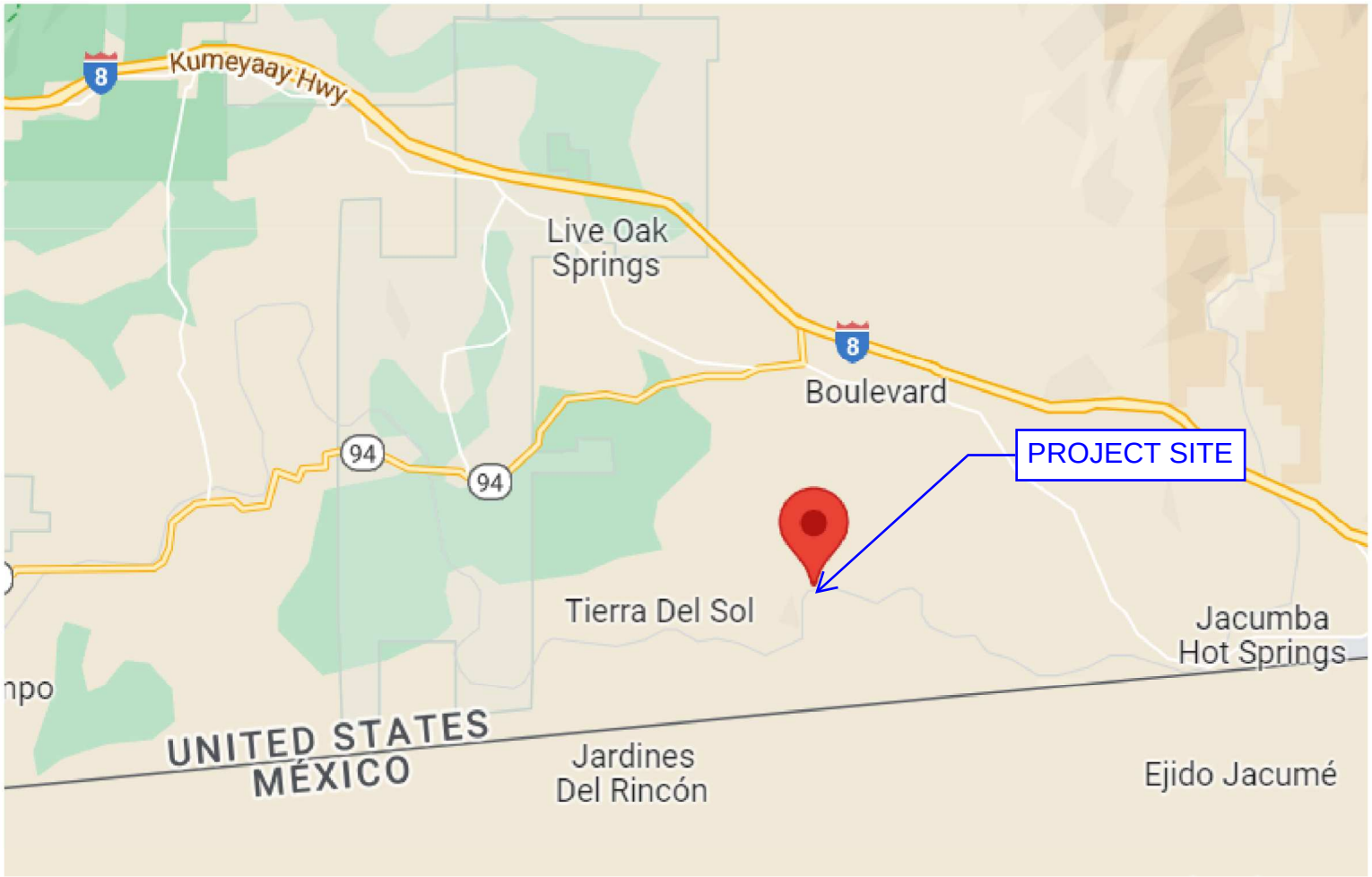
Michael Baker
INTERNATIONAL

Appendix A – Site Information

Vicinity Map
Rainfall Isopluvials
San Diego County Hydrology Manual Excerpts
San Diego County Hydraulic Manual Excerpts
FEMA FIRM
NRCS WebSoil Survey
Weighted Runoff Coefficients (EX and PR)


Kumeyaay Hwy
8
Live Oak Springs
8
Boulevard
94
94
PROJECT SITE
Tierra Del Sol
Jacumba Hot Springs
UNITED STATES
MÉXICO
Jardines Del Rincón
Ejido Jacumé

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

Project Site:
P6(100YR) = 3.0"

Orange County

Riverside County

Pacific Ocean

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Project Site:
P24(100YR) = 5.0"

Orange County

Riverside County

Imperial County

Mexico

Pacific Ocean

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
POWAY
S.D. COUNTY
DEL MAR
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

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N W E S

3 0 3 Miles

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

Table A-1 Average Manning Roughness Coefficients for Pavement and Gutters[1]

Concrete Gutter[2]	0.015
Concrete Pavement	
Float Finish	0.014
Broom Finish	0.016
Concrete Gutter with Asphalt Pavement	
Smooth Finish	0.013
Rough Texture	0.015
Asphalt Pavement	
Smooth Finish	0.013
Rough Texture	0.016

Based on FHWA HEC-22.

[1] Based on materials and workmanship required by standard specifications.
[2] Increase roughness coefficient in gutters with mild slopes where sediment might accumulate by 0.020.

Table A-2 Average Manning Roughness Coefficients for Closed Conduits[3]

Reinforced Concrete Pipe (RCP)	0.013
Corrugated Metal Pipe and Pipe Arch	
2-3/8 x 1/2 inch Corrugations	
Unlined	0.024
Half Lined	
Full Flow	0.018
d/D>=0.60	0.016
d/D<0.60	0.013
Fully Lined	0.013
3 x 1 inch Corrugations	0.027
6 x 2 inch Corrugations	0.032
Spiral Rib Pipe	0.013
Helically Wound Pipe	
18-inch	0.015
24-inch	0.017
30-inch	0.019
36-inch	0.021
42-inch	0.022
48-inch	0.023
Plastic Pipe (HPDE and PVC)	
Smooth	0.013
Corrugated	0.024
Vitrified Clay Pipe	0.014
Cast-Iron Pipe (Uncoated)	0.013
Steel Pipe	0.011
Brick	0.017
Cast-In-Place Concrete Pipe	
Rough Wood Forms	0.017
Smooth Wood or Steel Forms	0.014

[3] Based on materials and workmanship required by standard specifications.

Table A-3

Table A-3 Average Manning Roughness Coefficients for Small Open Channels Conveying Less than 50 cfs[4]

	Design Flow Depth		
Lining Type	**0 – 0.5 ft**	**0.5 – 2.0 ft**	**> 2.0 ft**
Concrete (Poured)	0.015	0.013	0.013
Air Blown Concrete	0.023	0.019	0.016
Grouted Riprap	0.040	0.030	0.028
Stone Masonry	0.042	0.032	0.030
Soil Cement	0.025	0.022	0.020
Bare Soil	0.023	0.020	0.020
Rock Cut	0.045	0.035	0.025
Rock Riprap	Based on Rock Size (See Section 5.7.2)		

Table A-4

Table A-4 Average Manning Roughness Coefficients for Larger Open Channels

Unlined Channels
- Clay Loam 0.023
- Sand 0.020

Lined Channels
- Grass Lined (Well-Maintained) 0.035
- Grass Lined (Not Maintained) 0.045
- Wetland-Bottom Channels (New Channel) 0.023

Wetland-Bottom Channels (Mature Channel) ..... See Table A-5
Riprap-Lined Channels ..... See Section 5.7.2
Concrete (Poured) 0.014
Air Blown Mortar (Gunite or Shotcrete)[5] 0.016
Asphaltic Concrete or Bituminous Plant Mix 0.018

For channels with revetments or multiple lining types, use composite Manning roughness coefficient based on component lining materials.

[4] Based on materials and workmanship required by standard specifications.
[5] For air-blown concrete, use n=0.012 (if troweled) and n=0.025 if purposely roughened.

Table A-5

Table A-5 Average Manning Roughness Coefficients for Natural Channels

Minor Streams (Surface Width at Flood Stage < 100 ft)

Fairly Regular Section	
(A) Some Grass and Weeds, Little or No Brush	0.030
(B) Dense Growth of Weeds, Depth of Flow Materially Greater Than Weed Height	0.040
(C) Some Weeds, Light Brush on Banks	0.040
(D) Some Weeds, Heavy Brush on Banks	0.060
(E) For Trees within Channel with Branches Submerged at High Stage, Increase All Above Values By	0.015
Irregular Section, with Pools, Slight Channel Meander	
Channels (A) to (E) Above, Increase All Values By	0.015
Mountain Streams; No Vegetation in Channel, Banks Usually Steep, Trees and Brush along Banks Submerged at High Stage	
(A) Bottom, Gravel, Cobbles and Few Boulders	0.050
(B) Bottom, Cobbles with Large Boulders	0.060

Flood Plains (Adjacent To Natural Streams)

Pasture, No Brush	
(A) Short Grass	0.030
(B) High Grass	0.040
Cultivated Areas	
(A) No Crop	0.040
(B) Mature Row Crops	0.040
(C) Mature Field Crops	0.050
Heavy Weeds, Scattered Brush	0.050
Light Brush and Trees	0.060
Medium To Dense Brush	0.090
Dense Willows	0.170
Cleared Land with Tree Stumps, 100-150 Per Acre	0.060
Heavy Stand of Timber, Little Undergrowth	
(A) Flood Depth below Branches	0.110
(B) Flood Depth Reaches Branches	0.140

National Flood Hazard Layer FIRMette

FEMA

116°17'35"W 32°37'48"N

116°16'57"W 32°37'17"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

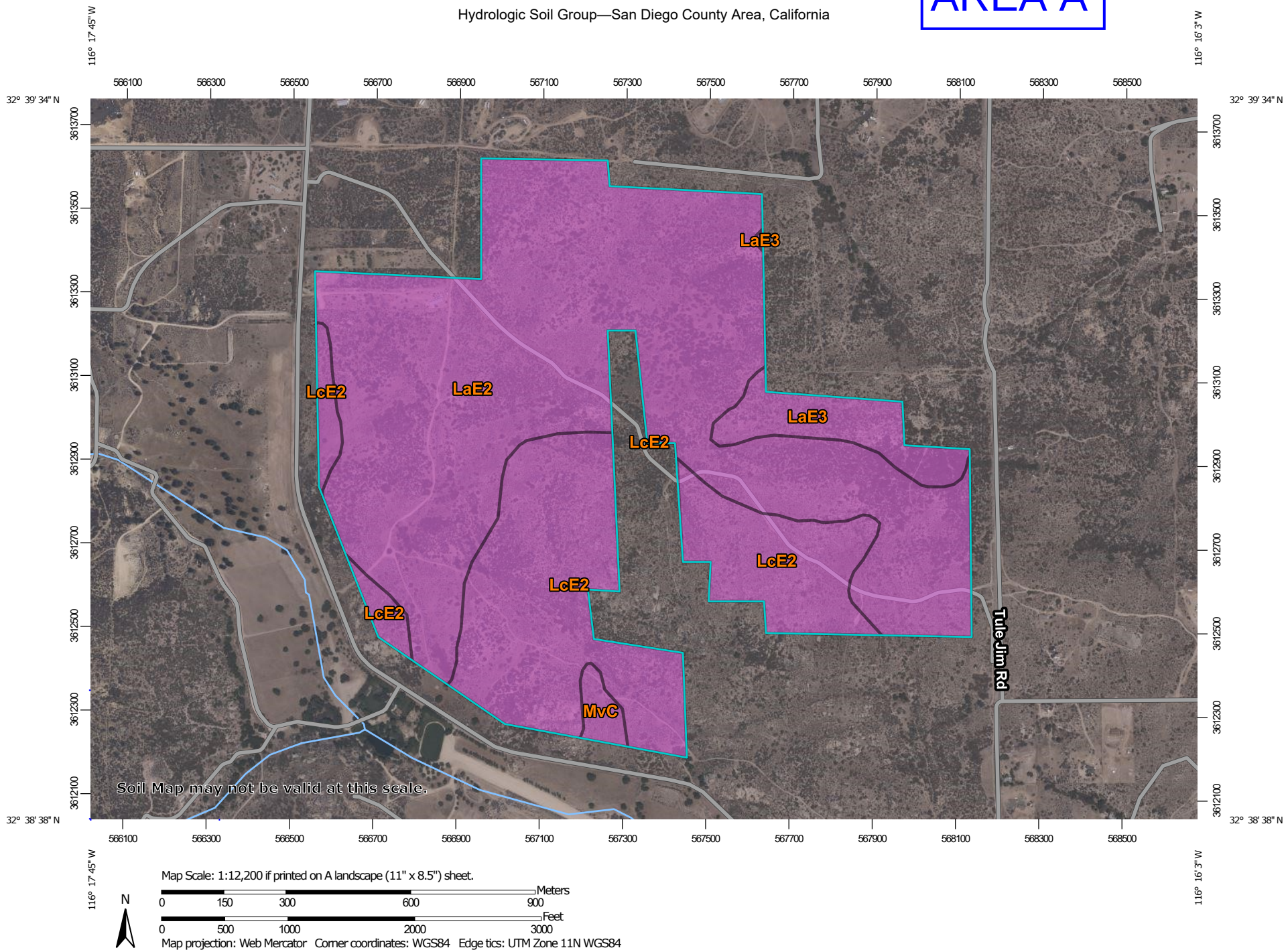
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/1/2022 at 11:14 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

AREA A



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Feet: 0 500 1000 2000 3000

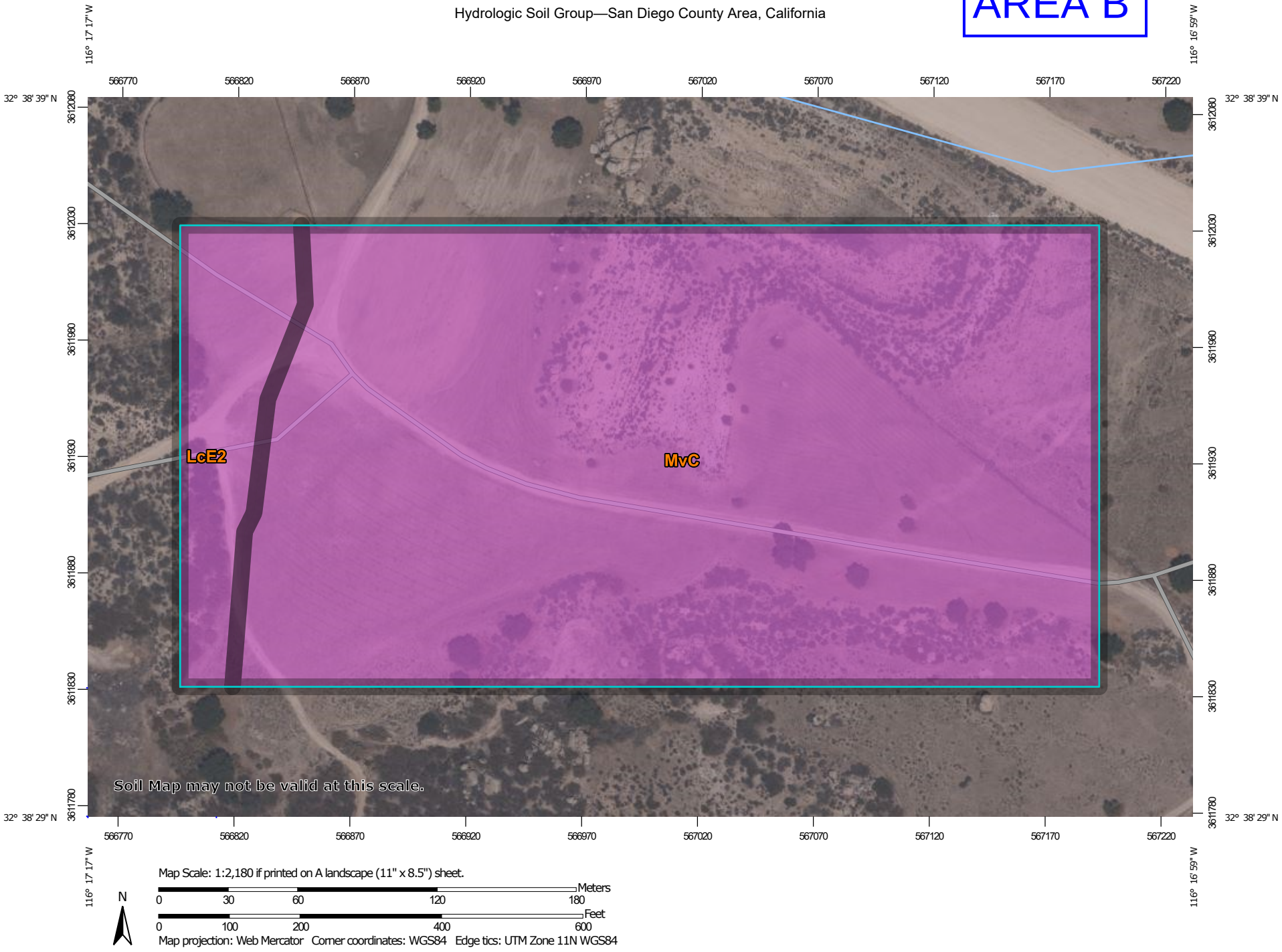
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

AREA A

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
LaE2	La Posta loamy coarse sand, 5 to 30 percent slopes, eroded	A	214.6	64.6%
LaE3	La Posta loamy coarse sand, 5 to 30 percent slopes, severely eroded	A	16.2	4.9%
LcE2	La Posta rocky loamy coarse sand, 5 to 30 percent slopes, eroded	A	97.8	29.4%
MvC	Mottsville loamy coarse sand, 2 to 9 percent slopes	A	3.6	1.1%
Totals for Area of Interest			**332.2**	**100.0%**

AREA B



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

AREA B

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
LcE2	La Posta rocky loamy coarse sand, 5 to 30 percent slopes, eroded	A	1.8	9.3%
MvC	Mottsville loamy coarse sand, 2 to 9 percent slopes	A	17.7	90.7%
Totals for Area of Interest			**19.5**	**100.0%**

Description

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

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

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

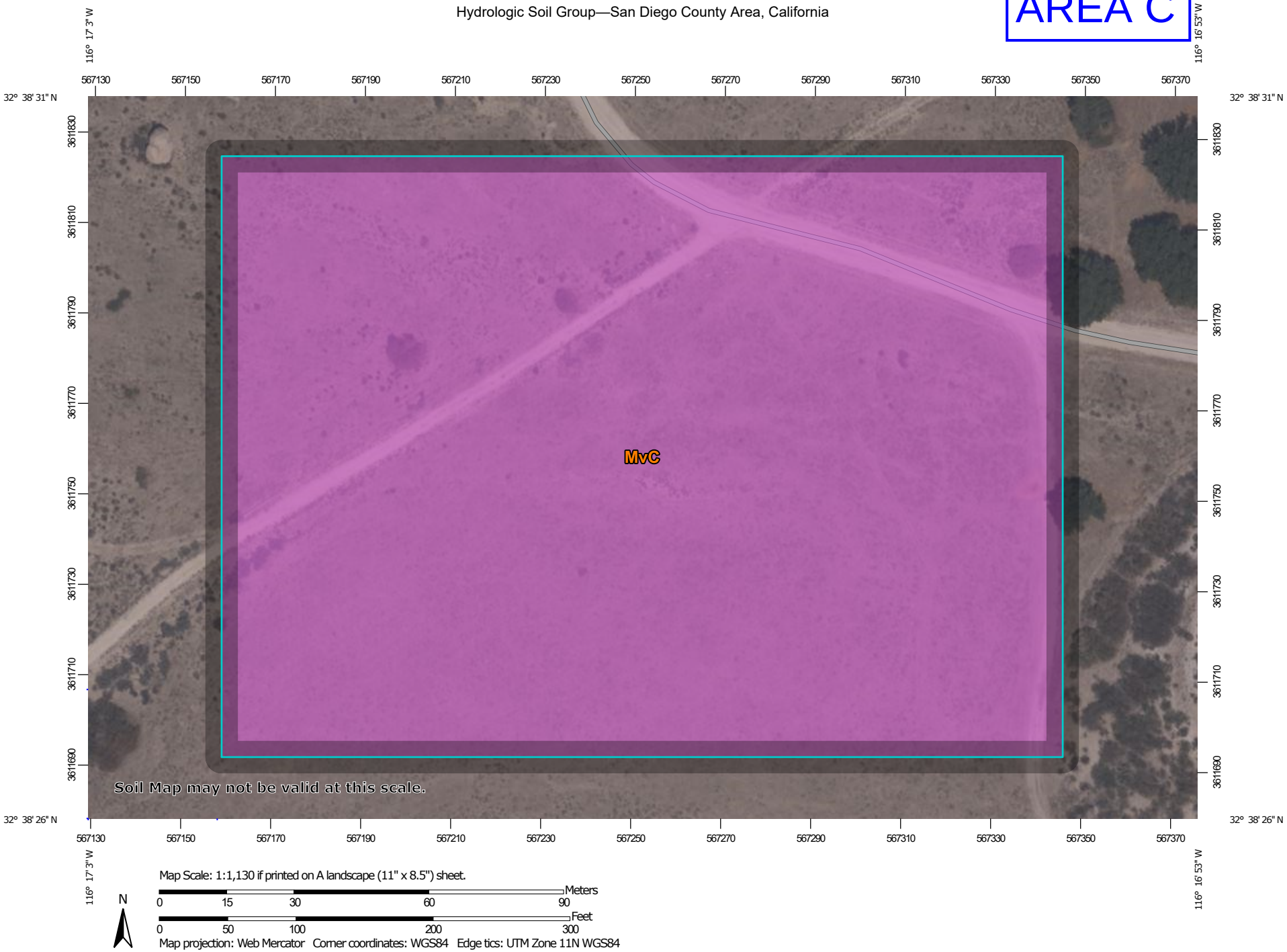
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

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

AREA C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116° 16' 53" W
32° 38' 31" N
32° 38' 26" N
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567150
567170
567190
567210
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567270
567290
567310
567330
567350
567370
3611830
3611810
3611790
3611770
3611750
3611730
3611710
3611690
MvC
Soil Map may not be valid at this scale.
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N
Meters
0 15 30 60 90
Feet
0 50 100 200 300
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

AREA C

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
MvC	Mottsville loamy coarse sand, 2 to 9 percent slopes	A	6.2	100.0%
Totals for Area of Interest			**6.2**	**100.0%**

Description

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

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

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

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

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

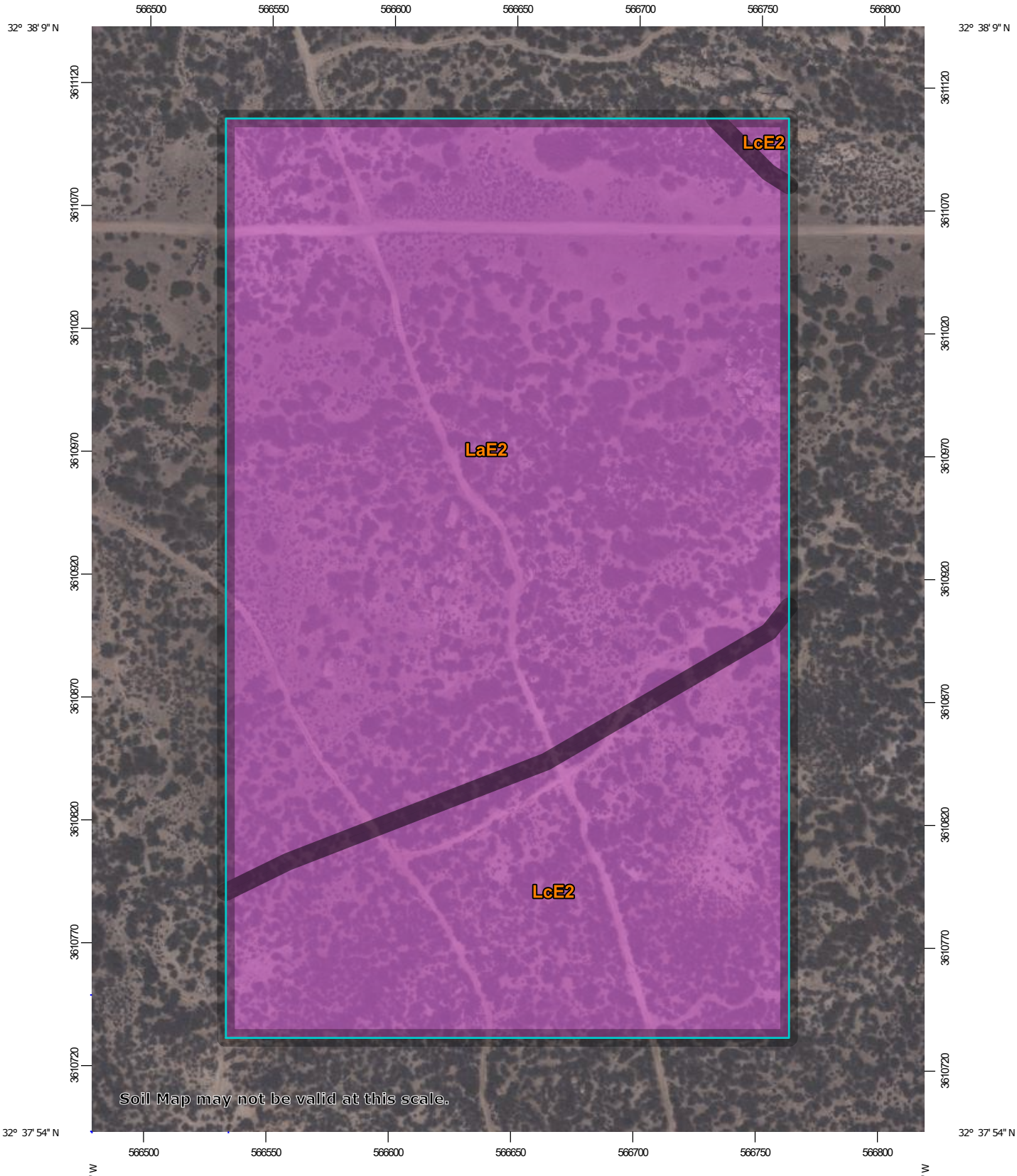
Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over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

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

Rating Options

Aggregation Method: Dominant Condition

AREA D



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Feet: 0 100 200 400 600

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

AREA D

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
LaE2	La Posta loamy coarse sand, 5 to 30 percent slopes, eroded	A	14.9	70.0%
LcE2	La Posta rocky loamy coarse sand, 5 to 30 percent slopes, eroded	A	6.4	30.0%
Totals for Area of Interest			**21.4**	**100.0%**

Description

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

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

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

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

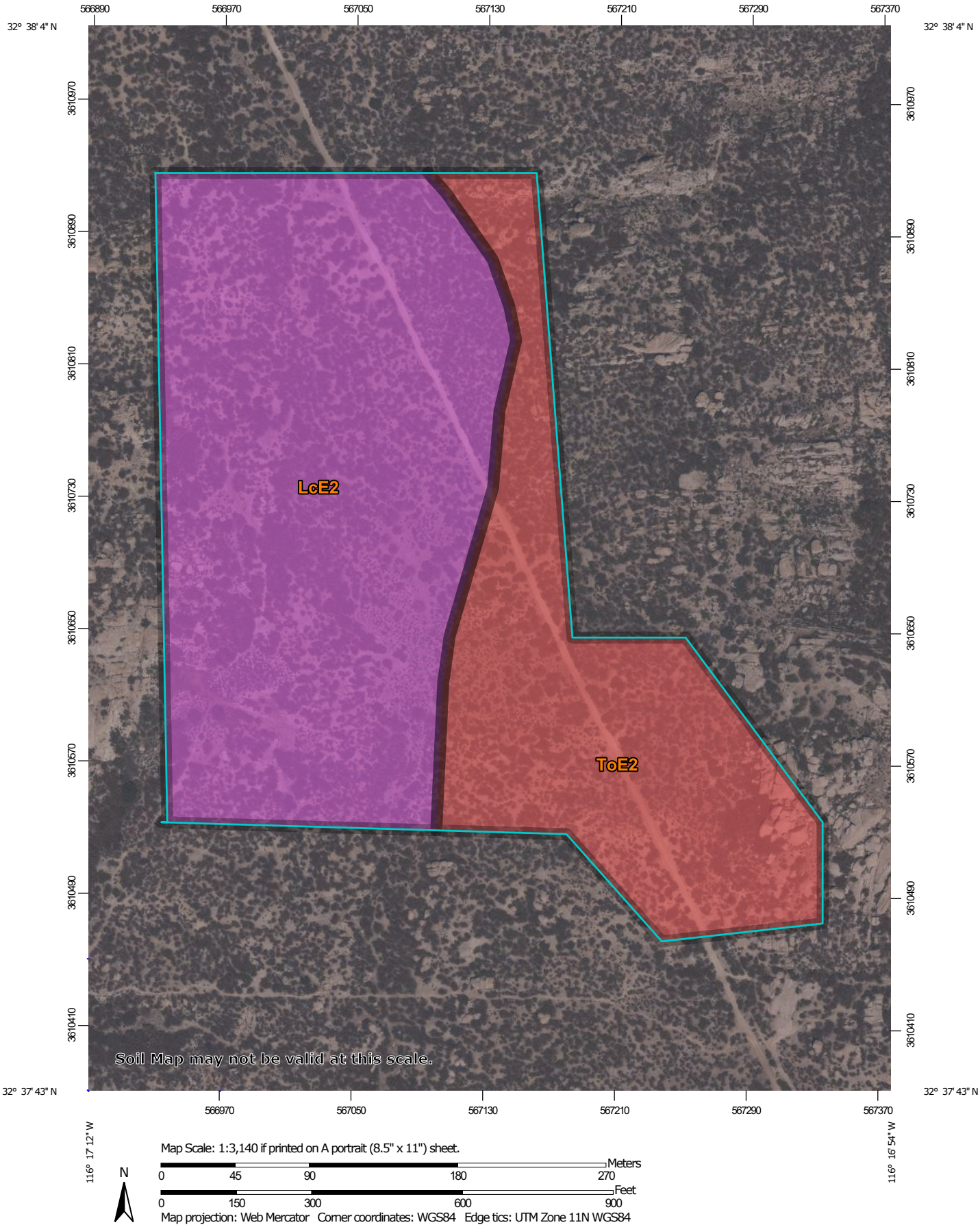
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

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

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

AREA E

Hydrologic Soil Group—San Diego County Area, California



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Feet: 0 150 300 600 900

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

AREA E

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
LcE2	La Posta rocky loamy coarse sand, 5 to 30 percent slopes, eroded	A	18.5	63.8%
ToE2	Tollhouse rocky coarse sandy loam, 5 to 30 percent slopes, eroded	D	10.5	36.2%
Totals for Area of Interest			**29.0**	**100.0%**

Description

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

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

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

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

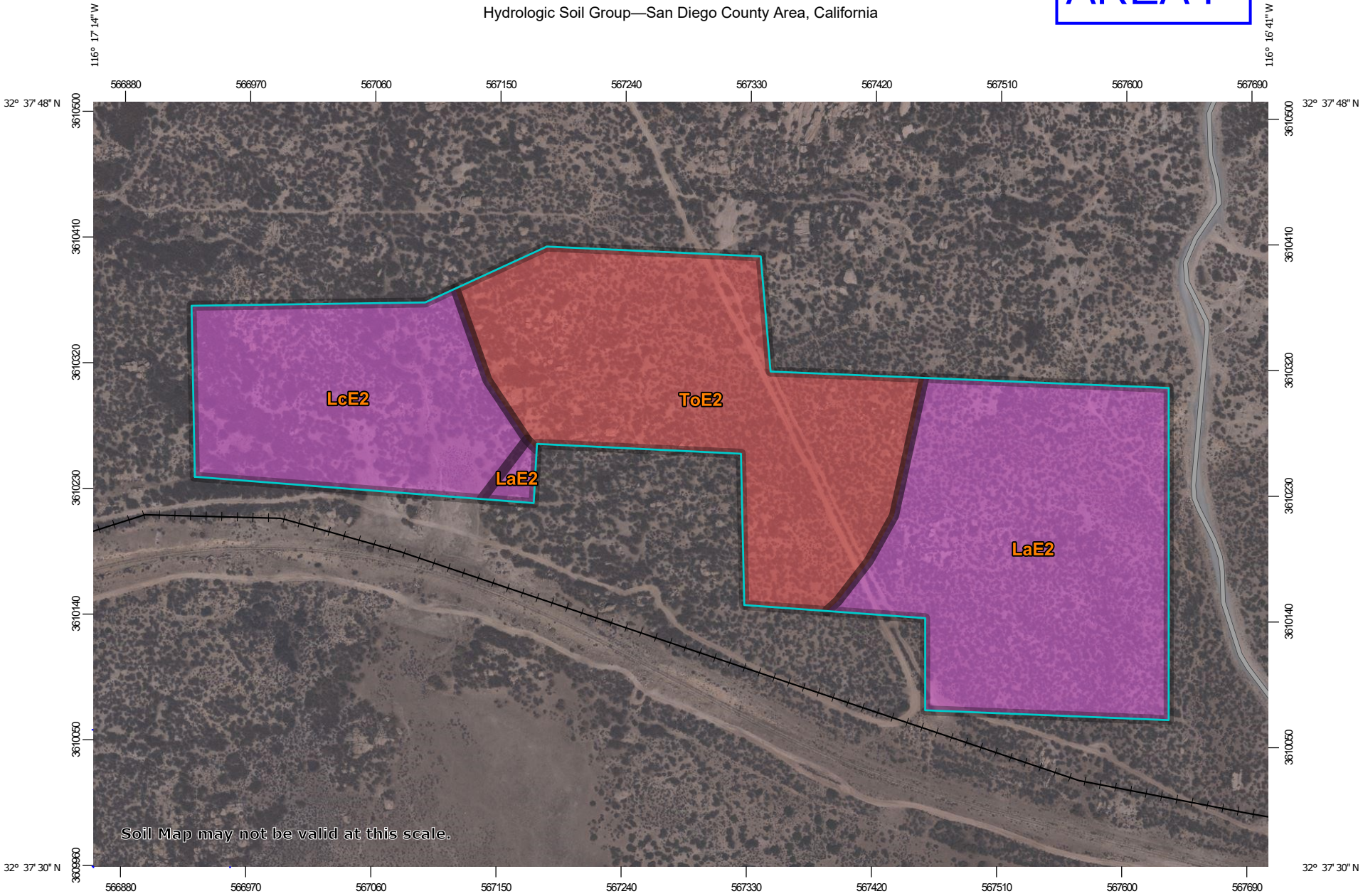
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

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

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

AREA F

Hydrologic Soil Group—San Diego County Area, California



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Feet: 0 150 300 600 900

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

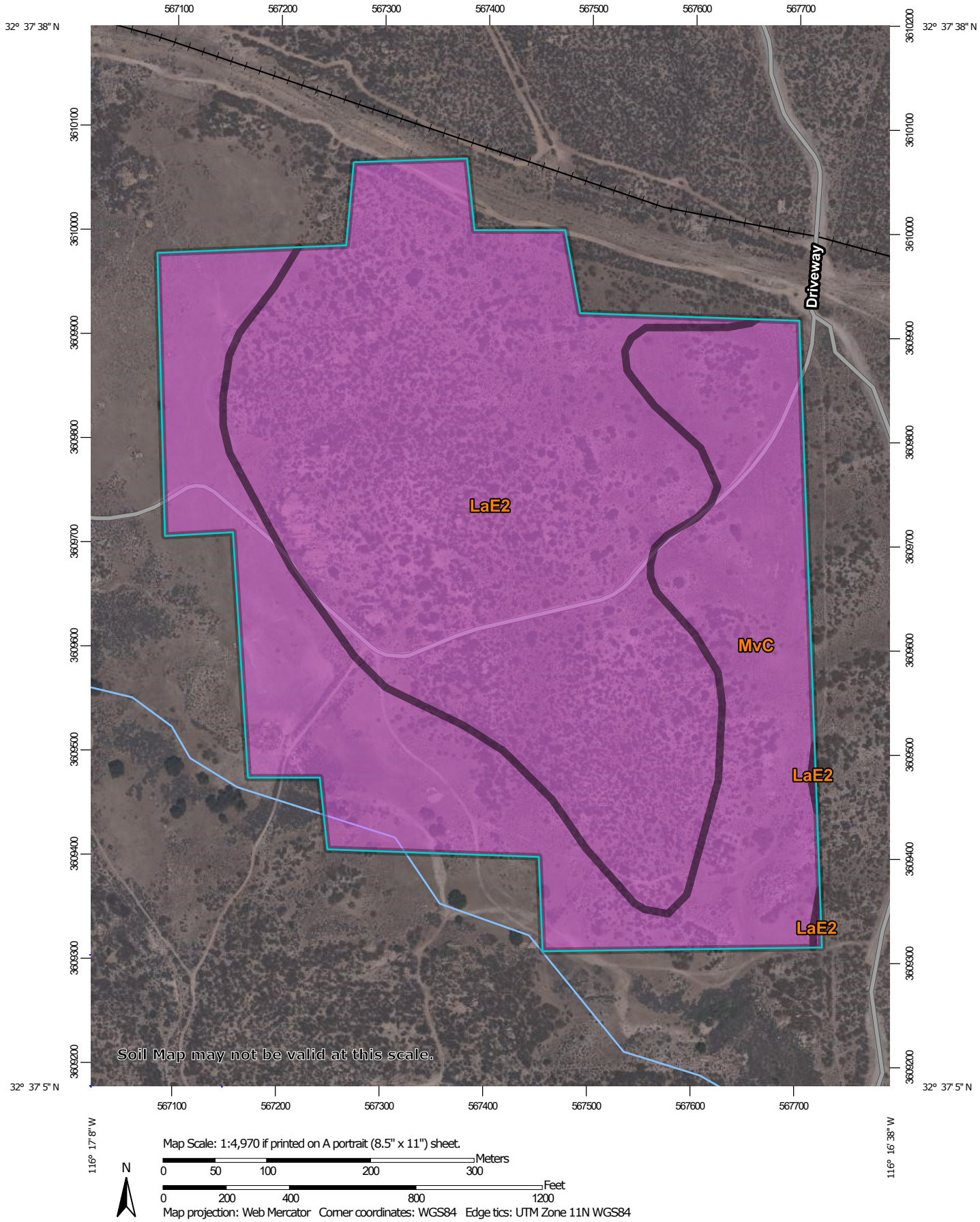
AREA F

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
LaE2	La Posta loamy coarse sand, 5 to 30 percent slopes, eroded	A	11.6	38.9%
LcE2	La Posta rocky loamy coarse sand, 5 to 30 percent slopes, eroded	A	7.1	23.7%
ToE2	Tollhouse rocky coarse sandy loam, 5 to 30 percent slopes, eroded	D	11.2	37.4%
Totals for Area of Interest			**30.0**	**100.0%**

AREA G

Hydrologic Soil Group—San Diego County Area, California



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N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
LaE2	La Posta loamy coarse sand, 5 to 30 percent slopes, eroded	A	50.9	57.8%
MvC	Mottsville loamy coarse sand, 2 to 9 percent slopes	A	37.2	42.2%
Totals for Area of Interest			**88.1**	**100.0%**

Description

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

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

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

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

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

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

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 16, Sep 13, 2021

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

Date(s) aerial images were photographed: Aug 18, 2018—Aug 22, 2018

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

Total Project Area = **558.00** **ac**
Total Project EX. Impervious = **0.00** **ac**
Total Project PR. Impervious = **10.488** **ac**

Weighted Runoff Coefficients: On-Site

EXISTING Condition

Land Use	Area A (North)	
	Area (ac)	C
Type A Natural	184.00	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious	0.00	0.90
Total Area =	**184.00**	

EX. Area A Weighted C = **0.20**

Land Use	Area A (South)	
	Area (ac)	C
Type A Natural	126.00	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious	0.00	0.90
Total Area =	**126.00**	

EX. Area A Weighted C = **0.20**

Land Use	Area B	
	Area (ac)	C
Type A Natural	17.00	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious	0.00	0.90
Total Area =	**17.00**	

EX. Area B Weighted C = **0.20**

PROPOSED Condition

Land Use	Area A (North)	
	Area (ac)	C
Type A Natural	176.48	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious Invertor Skids	0.103	0.90
Impervious Battery Storage	5.076	0.90
Impervious Substation	0.025	0.90
Impervious Storage Building	0.009	0.90
Impervious Control Enclosure	0.010	0.90
Impervious Water Tank	0.008	0.90
Impervious Posts	0.060	0.90
Impervious Concrete Crossings	2.225	0.90
Sub-Total Impervious	*7.516*	-
Total Area =	**184.00**	

PR. Area A Weighted C = 0.23

Land Use	Area A (South)	
	Area (ac)	C
Type A Natural	125.10	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious Invertor Skids	0.138	0.90
Impervious Battery Storage	0.000	0.90
Impervious Substation	0.000	0.90
Impervious Storage Building	0.000	0.90
Impervious Control Enclosure	0.000	0.90
Impervious Water Tank	0.005	0.90
Impervious Posts	0.041	0.90
Impervious Concrete Crossings	0.716	0.90
Sub-Total Impervious	*0.900*	-
Total Area =	**126.00**	

PR. Area A Weighted C = 0.20

Land Use	Area B	
	Area (ac)	C
Type A Natural	16.88	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious Invertor Skids	0.017	0.90
Impervious Battery Storage	0.000	0.90
Impervious Substation	0.000	0.90
Impervious Storage Building	0.000	0.90
Impervious Control Enclosure	0.000	0.90
Impervious Water Tank	0.000	0.90
Impervious Posts	0.006	0.90
Impervious Concrete Crossings	0.098	0.90
Sub-Total Impervious	*0.121*	`
Total Area =	**17.00**	

PR. Area B Weighted C = 0.20

Weighted Runoff Coefficients: On-Site

EXISTING Condition

Land Use	Area C	
	Area (ac)	C
Type A Natural	12.00	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious	0.00	0.90
Total Area =	**12.00**	

EX. Area C Weighted C = **0.20**

PROPOSED Condition

Land Use	Area C	
	Area (ac)	C
Type A Natural	11.91	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious Invertor Skids	0.017	0.90
Impervious Battery Storage	0.000	0.90
Impervious Substation	0.000	0.90
Impervious Storage Building	0.000	0.90
Impervious Control Enclosure	0.000	0.90
Impervious Water Tank	0.000	0.90
Impervious Posts	0.004	0.90
Impervious Concrete Crossings	0.064	0.90
Sub-Total Impervious	*0.085*	-
Total Area =	**12.00**	

PR. Area C Weighted C = 0.20

Land Use	Area D EAST	
	Area (ac)	C
Type A Natural	20.00	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious	0.00	0.90
Total Area =	**20.00**	

EX. Area D Weighted C = **0.20**

Land Use	Area D EAST	
	Area (ac)	C
Type A Natural	19.86	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious Invertor Skids	0.017	0.90
Impervious Battery Storage	0.000	0.90
Impervious Substation	0.000	0.90
Impervious Storage Building	0.000	0.90
Impervious Control Enclosure	0.000	0.90
Impervious Water Tank	0.000	0.90
Impervious Posts	0.010	0.90
Impervious Concrete Crossings	0.115	0.90
Sub-Total Impervious	*0.142*	-
Total Area =	**20.00**	

PR. Area D Weighted C = 0.20

Land Use	Area D SOUTH	
	Area (ac)	C
Type A Natural	11.00	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious	0.00	0.90
Total Area =	**11.00**	

EX. Area D Weighted C = **0.20**

Land Use	Area D SOUTH	
	Area (ac)	C
Type A Natural	10.92	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious Invertor Skids	0.017	0.90
Impervious Battery Storage	0.000	0.90
Impervious Substation	0.000	0.90
Impervious Storage Building	0.000	0.90
Impervious Control Enclosure	0.000	0.90
Impervious Water Tank	0.000	0.90
Impervious Posts	0.005	0.90
Impervious Concrete Crossings	0.056	0.90
Sub-Total Impervious	*0.078*	-
Total Area =	**11.00**	

PR. Area D Weighted C = 0.20

Weighted Runoff Coefficients: On-Site

Land Use	Area E	
	Area (ac)	C
Type A Natural	10.88	0.2
Type B Natural	0	0.25
Type C Natural	0.00	0.30
Type D Natural	5.12	0.35
Impervious	0.00	0.90
Total Area =	**16.00**	

(64% Soil A and 36% Soil D per NRCS)

Land Use	Area E	
	Area (ac)	C
Type A Natural	10.73	0.2
Type B Natural	0	0.25
Type C Natural	0.00	0.30
Type D Natural	5.11	0.35
Impervious Invertor Skids	0.0172	0.90
Impervious Battery Storage	0.0000	0.90
Impervious Substation	0.0000	0.90
Impervious Storage Building	0.0000	0.90
Impervious Control Enclosure	0.0000	0.90
Impervious Water Tank	0.0000	0.90
Impervious Posts	0.0052	0.90
Impervious Concrete Crossings	0.139	0.90
Sub-Total Impervious	*0.1614*	-
Total Area =	**16.00**	

EX. Area E Weighted C = **0.25** **PR. Area E Weighted C =** 0.25

EXISTING Condition

Land Use	Area F	
	Area (ac)	C
Type A Natural	20.20	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	11.80	0.35
Impervious	0.00	0.90
Total Area =	**32.00**	

(63% Soil A and 37% Soil D per NRCS)

PROPOSED Condition

Land Use	Area F	
	Area (ac)	C
Type A Natural	19.91	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	11.600	0.35
Impervious Invertor Skids	0.034	0.90
Impervious Battery Storage	0.002	0.90
Impervious Substation	0.000	0.90
Impervious Storage Building	0.000	0.90
Impervious Control Enclosure	0.000	0.90
Impervious Water Tank	0.000	0.90
Impervious Posts	0.010	0.90
Impervious Concrete Crossings	0.439	0.90
Sub-Total Impervious	*0.486*	-
Total Area =	**32.00**	

EX. Area F Weighted C = **0.26** **PR. Area F Weighted C =** 0.26

Land Use	Area G & H	
	Area (ac)	C
Type A Natural	140.00	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious	0.00	0.90
Total Area =	**140.00**	

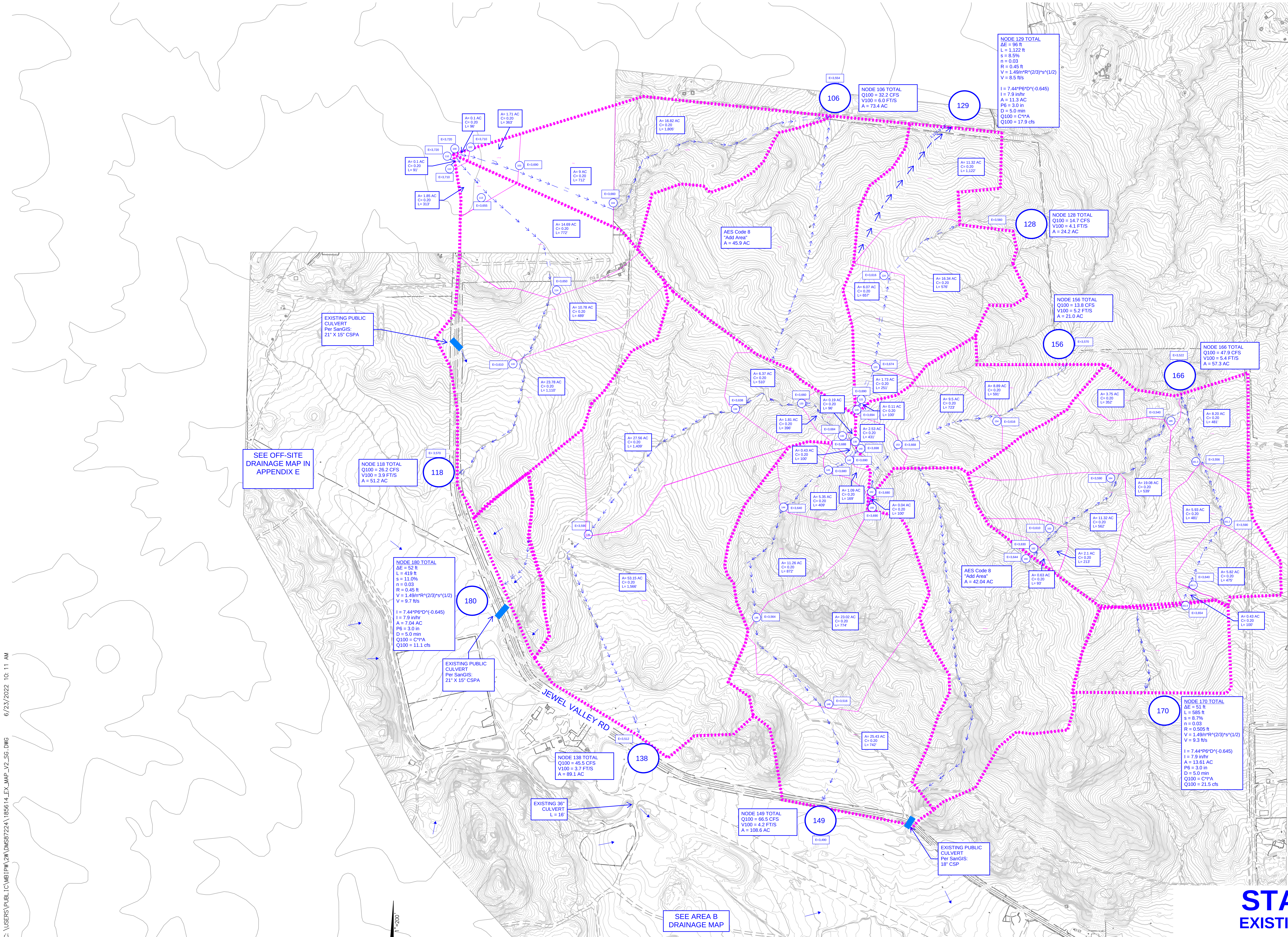
Land Use	Area G & H	
	Area (ac)	C
Type A Natural	139.00	0.20
Type B Natural	0.00	0.25
Type C Natural	0.00	0.30
Type D Natural	0.00	0.35
Impervious Invertor Skids	0.000	0.90
Impervious Battery Storage	0.000	0.90
Impervious Substation	0.000	0.90
Impervious Storage Building	0.000	0.90
Impervious Control Enclosure	0.000	0.90
Impervious Water Tank	0.000	0.90
Impervious Posts	0.000	0.90
Impervious Concrete Crossings	0.999	0.90
Sub-Total Impervious	*1.00*	-
Total Area =	**140.00**	

EX. Area G Weighted C = **0.20** **PR. Area G Weighted C =** 0.20

Michael Baker
INTERNATIONAL

Appendix B – Existing Hydrology

Hydrologic Work Maps
AES Output


NODE 129 TOTAL
ΔE = 96 ft
L = 1,122 ft
s = 8.5%
n = 0.03
R = 0.45 ft
V = 1.49/n*R^(2/3)*s^(1/2)
V = 8.5 ft/s
I = 7.44*P6*D^(-0.645)
I = 7.9 in/hr
A = 11.3 AC
P6 = 3.0 in
D = 5.0 min
Q100 = C*I*A
Q100 = 17.9 cfs
129
106
NODE 106 TOTAL
Q100 = 32.2 CFS
V100 = 6.0 FT/S
A = 73.4 AC
128
NODE 128 TOTAL
Q100 = 14.7 CFS
V100 = 4.1 FT/S
A = 24.2 AC
AES Code 8
"Add Area"
A = 45.9 AC
156
NODE 156 TOTAL
Q100 = 13.8 CFS
V100 = 5.2 FT/S
A = 21.0 AC
166
NODE 166 TOTAL
Q100 = 47.9 CFS
V100 = 5.4 FT/S
A = 57.3 AC
EXISTING PUBLIC
CULVERT
Per SanGIS:
21" X 15" CSPA
SEE OFF-SITE
DRAINAGE MAP IN
APPENDIX E
118
NODE 118 TOTAL
Q100 = 26.2 CFS
V100 = 3.9 FT/S
A = 51.2 AC
AES Code 8
"Add Area"
A = 42.04 AC
NODE 180 TOTAL
ΔE = 52 ft
L = 419 ft
s = 11.0%
n = 0.03
R = 0.45 ft
V = 1.49/n*R^(2/3)*s^(1/2)
V = 9.7 ft/s
I = 7.44*P6*D^(-0.645)
I = 7.9 in/hr
A = 7.04 AC
P6 = 3.0 in
D = 5.0 min
Q100 = C*I*A
Q100 = 11.1 cfs
180
EXISTING PUBLIC
CULVERT
Per SanGIS:
21" X 15" CSPA
JEWEL VALLEY RD
138
NODE 138 TOTAL
Q100 = 45.5 CFS
V100 = 3.7 FT/S
A = 89.1 AC
EXISTING 36"
CULVERT
L = 16'
149
NODE 149 TOTAL
Q100 = 66.5 CFS
V100 = 4.2 FT/S
A = 108.6 AC
EXISTING PUBLIC
CULVERT
Per SanGIS:
18" CSP
170
NODE 170 TOTAL
ΔE = 51 ft
L = 585 ft
s = 8.7%
n = 0.03
R = 0.505 ft
V = 1.49/n*R^(2/3)*s^(1/2)
V = 9.3 ft/s
I = 7.44*P6*D^(-0.645)
I = 7.9 in/hr
A = 13.61 AC
P6 = 3.0 in
D = 5.0 min
Q100 = C*I*A
Q100 = 21.5 cfs
SEE AREA B
DRAINAGE MAP

STARLIGHT SOLAR
EXISTING HYDROLOGIC WORK MAP
AREA A

LEGEND
DRAINAGE BOUNDARY
FLOW PATH
DRAINAGE NODE

SCALE: 1"=300'

300 150 0 300 600 900

MBI 185614
MARCH 2024

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San Diego, CA 92124
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6/23/2022 10:11 AM
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_____________________________________________________________________________
*****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1264

                              Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* 185614 STARLIGHT SOLAR                                                  *
* EX Q100 ON-SITE AREA A                                                  *
* 2024-03-01                                                              *
 *************************************************************************

  FILE NAME: 614EXA.DAT
  TIME/DATE OF STUDY: 07:39 03/02/2024
-----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

+---------------------------------------------------------------------------+
| BEGIN AREA DRAINING TO NODE 106                                           |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    96.00
  UPSTREAM ELEVATION(FEET) =   3720.00
  DOWNSTREAM ELEVATION(FEET) =   3710.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.368
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.155
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3710.00  DOWNSTREAM(FEET) =   3690.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   363.00   CHANNEL SLOPE =  0.0551
  CHANNEL BASE(FEET) =   60.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.800
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.74
  AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   8.19
  Tc(MIN.) =   15.56
  SUBAREA AREA(ACRES) =     1.71       SUBAREA RUNOFF(CFS) =    1.30
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       1.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   0.85
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     459.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3690.00  DOWNSTREAM(FEET) =   3670.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1099.00   CHANNEL SLOPE =  0.0182
  CHANNEL BASE(FEET) =   50.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.361
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.93
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.08
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =  17.00
  Tc(MIN.) =   32.56
  SUBAREA AREA(ACRES) =    14.45       SUBAREA RUNOFF(CFS) =    6.82
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       16.3         PEAK FLOW RATE(CFS) =       7.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.25
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1558.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3670.00  DOWNSTREAM(FEET) =   3554.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1371.00   CHANNEL SLOPE =  0.0846
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   7.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.189
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.65
  AVERAGE FLOW DEPTH(FEET) =   0.51   TRAVEL TIME(MIN.) =   4.04
  Tc(MIN.) =   36.60
  SUBAREA AREA(ACRES) =    11.27       SUBAREA RUNOFF(CFS) =    4.93
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       27.5         PEAK FLOW RATE(CFS) =      12.05

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   5.97
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =    2929.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.189
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =   45.90   SUBAREA RUNOFF(CFS) =   20.09
  TOTAL AREA(ACRES) =       73.4   TOTAL RUNOFF(CFS) =      32.15
  TC(MIN.) =   36.60
```

NODE 106

```
+----------------------------------------------------------------------+
| BEGIN AREA DRAINING TO NODE 118                                      |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+

**********************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    91.00
  UPSTREAM ELEVATION(FEET) =   3720.00
  DOWNSTREAM ELEVATION(FEET) =   3710.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.174
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.262
  SUBAREA RUNOFF(CFS) =      0.13
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.13

**********************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3710.00  DOWNSTREAM(FEET) =   3655.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   313.00   CHANNEL SLOPE =  0.1757
  CHANNEL BASE(FEET) =   50.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.483
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.07
  AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   4.87
  Tc(MIN.) =   12.04
  SUBAREA AREA(ACRES) =     1.85       SUBAREA RUNOFF(CFS) =    1.66
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        2.0         PEAK FLOW RATE(CFS) =       1.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   1.68
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =     404.00 FEET.

**********************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3655.00  DOWNSTREAM(FEET) =   3650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   772.00   CHANNEL SLOPE =  0.0065
  CHANNEL BASE(FEET) =   23.00   "Z" FACTOR =  15.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.011
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.25
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =  10.28
  Tc(MIN.) =   22.32
  SUBAREA AREA(ACRES) =    14.69       SUBAREA RUNOFF(CFS) =    8.85
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       16.6         PEAK FLOW RATE(CFS) =      10.02

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   1.47
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =    1176.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    116.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3650.00  DOWNSTREAM(FEET) =   3610.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   489.00   CHANNEL SLOPE =  0.0818
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  14.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.879
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.07
  AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   1.61
  Tc(MIN.) =   23.93
  SUBAREA AREA(ACRES) =    10.78       SUBAREA RUNOFF(CFS) =    6.21
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       27.4         PEAK FLOW RATE(CFS) =      15.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.46   FLOW VELOCITY(FEET/SEC.) =   5.32
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    116.00 =    1665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    118.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3610.00  DOWNSTREAM(FEET) =   3570.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1110.00   CHANNEL SLOPE =  0.0360
```

```
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.561
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.89
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.88
  AVERAGE FLOW DEPTH(FEET) =   0.53   TRAVEL TIME(MIN.) =   4.77
  Tc(MIN.) =   28.70
  SUBAREA AREA(ACRES) =    23.78       SUBAREA RUNOFF(CFS) =   12.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       51.2         PEAK FLOW RATE(CFS) =      26.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.57   FLOW VELOCITY(FEET/SEC.) =   4.07
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    118.00 =    2775.00 FEET.

+----------------------------------------------------------------------------+
| BEGIN AREA DRAINING TO NODE 128                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    122.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3694.00
  DOWNSTREAM ELEVATION(FEET) =   3690.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.206
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.989
  SUBAREA RUNOFF(CFS) =      0.11
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.11

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3690.00  DOWNSTREAM(FEET) =   3674.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   251.00   CHANNEL SLOPE =  0.0637
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.035
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
```

NODE 118

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.05
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   3.97
  Tc(MIN.) =   14.18
  SUBAREA AREA(ACRES) =     1.73       SUBAREA RUNOFF(CFS) =    1.40
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       1.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   1.39
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    123.00 =     351.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3674.00  DOWNSTREAM(FEET) =   3616.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   657.00   CHANNEL SLOPE =  0.0883
  CHANNEL BASE(FEET) =   35.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.271
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.46
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.01
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   5.46
  Tc(MIN.) =   19.64
  SUBAREA AREA(ACRES) =     6.07       SUBAREA RUNOFF(CFS) =    3.97
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        7.9         PEAK FLOW RATE(CFS) =       5.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   2.27
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    124.00 =    1008.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    128.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3616.00  DOWNSTREAM(FEET) =   3560.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   576.00   CHANNEL SLOPE =  0.0972
  CHANNEL BASE(FEET) =   13.00   "Z" FACTOR =  14.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.040
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.07
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   2.36
```

```
  Tc(MIN.) =   21.99
  SUBAREA AREA(ACRES) =    16.34       SUBAREA RUNOFF(CFS) =    9.94
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       24.2         PEAK FLOW RATE(CFS) =      14.74

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   4.79
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    128.00 =    1584.00 FEET.

+----------------------------------------------------------------------------+
| BEGIN AREA DRAINING TO NODE 138                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    132.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    96.00
  UPSTREAM ELEVATION(FEET) =   3688.00
  DOWNSTREAM ELEVATION(FEET) =   3684.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.865
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.099
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3684.00  DOWNSTREAM(FEET) =   3660.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.0606
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.464
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.92
  AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   2.26
  Tc(MIN.) =   12.12
  SUBAREA AREA(ACRES) =     1.81       SUBAREA RUNOFF(CFS) =    1.62
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        2.0         PEAK FLOW RATE(CFS) =       1.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

NODE 128

```
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   3.43
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    133.00 =     492.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3660.00  DOWNSTREAM(FEET) =   3638.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   510.00   CHANNEL SLOPE =  0.0431
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  14.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.904
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.03
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   2.80
  Tc(MIN.) =   14.93
  SUBAREA AREA(ACRES) =     6.37       SUBAREA RUNOFF(CFS) =    4.97
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        8.4         PEAK FLOW RATE(CFS) =       6.54

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.37   FLOW VELOCITY(FEET/SEC.) =   3.39
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    134.00 =    1002.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    136.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3638.00  DOWNSTREAM(FEET) =   3590.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1409.00   CHANNEL SLOPE =  0.0341
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.054
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.40
  AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   6.91
  Tc(MIN.) =   21.84
  SUBAREA AREA(ACRES) =    27.56       SUBAREA RUNOFF(CFS) =   16.83
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       35.9         PEAK FLOW RATE(CFS) =      21.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   3.75
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    136.00 =    2411.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    138.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3590.00  DOWNSTREAM(FEET) =   3512.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1556.00   CHANNEL SLOPE =  0.0501
  CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =  25.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.555
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      35.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.72
  AVERAGE FLOW DEPTH(FEET) =   0.21   TRAVEL TIME(MIN.) =   6.96
  Tc(MIN.) =   28.80
  SUBAREA AREA(ACRES) =    53.16       SUBAREA RUNOFF(CFS) =   27.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       89.1         PEAK FLOW RATE(CFS) =      45.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   3.99
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    138.00 =    3967.00 FEET.

+----------------------------------------------------------------------------+
| BEGIN AREA DRAINING TO NODE 149                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    142.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3698.00
  DOWNSTREAM ELEVATION(FEET) =   3690.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.101
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.790
  SUBAREA RUNOFF(CFS) =      0.50
  TOTAL AREA(ACRES) =      0.43   TOTAL RUNOFF(CFS) =      0.50

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    143.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

NODE 138

```
  ELEVATION DATA: UPSTREAM(FEET) =   3690.00  DOWNSTREAM(FEET) =   3680.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   169.00   CHANNEL SLOPE =  0.0592
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =   7.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.932
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.23
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.29
  Tc(MIN.) =   10.39
  SUBAREA AREA(ACRES) =     1.09       SUBAREA RUNOFF(CFS) =    1.08
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   1.40
  LONGEST FLOWPATH FROM NODE    140.00 TO NODE    143.00 =     269.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    144.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3680.00  DOWNSTREAM(FEET) =   3640.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   409.00   CHANNEL SLOPE =  0.0978
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.368
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.84
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.17
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   2.15
  Tc(MIN.) =   12.54
  SUBAREA AREA(ACRES) =     5.35       SUBAREA RUNOFF(CFS) =    4.67
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        6.9         PEAK FLOW RATE(CFS) =       6.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   3.77
  LONGEST FLOWPATH FROM NODE    140.00 TO NODE    144.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    144.00 TO NODE    146.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3640.00  DOWNSTREAM(FEET) =   3564.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   872.00   CHANNEL SLOPE =  0.0872
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  14.000
```

```
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.746
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.31
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   3.37
  Tc(MIN.) =   15.91
  SUBAREA AREA(ACRES) =    11.26       SUBAREA RUNOFF(CFS) =    8.44
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       18.1         PEAK FLOW RATE(CFS) =      13.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   4.61
  LONGEST FLOWPATH FROM NODE    140.00 TO NODE    146.00 =    1550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    148.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3564.00  DOWNSTREAM(FEET) =   3516.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   774.00   CHANNEL SLOPE =  0.0620
  CHANNEL BASE(FEET) =   18.00   "Z" FACTOR =   9.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.361
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.42
  AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   2.92
  Tc(MIN.) =   18.83
  SUBAREA AREA(ACRES) =    23.02       SUBAREA RUNOFF(CFS) =   15.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       41.2         PEAK FLOW RATE(CFS) =      27.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =   4.86
  LONGEST FLOWPATH FROM NODE    140.00 TO NODE    148.00 =    2324.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    148.00 TO NODE    149.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3516.00  DOWNSTREAM(FEET) =   3490.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   742.00   CHANNEL SLOPE =  0.0350
  CHANNEL BASE(FEET) =    9.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.062
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      35.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.22
  AVERAGE FLOW DEPTH(FEET) =   0.46   TRAVEL TIME(MIN.) =   2.93
  Tc(MIN.) =   21.76
  SUBAREA AREA(ACRES) =    25.43       SUBAREA RUNOFF(CFS) =   15.57
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       66.6         PEAK FLOW RATE(CFS) =      40.77

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.49   FLOW VELOCITY(FEET/SEC.) =   4.38
  LONGEST FLOWPATH FROM NODE    140.00 TO NODE    149.00 =    3066.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    149.00 TO NODE    149.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.062
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =   42.04   SUBAREA RUNOFF(CFS) =   25.74
  TOTAL AREA(ACRES) =      108.6   TOTAL RUNOFF(CFS) =      66.51
  TC(MIN.) =   21.76

+----------------------------------------------------------------------------+
| BEGIN AREA DRAINING TO NODE 156                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    152.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3690.00
  DOWNSTREAM ELEVATION(FEET) =   3680.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.075
  SUBAREA RUNOFF(CFS) =      1.21
  TOTAL AREA(ACRES) =      1.00   TOTAL RUNOFF(CFS) =      1.21

****************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    153.00 IS CODE =  51
----------------------------------------------------------------------------
```

NODE 149

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3680.00  DOWNSTREAM(FEET) =   3668.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   431.00   CHANNEL SLOPE =  0.0278
  CHANNEL BASE(FEET) =   14.00   "Z" FACTOR =   9.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.422
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.93
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.50
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   4.79
  Tc(MIN.) =   12.31
  SUBAREA AREA(ACRES) =     1.57       SUBAREA RUNOFF(CFS) =    1.39
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       2.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.62
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    153.00 =     531.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3668.00  DOWNSTREAM(FEET) =   3616.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   723.00   CHANNEL SLOPE =  0.0719
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  15.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.518
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.30
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   5.24
  Tc(MIN.) =   17.54
  SUBAREA AREA(ACRES) =     9.50       SUBAREA RUNOFF(CFS) =    6.68
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       12.1         PEAK FLOW RATE(CFS) =       8.49

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   2.80
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    154.00 =    1254.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    156.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   3616.00  DOWNSTREAM(FEET) =   3570.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   591.00   CHANNEL SLOPE =  0.0778
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.293
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.21
  AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   1.89
  Tc(MIN.) =   19.43
  SUBAREA AREA(ACRES) =     8.89       SUBAREA RUNOFF(CFS) =    5.85
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       21.0         PEAK FLOW RATE(CFS) =      13.80

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   5.51
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    156.00 =    1845.00 FEET.

+----------------------------------------------------------------------------+
| BEGIN AREA DRAINING TO NODE 166                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    162.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    93.00
  UPSTREAM ELEVATION(FEET) =   3644.00
  DOWNSTREAM ELEVATION(FEET) =   3630.00
  ELEVATION DIFFERENCE(FEET) =     14.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.252
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.219
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.63   TOTAL RUNOFF(CFS) =      0.78

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    163.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3630.00  DOWNSTREAM(FEET) =   3610.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   213.00   CHANNEL SLOPE =  0.0939
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.733
```

NODE 156

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.64
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   0.98
  Tc(MIN.) =    8.23
  SUBAREA AREA(ACRES) =     2.10       SUBAREA RUNOFF(CFS) =    2.41
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       3.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =   4.06
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    163.00 =     306.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    164.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3610.00  DOWNSTREAM(FEET) =   3590.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   562.00   CHANNEL SLOPE =  0.0356
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.811
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.65
  AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   2.57
  Tc(MIN.) =   10.80
  SUBAREA AREA(ACRES) =    11.32       SUBAREA RUNOFF(CFS) =   10.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       14.0         PEAK FLOW RATE(CFS) =      13.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   4.06
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    164.00 =     868.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    164.00 TO NODE    165.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3590.00  DOWNSTREAM(FEET) =   3540.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   539.00   CHANNEL SLOPE =  0.0928
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  17.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.406
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.70
  AVERAGE FLOW DEPTH(FEET) =   0.48   TRAVEL TIME(MIN.) =   1.58
  Tc(MIN.) =   12.37
  SUBAREA AREA(ACRES) =    19.08       SUBAREA RUNOFF(CFS) =   16.81
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       33.1         PEAK FLOW RATE(CFS) =      29.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.53   FLOW VELOCITY(FEET/SEC.) =   6.13
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    165.00 =    1407.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    166.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3540.00  DOWNSTREAM(FEET) =   3522.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   352.00   CHANNEL SLOPE =  0.0511
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.185
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      30.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.69
  AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   1.03
  Tc(MIN.) =   13.40
  SUBAREA AREA(ACRES) =     3.75       SUBAREA RUNOFF(CFS) =    3.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       36.9         PEAK FLOW RATE(CFS) =      30.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.74   FLOW VELOCITY(FEET/SEC.) =   5.71
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    166.00 =    1759.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    166.00 TO NODE    166.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.40
  RAINFALL INTENSITY(INCH/HR) =   4.18
  TOTAL STREAM AREA(ACRES) =    36.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     30.87

****************************************************************************
  FLOW PROCESS FROM NODE    161.00 TO NODE    161.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3654.00
  DOWNSTREAM ELEVATION(FEET) =   3640.00
  ELEVATION DIFFERENCE(FEET) =     14.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.075
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.43   TOTAL RUNOFF(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE    161.10 TO NODE    161.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3640.00  DOWNSTREAM(FEET) =   3590.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   475.00   CHANNEL SLOPE =  0.1053
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.287
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.38
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   1.81
  Tc(MIN.) =    9.33
  SUBAREA AREA(ACRES) =     5.82       SUBAREA RUNOFF(CFS) =    6.15
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        6.2         PEAK FLOW RATE(CFS) =       6.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   5.06
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    161.20 =     575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    161.20 TO NODE    161.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3590.00  DOWNSTREAM(FEET) =   3556.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   481.00   CHANNEL SLOPE =  0.0707
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.750
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.76
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   1.69
  Tc(MIN.) =   11.01
  SUBAREA AREA(ACRES) =     5.93       SUBAREA RUNOFF(CFS) =    5.63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       12.2         PEAK FLOW RATE(CFS) =      11.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =   5.07
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    161.30 =    1056.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    161.30 TO NODE    166.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3556.00  DOWNSTREAM(FEET) =   3522.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   481.00   CHANNEL SLOPE =  0.0707
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.378
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.41
  AVERAGE FLOW DEPTH(FEET) =   0.53   TRAVEL TIME(MIN.) =   1.48
  Tc(MIN.) =   12.49
  SUBAREA AREA(ACRES) =     8.20       SUBAREA RUNOFF(CFS) =    7.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       20.4         PEAK FLOW RATE(CFS) =      17.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.56   FLOW VELOCITY(FEET/SEC.) =   5.66
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    166.00 =    1537.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    166.00 TO NODE    166.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.49
  RAINFALL INTENSITY(INCH/HR) =   4.38
  TOTAL STREAM AREA(ACRES) =    20.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.85

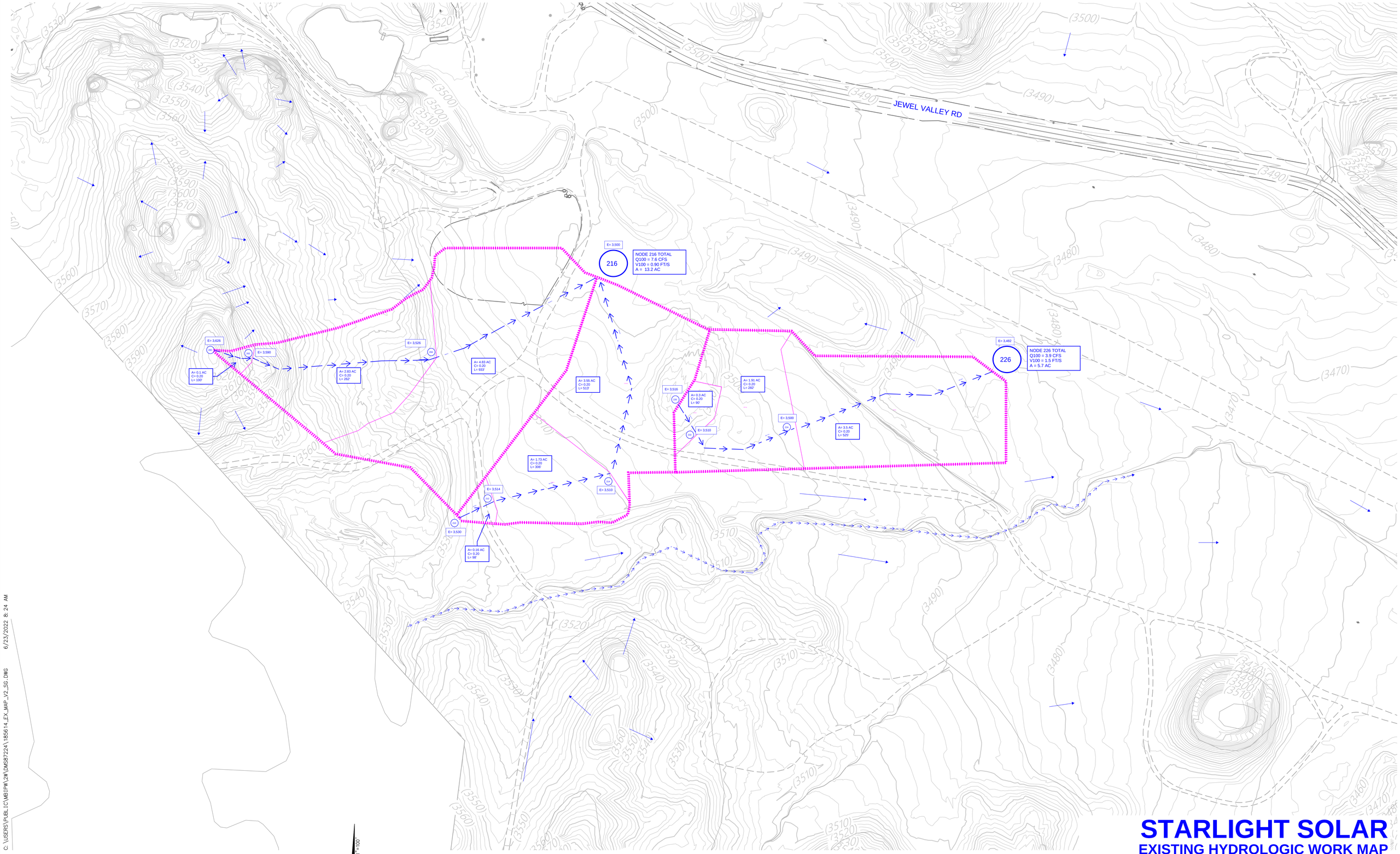
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       30.87    13.40        4.185         36.88
      2       17.85    12.49        4.378         20.38
```

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       46.62    12.49       4.378
      2       47.92    13.40       4.185

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      47.92   Tc(MIN.) =   13.40
  TOTAL AREA(ACRES) =       57.3
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    166.00 =    1759.00 FEET.
 ============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       57.3  TC(MIN.) =     13.40
  PEAK FLOW RATE(CFS)   =      47.92
 ============================================================================
 ============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

NODE 166



C:\USERS\PUBLIC\MBIPW\2M\DWS87224\185614_EX_MAP_V2_SG.DWG 6/23/2022 8:24 AM

Michael Baker
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100 50 0 100 200 300
SCALE: 1"=100'

SCALE 1"=100'

LEGEND
DRAINAGE BOUNDARY
FLOW PATH
DRAINAGE NODE (100)

STARLIGHT SOLAR
EXISTING HYDROLOGIC WORK MAP
AREA B

MBI 185614
March 2024

```
_____________________________________________________________________________
*****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1264

                              Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* 185614 STARLIGHT SOLAR                                                  *
* EX Q100 ON-SITE AREA B                                                  *
* 2024-03-01                                                              *
 *************************************************************************

  FILE NAME: 614EXB.DAT
  TIME/DATE OF STUDY: 07:59 03/02/2024
-----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

*****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  21
-----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=============================================================================
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3626.00
  DOWNSTREAM ELEVATION(FEET) =   3590.00
  ELEVATION DIFFERENCE(FEET) =     36.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.520
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.075
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    204.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3590.00  DOWNSTREAM(FEET) =   3526.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   262.00   CHANNEL SLOPE =  0.2443
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.285
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.41
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.81
  Tc(MIN.) =    9.33
  SUBAREA AREA(ACRES) =     2.83       SUBAREA RUNOFF(CFS) =    2.99
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        2.9         PEAK FLOW RATE(CFS) =       3.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   3.12
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     362.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    216.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3526.00  DOWNSTREAM(FEET) =   3500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   933.00   CHANNEL SLOPE =  0.0279
  CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =  15.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.425
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.80
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.74
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   8.95
```

```
  Tc(MIN.) =   18.28
  SUBAREA AREA(ACRES) =     4.83       SUBAREA RUNOFF(CFS) =    3.31
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        7.8         PEAK FLOW RATE(CFS) =       5.32

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   1.82
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    216.00 =    1295.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.28
  RAINFALL INTENSITY(INCH/HR) =   3.43
  TOTAL STREAM AREA(ACRES) =     7.76
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.32

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    212.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    98.00
  UPSTREAM ELEVATION(FEET) =   3530.00
  DOWNSTREAM ELEVATION(FEET) =   3514.00
  ELEVATION DIFFERENCE(FEET) =     16.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.444
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.115
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    214.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3514.00  DOWNSTREAM(FEET) =   3510.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   306.00   CHANNEL SLOPE =  0.0131
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  45.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.852
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.65
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   7.79
  Tc(MIN.) =   15.24
  SUBAREA AREA(ACRES) =     1.73       SUBAREA RUNOFF(CFS) =    1.33
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       1.46

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   0.80
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    214.00 =     404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    216.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3510.00  DOWNSTREAM(FEET) =   3500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   513.00   CHANNEL SLOPE =  0.0195
  CHANNEL BASE(FEET) =   55.00   "Z" FACTOR =  35.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.817
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.90
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   9.51
  Tc(MIN.) =   24.75
  SUBAREA AREA(ACRES) =     3.55       SUBAREA RUNOFF(CFS) =    2.00
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        5.4         PEAK FLOW RATE(CFS) =       3.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   0.96
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    216.00 =     917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    216.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   24.75
  RAINFALL INTENSITY(INCH/HR) =   2.82
  TOTAL STREAM AREA(ACRES) =     5.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.07

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.32    18.28        3.425          7.76
      2        3.07    24.75        2.817          5.44
```

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        7.58    18.28       3.425
      2        7.44    24.75       2.817

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.58   Tc(MIN.) =   18.28
  TOTAL AREA(ACRES) =       13.2
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    216.00 =    1295.00 FEET.

+----------------------------------------------------------------------+
| END NODE 216                                                         |
| BEGIN NODE 220                                                       |
|                                                                      |
+----------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    222.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =   3516.00
  DOWNSTREAM ELEVATION(FEET) =   3510.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.166
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.760
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    222.00 TO NODE    224.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3510.00  DOWNSTREAM(FEET) =   3500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   282.00   CHANNEL SLOPE =  0.0355
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  30.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.370
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.08
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   4.36
  Tc(MIN.) =   12.53
```

NODE 216

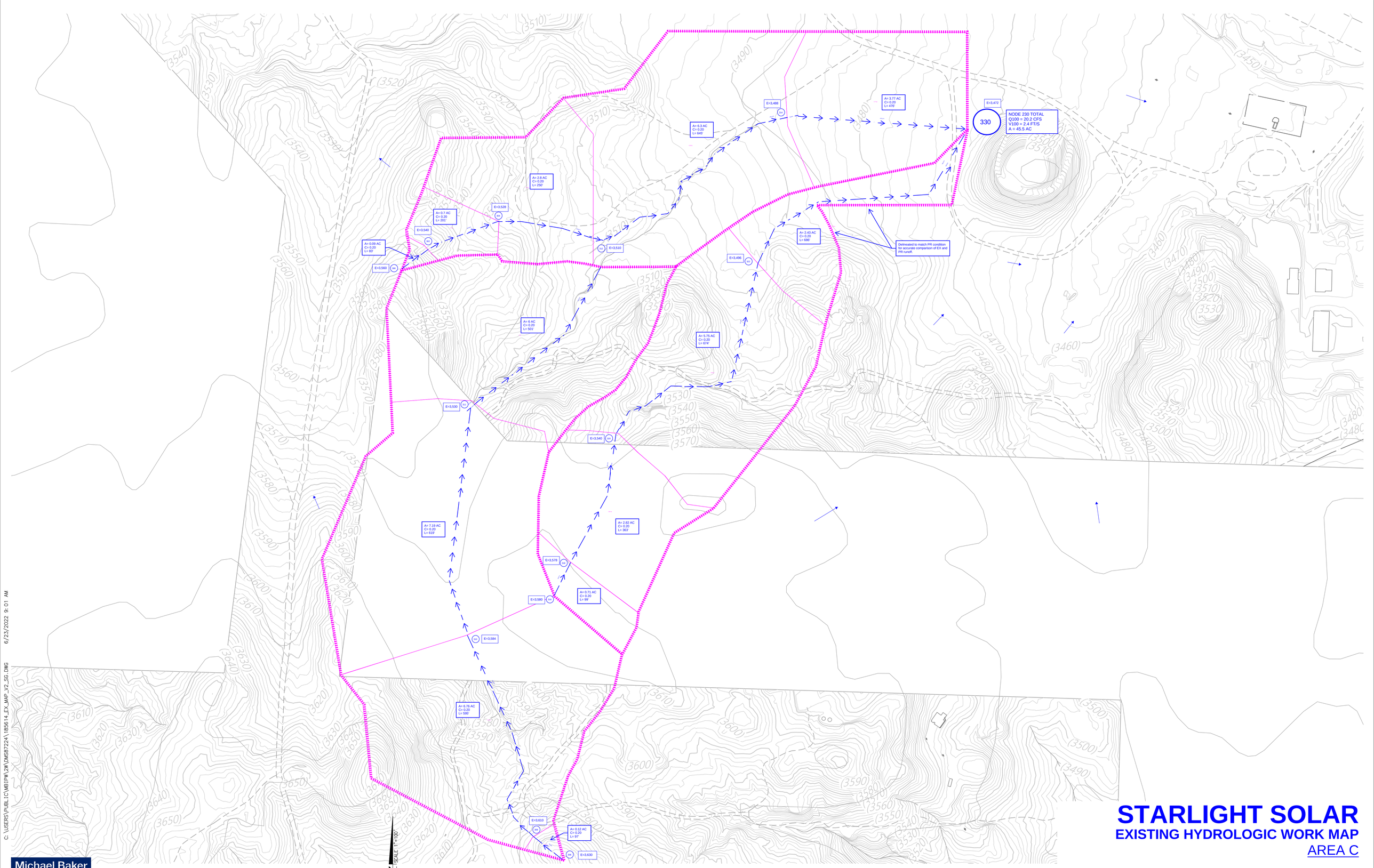
```
  SUBAREA AREA(ACRES) =     1.91       SUBAREA RUNOFF(CFS) =    1.67
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        2.2         PEAK FLOW RATE(CFS) =       1.93

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   1.21
  LONGEST FLOWPATH FROM NODE    220.00 TO NODE    224.00 =     372.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    224.00 TO NODE    226.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3500.00  DOWNSTREAM(FEET) =   3482.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   525.00   CHANNEL SLOPE =  0.0343
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  30.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.409
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.49
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   5.89
  Tc(MIN.) =   18.42
  SUBAREA AREA(ACRES) =     3.50       SUBAREA RUNOFF(CFS) =    2.39
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        5.7         PEAK FLOW RATE(CFS) =       3.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   1.52
  LONGEST FLOWPATH FROM NODE    220.00 TO NODE    226.00 =     897.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.7  TC(MIN.) =     18.42
  PEAK FLOW RATE(CFS)   =       3.89
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

NODE 226



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100 50 0 100 200 300
SCALE: 1"=100'

SCALE: 1"=100'

LEGEND
DRAINAGE BOUNDARY
FLOW PATH
DRAINAGE NODE (100)

STARLIGHT SOLAR
EXISTING HYDROLOGIC WORK MAP
AREA C

MBI 185614
MARCH 2024

```
_____________________________________________________________________________
*****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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              Ver. 23.0 Release Date: 07/01/2016  License ID 1264

                              Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* 185614 STARLIGHT SOLAR                                                  *
* EX Q100 ONSITE & OFFSITE AREA C                                         *
* 2024-03-01                                                              *
 *************************************************************************

  FILE NAME: 614EXC.DAT
  TIME/DATE OF STUDY: 08:06 03/02/2024
-----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

*****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE =  21
-----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=============================================================================
  *USER SPECIFIED(SUBAREA):
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  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
  UPSTREAM ELEVATION(FEET) =   3560.00
  DOWNSTREAM ELEVATION(FEET) =   3540.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.851
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.451
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    304.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3540.00  DOWNSTREAM(FEET) =   3528.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0597
  CHANNEL BASE(FEET) =   18.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.005
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.47
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.01
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   3.30
  Tc(MIN.) =   10.15
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    0.70
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       0.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     284.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    312.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3528.00  DOWNSTREAM(FEET) =   3510.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00   CHANNEL SLOPE =  0.0720
  CHANNEL BASE(FEET) =   17.00   "Z" FACTOR =  24.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.413
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.90
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   2.19
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  Tc(MIN.) =   12.34
  SUBAREA AREA(ACRES) =     2.80       SUBAREA RUNOFF(CFS) =    2.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        3.6         PEAK FLOW RATE(CFS) =       3.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   2.30
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    312.00 =     534.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    312.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.34
  RAINFALL INTENSITY(INCH/HR) =   4.41
  TOTAL STREAM AREA(ACRES) =     3.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.17

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    308.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    97.00
  UPSTREAM ELEVATION(FEET) =   3630.00
  DOWNSTREAM ELEVATION(FEET) =   3610.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.406
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.135
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3610.00  DOWNSTREAM(FEET) =   3584.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   595.00   CHANNEL SLOPE =  0.0437
  CHANNEL BASE(FEET) =    9.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.934
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .0300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.35
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  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   7.34
  Tc(MIN.) =   14.75
  SUBAREA AREA(ACRES) =     6.76       SUBAREA RUNOFF(CFS) =    0.80
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.033
  TOTAL AREA(ACRES) =        6.9         PEAK FLOW RATE(CFS) =       0.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.50
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    310.00 =     692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3584.00  DOWNSTREAM(FEET) =   3530.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   619.00   CHANNEL SLOPE =  0.0872
  CHANNEL BASE(FEET) =   35.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.181
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.79
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   5.75
  Tc(MIN.) =   20.50
  SUBAREA AREA(ACRES) =     7.19       SUBAREA RUNOFF(CFS) =    4.57
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.118
  TOTAL AREA(ACRES) =       14.1         PEAK FLOW RATE(CFS) =       5.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   2.35
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    311.00 =    1311.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3530.00  DOWNSTREAM(FEET) =   3510.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   501.00   CHANNEL SLOPE =  0.0399
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.008
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.49
  AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   1.86
  Tc(MIN.) =   22.36
  SUBAREA AREA(ACRES) =     6.00       SUBAREA RUNOFF(CFS) =    3.61
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  AREA-AVERAGE RUNOFF COEFFICIENT =  0.143
  TOTAL AREA(ACRES) =       20.1         PEAK FLOW RATE(CFS) =       8.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) =   4.71
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    312.00 =    1812.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   22.36
  RAINFALL INTENSITY(INCH/HR) =   3.01
  TOTAL STREAM AREA(ACRES) =    20.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.62

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.17    12.34        4.413          3.59
      2        8.62    22.36        3.008         20.07

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        7.93    12.34       4.413
      2       10.78    22.36       3.008

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.78   Tc(MIN.) =   22.36
  TOTAL AREA(ACRES) =       23.7
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    312.00 =    1812.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    314.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3510.00  DOWNSTREAM(FEET) =   3488.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   645.00   CHANNEL SLOPE =  0.0341
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  25.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.744
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.51
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  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.13
  AVERAGE FLOW DEPTH(FEET) =   0.40   TRAVEL TIME(MIN.) =   3.43
  Tc(MIN.) =   25.79
  SUBAREA AREA(ACRES) =     6.32       SUBAREA RUNOFF(CFS) =    3.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.162
  TOTAL AREA(ACRES) =       30.0         PEAK FLOW RATE(CFS) =      13.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =   3.18
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    314.00 =    2457.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    330.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3488.00  DOWNSTREAM(FEET) =   3472.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   476.00   CHANNEL SLOPE =  0.0336
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  36.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.541
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.44
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   3.26
  Tc(MIN.) =   29.05
  SUBAREA AREA(ACRES) =     3.77       SUBAREA RUNOFF(CFS) =    1.92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.166
  TOTAL AREA(ACRES) =       33.8         PEAK FLOW RATE(CFS) =      14.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   2.43
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    330.00 =    2933.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   29.05
  RAINFALL INTENSITY(INCH/HR) =   2.54
  TOTAL STREAM AREA(ACRES) =    33.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.23

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    318.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
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  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    99.00
  UPSTREAM ELEVATION(FEET) =   3580.00
  DOWNSTREAM ELEVATION(FEET) =   3578.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.836
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.30
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.534
  SUBAREA RUNOFF(CFS) =      0.64
  TOTAL AREA(ACRES) =      0.71   TOTAL RUNOFF(CFS) =      0.64

****************************************************************************
  FLOW PROCESS FROM NODE    318.00 TO NODE    320.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3578.00  DOWNSTREAM(FEET) =   3540.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   363.00   CHANNEL SLOPE =  0.1047
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.770
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.54
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   3.92
  Tc(MIN.) =   15.76
  SUBAREA AREA(ACRES) =     2.82       SUBAREA RUNOFF(CFS) =    2.13
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        3.5         PEAK FLOW RATE(CFS) =       2.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   1.81
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    320.00 =     462.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    322.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3540.00  DOWNSTREAM(FEET) =   3496.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   674.00   CHANNEL SLOPE =  0.0653
  CHANNEL BASE(FEET) =    7.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.351
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
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  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.56
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   3.16
  Tc(MIN.) =   18.91
  SUBAREA AREA(ACRES) =     5.75       SUBAREA RUNOFF(CFS) =    3.85
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        9.3         PEAK FLOW RATE(CFS) =       6.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   3.99
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    322.00 =    1136.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    330.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3496.00  DOWNSTREAM(FEET) =   3472.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   686.00   CHANNEL SLOPE =  0.0350
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =  22.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.896
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.38
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   4.80
  Tc(MIN.) =   23.71
  SUBAREA AREA(ACRES) =     2.43       SUBAREA RUNOFF(CFS) =    1.41
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       11.7         PEAK FLOW RATE(CFS) =       6.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   2.37
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    330.00 =    1822.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.71
  RAINFALL INTENSITY(INCH/HR) =   2.90
  TOTAL STREAM AREA(ACRES) =    11.71
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.78

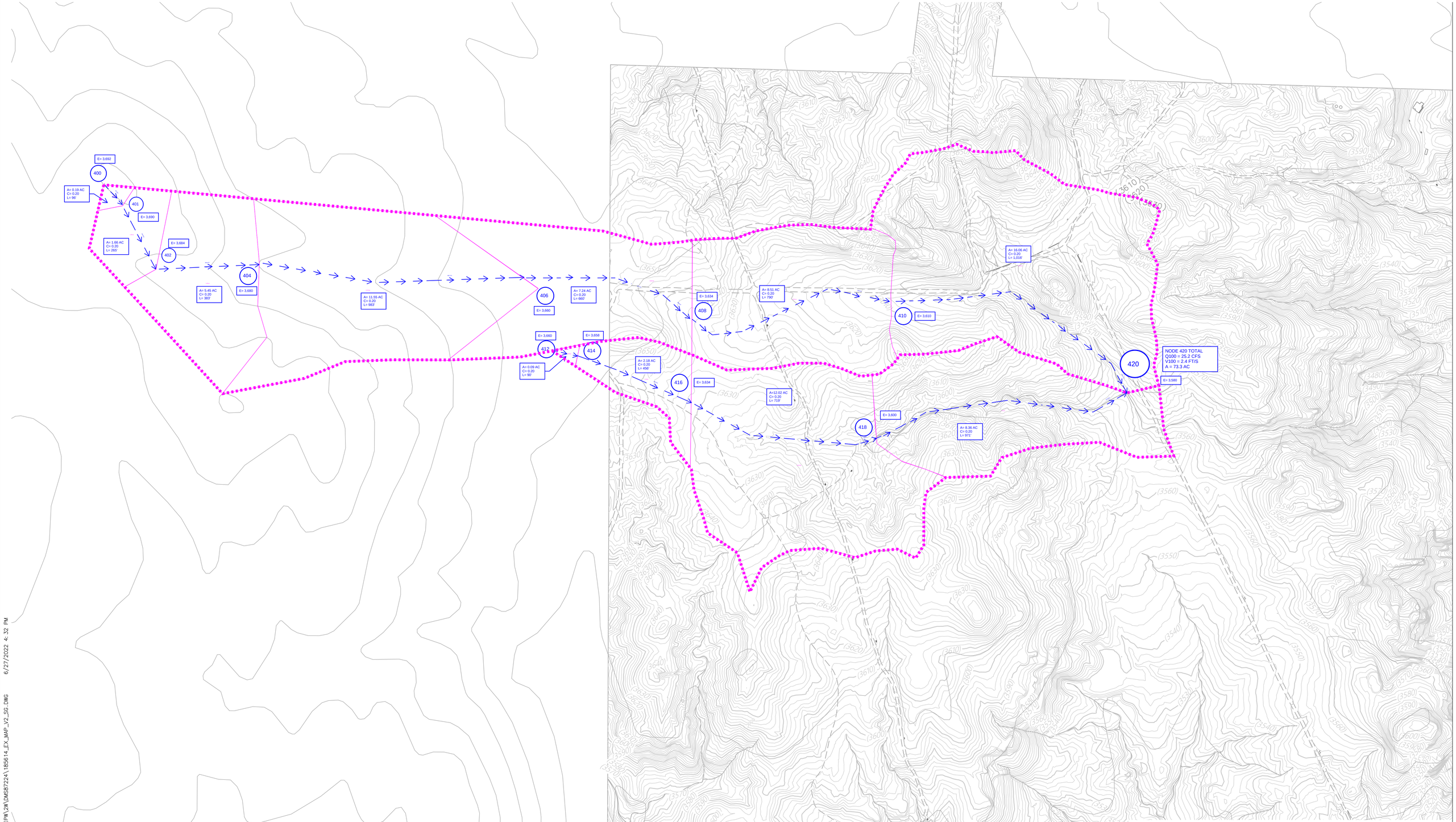
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       14.23    29.05        2.541         33.75
```

```
      2        6.78    23.71        2.896         11.71

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       19.27    23.71       2.896
      2       20.18    29.05       2.541

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      20.18   Tc(MIN.) =   29.05
  TOTAL AREA(ACRES) =       45.5
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    330.00 =    2933.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       45.5  TC(MIN.) =     29.05
  PEAK FLOW RATE(CFS)   =      20.18
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



C:\USERS\PUBLIC\MBIPW\2M\DMS87224\185614_EX_MAP_V2_SG.DWG 6/27/2022 4:32 PM

Michael Baker
INTERNATIONAL
9755 Clairemont Mesa Boulevard
San Diego, CA 92124
Phone: (858) 614-5000
MBAKERINTL.COM

150 75 0 150 300 450
SCALE: 1"=150'

SCALE 1"=150'

LEGEND
DRAINAGE BOUNDARY
FLOW PATH
DRAINAGE NODE (100)

STARLIGHT SOLAR
EXISTING HYDROLOGIC WORK MAP
AREA D (East)

MBI 185614
MARCH 2024

```
_____________________________________________________________________________
*****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1264

                             Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* 185614 STARLIGHT SOLAR                                                  *
* EX Q100 AREA D (EASTERLY FLOW)                                          *
* 2024-03-01                                                              *
 ***************************************************************************

  FILE NAME: 614EXD.DAT
  TIME/DATE OF STUDY: 08:14 03/02/2024
-----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

*****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
-----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=============================================================================
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    96.00
  UPSTREAM ELEVATION(FEET) =   3692.00
  DOWNSTREAM ELEVATION(FEET) =   3690.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.780
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    86.25
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.548
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3690.00  DOWNSTREAM(FEET) =   3684.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   265.00   CHANNEL SLOPE =  0.0226
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.430
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.68
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   6.46
  Tc(MIN.) =   18.24
  SUBAREA AREA(ACRES) =     1.66       SUBAREA RUNOFF(CFS) =    1.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       1.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   0.86
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     361.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    404.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3684.00  DOWNSTREAM(FEET) =   3680.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   383.00   CHANNEL SLOPE =  0.0104
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.735
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.83
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   7.68
  Tc(MIN.) =   25.92
  SUBAREA AREA(ACRES) =     5.45       SUBAREA RUNOFF(CFS) =    2.98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        7.3         PEAK FLOW RATE(CFS) =       3.99

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   0.95
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    404.00 =     744.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    406.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3680.00  DOWNSTREAM(FEET) =   3660.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   983.00   CHANNEL SLOPE =  0.0203
  CHANNEL BASE(FEET) =   43.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.119
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.30
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =  12.56
  Tc(MIN.) =   38.48
  SUBAREA AREA(ACRES) =    11.55       SUBAREA RUNOFF(CFS) =    4.90
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       18.9         PEAK FLOW RATE(CFS) =       7.99

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.44
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    406.00 =    1727.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    408.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3660.00  DOWNSTREAM(FEET) =   3634.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0394
  CHANNEL BASE(FEET) =   17.00   "Z" FACTOR =  16.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.991
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.80
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   3.93
  Tc(MIN.) =   42.41
  SUBAREA AREA(ACRES) =     7.24       SUBAREA RUNOFF(CFS) =    2.88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       26.1         PEAK FLOW RATE(CFS) =      10.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   2.90
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    408.00 =    2387.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    408.00 TO NODE    410.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3634.00  DOWNSTREAM(FEET) =   3610.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   790.00   CHANNEL SLOPE =  0.0304
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =  30.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.850
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.57
  AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   5.12
  Tc(MIN.) =   47.53
  SUBAREA AREA(ACRES) =     8.51       SUBAREA RUNOFF(CFS) =    3.15
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       34.6         PEAK FLOW RATE(CFS) =      12.80

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   2.63
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =    3177.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    420.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3610.00  DOWNSTREAM(FEET) =   3580.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1016.00   CHANNEL SLOPE =  0.0295
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  25.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.719
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.96
  AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   5.72
  Tc(MIN.) =   53.25
  SUBAREA AREA(ACRES) =    16.06       SUBAREA RUNOFF(CFS) =    5.52
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       50.7         PEAK FLOW RATE(CFS) =      17.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   3.08
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    420.00 =    4193.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    420.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   53.25
  RAINFALL INTENSITY(INCH/HR) =   1.72
  TOTAL STREAM AREA(ACRES) =    50.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.41

****************************************************************************
  FLOW PROCESS FROM NODE    412.00 TO NODE    414.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =   3660.00
  DOWNSTREAM ELEVATION(FEET) =   3658.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.668
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    88.33
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.576
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.18

****************************************************************************
  FLOW PROCESS FROM NODE    414.00 TO NODE    416.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3658.00  DOWNSTREAM(FEET) =   3634.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   456.00   CHANNEL SLOPE =  0.0526
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.350
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.89
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.05
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   7.25
  Tc(MIN.) =   18.92
  SUBAREA AREA(ACRES) =     2.07       SUBAREA RUNOFF(CFS) =    1.39
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        2.3         PEAK FLOW RATE(CFS) =       1.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   1.20
  LONGEST FLOWPATH FROM NODE    412.00 TO NODE    416.00 =     546.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    418.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3634.00  DOWNSTREAM(FEET) =   3600.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   719.00   CHANNEL SLOPE =  0.0473
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.847
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.20
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   5.44
  Tc(MIN.) =   24.36
  SUBAREA AREA(ACRES) =    12.02       SUBAREA RUNOFF(CFS) =    6.84
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       14.3         PEAK FLOW RATE(CFS) =       8.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   2.67
  LONGEST FLOWPATH FROM NODE    412.00 TO NODE    418.00 =    1265.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    418.00 TO NODE    420.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3600.00  DOWNSTREAM(FEET) =   3580.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   971.00   CHANNEL SLOPE =  0.0206
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  30.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.426
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.36
  AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   6.85
  Tc(MIN.) =   31.20
```

```
  SUBAREA AREA(ACRES) =     8.36       SUBAREA RUNOFF(CFS) =    4.06
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       22.7         PEAK FLOW RATE(CFS) =      10.99

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   2.38
  LONGEST FLOWPATH FROM NODE    412.00 TO NODE    420.00 =    2236.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    418.00 TO NODE    420.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   31.20
  RAINFALL INTENSITY(INCH/HR) =   2.43
  TOTAL STREAM AREA(ACRES) =    22.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.99

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       17.41    53.25        1.719         50.66
      2       10.99    31.20        2.426         22.65

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       21.19    31.20       2.426
      2       25.20    53.25       1.719

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      25.20   Tc(MIN.) =   53.25
  TOTAL AREA(ACRES) =       73.3
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    420.00 =    4193.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       73.3  TC(MIN.) =     53.25
  PEAK FLOW RATE(CFS)   =      25.20
  *** PEAK FLOW RATE TABLE ***
         Q(CFS)   Tc(MIN.)
  1       21.19      31.20
  2       25.20      53.25
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

NODE 420

SEE AREA D
(EASTERLY FLOW)
WORK MAP

SEE AREA D
(EASTERLY FLOW)
WORK MAP

A= 0.13 AC
C= 0.20
L= 98'

510

512

A=1.05 AC
C= 0.20
L= 275'

500

A= 0.31 AC
C= 0.20
L= 86'

502

A=11.62 AC
C= 0.20
L= 808'

A= 20.24 AC
C= 0.25
L= 959'

514

A= 19.92 AC
C= 0.25
L= 671'

504

A=15.42 AC
C= 0.20
L= 1,505'

520

530

A= 1.13 AC
C= 0.26
L= 100'

532

A= 38.66 AC
C= 0.26
L= 1,157'

A= 15.9 AC
C= 0.26
L= 794'

522

534

EX. RAILROAD

A= 22.59 AC
C= 0.20
L= 1,621'

CODE 8
"ADD AREA"
A = 22.73
C = 0.20

A= 24.94 AC
C= 0.20
L= 831'

536

A= 38.62 AC
C= 0.20
L= 1,314'

524

A= 31.42 AC
C= 0.20
L= 1,313'

SEE APPENDIX E
FOR OFF-SITE WORK MAP AND FLOODPLAIN
WORK MAP FOR LIMITS OF INUNDATION

526

538

A= 18.34 AC
C= 0.20
L= 940'

A= 41.01 AC
C= 0.20
L= 1,665'

550

PROJECT SITE (NODE 550)
Q100 = 141.5 cfs
V100 = 3.0 ft/s
A = 323.0 ac

TOTAL (NODE 299)
INCLUDES OFF-SITE
Q100 = 489 cfs
A = 1.34 sq-mi
Refer to Appendix E

7/25/2023 11:34 AM

C:\USERS\PUBLIC\MBIPW\2W\DMS87224\185614_PR_MAPS_2023-07-13.DWG

Michael Baker
INTERNATIONAL
9755 Clairemont Mesa Boulevard
San Diego, CA 92124
Phone: (858) 614-5000 ·
MBAKERINTL.COM

200 100 0 200 400 600
SCALE: 1"=200'

SCALE 1"=200'

STARLIGHT SOLAR

EXISTING HYDROLOGIC WORK MAP

AREA D (South) and AREA'S E, F, G AND H

MBI 185614
MARCH 2024

```
_____________________________________________________________________________
*****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1264

                              Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* 185614 STARLIGHT SOLAR                                                  *
* EX Q100 ONSITE AREAS D (SOUTHERLY FLOW) - H                             *
* 2024-03-01                                                              *
 ***************************************************************************

  FILE NAME: 614EXDH.DAT
  TIME/DATE OF STUDY: 08:22 03/02/2024
-----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

*****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    502.00 IS CODE =  21
-----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=============================================================================
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    86.00
  UPSTREAM ELEVATION(FEET) =   3646.00
  DOWNSTREAM ELEVATION(FEET) =   3640.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.863
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.903
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.31   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    504.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3640.00  DOWNSTREAM(FEET) =   3590.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   808.00   CHANNEL SLOPE =  0.0619
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =  15.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.505
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.29
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   4.09
  Tc(MIN.) =   11.95
  SUBAREA AREA(ACRES) =    11.62       SUBAREA RUNOFF(CFS) =   10.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       11.9         PEAK FLOW RATE(CFS) =      10.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   4.00
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    504.00 =     894.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    520.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3590.00  DOWNSTREAM(FEET) =   3500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1505.00   CHANNEL SLOPE =  0.0598
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.618
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.18
  AVERAGE FLOW DEPTH(FEET) =   0.56   TRAVEL TIME(MIN.) =   4.84
  Tc(MIN.) =   16.79
```

```
  SUBAREA AREA(ACRES) =    15.42       SUBAREA RUNOFF(CFS) =   11.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =       27.4         PEAK FLOW RATE(CFS) =      19.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =   5.40
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    520.00 =    2399.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    520.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.79
  RAINFALL INTENSITY(INCH/HR) =   3.62
  TOTAL STREAM AREA(ACRES) =    27.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.79

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    512.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    98.00
  UPSTREAM ELEVATION(FEET) =   3624.00
  DOWNSTREAM ELEVATION(FEET) =   3606.00
  ELEVATION DIFFERENCE(FEET) =     18.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.444
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.115
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    512.00 TO NODE    514.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3606.00  DOWNSTREAM(FEET) =   3524.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   959.00   CHANNEL SLOPE =  0.0855
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.784
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.64
  AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   3.45
```

```
  Tc(MIN.) =   10.89
  SUBAREA AREA(ACRES) =    20.24       SUBAREA RUNOFF(CFS) =   24.21
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.250
  TOTAL AREA(ACRES) =       20.4         PEAK FLOW RATE(CFS) =      24.33

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.47   FLOW VELOCITY(FEET/SEC.) =   5.50
  LONGEST FLOWPATH FROM NODE    510.00 TO NODE    514.00 =    1057.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    514.00 TO NODE    520.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3524.00  DOWNSTREAM(FEET) =   3500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   671.00   CHANNEL SLOPE =  0.0358
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  40.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.079
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.66
  AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   3.05
  Tc(MIN.) =   13.95
  SUBAREA AREA(ACRES) =    19.92       SUBAREA RUNOFF(CFS) =   20.31
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.250
  TOTAL AREA(ACRES) =       40.3         PEAK FLOW RATE(CFS) =      41.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =   3.77
  LONGEST FLOWPATH FROM NODE    510.00 TO NODE    520.00 =    1728.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    514.00 TO NODE    520.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.95
  RAINFALL INTENSITY(INCH/HR) =   4.08
  TOTAL STREAM AREA(ACRES) =    40.29
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     41.06

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       19.79    16.79        3.618         27.35
      2       41.06    13.95        4.079         40.29

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```

```
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       57.49    13.95       4.079
      2       56.21    16.79       3.618

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      57.49   Tc(MIN.) =   13.95
  TOTAL AREA(ACRES) =       67.6
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    520.00 =    2399.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    522.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3500.00  DOWNSTREAM(FEET) =   3484.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1157.00   CHANNEL SLOPE =  0.0138
  CHANNEL BASE(FEET) =   13.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.386
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      74.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.13
  AVERAGE FLOW DEPTH(FEET) =   0.84   TRAVEL TIME(MIN.) =   4.67
  Tc(MIN.) =   18.61
  SUBAREA AREA(ACRES) =    38.66       SUBAREA RUNOFF(CFS) =   34.03
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.241
  TOTAL AREA(ACRES) =      106.3         PEAK FLOW RATE(CFS) =      86.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.91   FLOW VELOCITY(FEET/SEC.) =   4.34
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    522.00 =    3556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    522.00 TO NODE    524.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3484.00  DOWNSTREAM(FEET) =   3450.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1621.00   CHANNEL SLOPE =  0.0210
  CHANNEL BASE(FEET) =   11.00   "Z" FACTOR =  16.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.846
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      93.06
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.70
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.82   TRAVEL TIME(MIN.) =   5.75
  Tc(MIN.) =   24.37
  SUBAREA AREA(ACRES) =    22.59       SUBAREA RUNOFF(CFS) =   12.86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.234
  TOTAL AREA(ACRES) =      128.9         PEAK FLOW RATE(CFS) =      86.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.79   FLOW VELOCITY(FEET/SEC.) =   4.63
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    524.00 =    5177.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    524.00 TO NODE    524.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.846
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2285
  SUBAREA AREA(ACRES) =   22.73   SUBAREA RUNOFF(CFS) =   12.94
  TOTAL AREA(ACRES) =      151.6   TOTAL RUNOFF(CFS) =      98.61
  TC(MIN.) =   24.37

****************************************************************************
  FLOW PROCESS FROM NODE    524.00 TO NODE    526.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3450.00  DOWNSTREAM(FEET) =   3430.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1313.00   CHANNEL SLOPE =  0.0152
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.440
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     106.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.34
  AVERAGE FLOW DEPTH(FEET) =   0.80   TRAVEL TIME(MIN.) =   6.56
  Tc(MIN.) =   30.93
  SUBAREA AREA(ACRES) =    31.42       SUBAREA RUNOFF(CFS) =   15.33
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.224
  TOTAL AREA(ACRES) =      183.0         PEAK FLOW RATE(CFS) =      99.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.78   FLOW VELOCITY(FEET/SEC.) =   3.27
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    526.00 =    6490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    526.00 TO NODE    550.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3430.00  DOWNSTREAM(FEET) =   3420.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1665.00   CHANNEL SLOPE =  0.0060
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  40.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.000
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     108.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.49
  AVERAGE FLOW DEPTH(FEET) =   1.04   TRAVEL TIME(MIN.) =  11.16
  Tc(MIN.) =   42.08
  SUBAREA AREA(ACRES) =    41.01       SUBAREA RUNOFF(CFS) =   16.41
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.219
  TOTAL AREA(ACRES) =      224.0         PEAK FLOW RATE(CFS) =      99.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.01   FLOW VELOCITY(FEET/SEC.) =   2.44
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    550.00 =    8155.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    526.00 TO NODE    550.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   42.08
  RAINFALL INTENSITY(INCH/HR) =   2.00
  TOTAL STREAM AREA(ACRES) =   224.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     99.89

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    532.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3552.00
  DOWNSTREAM ELEVATION(FEET) =   3518.00
  ELEVATION DIFFERENCE(FEET) =     34.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.019
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.351
  SUBAREA RUNOFF(CFS) =      1.87
  TOTAL AREA(ACRES) =      1.13   TOTAL RUNOFF(CFS) =      1.87

****************************************************************************
  FLOW PROCESS FROM NODE    532.00 TO NODE    534.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3518.00  DOWNSTREAM(FEET) =   3480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   794.00   CHANNEL SLOPE =  0.0479
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.805
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.48
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   3.80
  Tc(MIN.) =   10.82
  SUBAREA AREA(ACRES) =    15.90       SUBAREA RUNOFF(CFS) =   19.86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.260
  TOTAL AREA(ACRES) =       17.0         PEAK FLOW RATE(CFS) =      21.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   4.10
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    534.00 =     894.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    534.00 TO NODE    536.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3480.00  DOWNSTREAM(FEET) =   3456.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   831.00   CHANNEL SLOPE =  0.0289
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  35.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.909
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      31.08
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.40
  AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   4.08
  Tc(MIN.) =   14.89
  SUBAREA AREA(ACRES) =    24.94       SUBAREA RUNOFF(CFS) =   19.50
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.224
  TOTAL AREA(ACRES) =       42.0         PEAK FLOW RATE(CFS) =      36.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   3.51
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    536.00 =    1725.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    536.00 TO NODE    538.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3456.00  DOWNSTREAM(FEET) =   3440.00
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```
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1314.00   CHANNEL SLOPE =  0.0122
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  80.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.814
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      47.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.21
  AVERAGE FLOW DEPTH(FEET) =   0.46   TRAVEL TIME(MIN.) =   9.89
  Tc(MIN.) =   24.79
  SUBAREA AREA(ACRES) =    38.62       SUBAREA RUNOFF(CFS) =   21.74
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.213
  TOTAL AREA(ACRES) =       80.6         PEAK FLOW RATE(CFS) =      48.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.46   FLOW VELOCITY(FEET/SEC.) =   2.22
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    538.00 =    3039.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    538.00 TO NODE    550.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3440.00  DOWNSTREAM(FEET) =   3420.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   940.00   CHANNEL SLOPE =  0.0213
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  60.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.490
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      52.80
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.02
  AVERAGE FLOW DEPTH(FEET) =   0.46   TRAVEL TIME(MIN.) =   5.18
  Tc(MIN.) =   29.97
  SUBAREA AREA(ACRES) =    18.34       SUBAREA RUNOFF(CFS) =    9.13
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.210
  TOTAL AREA(ACRES) =       98.9         PEAK FLOW RATE(CFS) =      51.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.46   FLOW VELOCITY(FEET/SEC.) =   2.99
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    550.00 =    3979.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    538.00 TO NODE    550.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   29.97
  RAINFALL INTENSITY(INCH/HR) =   2.49
```

```
  TOTAL STREAM AREA(ACRES) =    98.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     51.82

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       99.89    42.08        2.000        224.05
      2       51.82    29.97        2.490         98.93

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      132.06    29.97       2.490
      2      141.52    42.08       2.000

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     141.52   Tc(MIN.) =   42.08
  TOTAL AREA(ACRES) =      323.0
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    550.00 =    8155.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      323.0  TC(MIN.) =     42.08
  PEAK FLOW RATE(CFS)   =     141.52
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

NODE 550