - 1064538	2004	MCKENNA, JEANETTE A.	CA 8525 (SNOWBALL). 8PP	MCKENNA ET AL	
SB-04539	NADB-R - 1064539	2004	MCKENNA, JEANETTE A.	CA 8525B (EXCISE). 10PP	MCKENNA ET AL	
SB-04869	NADB-R - 1064869	2005	Bonner, Wayne H. and Marnie Aislin-Kay	Cultural Resource Records Search and Site Visit Results for Cingular Telecommunications Facility Candidate LSANCA8114B (First Choice Self Storage), 14750 Foothill Boulevard, Fontana, San Bernardino County, California.		
SB-05062	NADB-R - 1065062	2005	Hoover, Anna M.	An Archaeological Records Search and Survey Report: APN's 1110-331-005 to -12 and -22; 1110-161-021 to -023 and 110-331-003, Tracts 16526, 16604 & 17010, +/- 58-acre Property, City of Fontana, San Bernardino County, California.	L&L Environmental, Inc	
SB-05498	Caltrans - ; NADB-R - 1065498	2003	Hammond, Christie	Historical Resources Compliance Report for Relinquishment of State Route 66 (Foothill Boulevard), City of Fontana, San Bernardino County, California.	Caltrans District 8	36-002910
SB-05498A		2003	Christie Hammond	Historical Resources Evaluation Report for the Relinquishment of State Route 66 (Foothill Boulevard) Between East Avenue/ Ilex Street and Maple Avenue city of Fontana San Bernardino, CA	Caltrans District 8	
SB-05869	NADB-R - 1065869	2007	Mason, Roger D. and Cary Cotterman	Cultural Resources Evaluation Report for the Cherry Avenue Road Widening Project, West Fontana, San Bernardino County, California.		36-013921, 36-021695, 36-021696
SB-05911		2007		The Standard in Environmental Risk Information, Cherry Line 14800 Baseline Avenue, Fontana, CA 92366, Inquiry Number: 2012679.7s	Environmental Data Resources inc	
SB-05999	NADB-R - 1065999	2008	Tang, Bai “Tom”, John J. Eddy, Harry M. Quinn, Terri Jacquemain, Daniel Ballester, and Laura Hensley Shaker	Identification and Evaluation of Historic Properties: Northeast Recycled Water Expansion Projects in and near the Cities of Rancho Cucamonga and Fontana, San Bernardino County, California.	CRMTECH	

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
SB-06000	NADB-R - 1066000	2008	Tang, Bai “Tom”, John J. Eddy, Harry M. Quinn, Terri Jacquemain, Daniel Ballester, and Laura Hensley Shaker	Extended Phase I Historical/Archaeological Resources Study: Northeast Recycled Water Expansion Projects in and near the Cities of Rancho Cucamonga and Fontana, San Bernardino County, California.	CRM TECH	
SB-06534	NADB-R - 1066534	2009	Bonner, Wayne H. and Arabesque Said	Cultural Resource Records Search and Site Visit Results for Verizon Wireless Candidate Cherryline, 14337 Baseline Avenue, Fontana, San Bernardino County, California.	Michael Brandman Associates	
SB-07048		2012	Padon, Beth	Cultural Resource Assessment Study for Verizon "Hemlock" Site in Rancho Cucamonga, San Bernardino County, California	Discovery Works	36-016454
SB-07401	NADB-R - 1067401	2013	Tang, Bai "Tom", Deirdre Encarnacion, Terri Jacquemain, and Daniel Ballester	Historical/Archaeological Resources Survey Report: Vulcan Conservation and Flood Control Project, in and near the City of Fontana, San Bernardino County, California.	CRM Tech	
SB-07922		2016	McKenna, Jeanette	A Phase I Cultural Resources Investigation of the Proposed West Fontana Flood Control Channel, Fontana, San Bernardino Co., California	McKenna et al.	36-029538