ATTACHMENT I

PRELIMINARY DRAINAGE AND HYDROLOGICAL STUDY

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SOUTH COAST TECHNOLOGY CENTER DEVELOPMENT
Preliminary Drainage and Hydrological Study

June 2024

INCLEDON
CONSULTING GROUP
Civil Engineering • Surveying • Planning

06/06/2024

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INTRODUCTION

This hydrology study has been prepared for the South Coast Technology Center Development project in the City of Santa Ana, Orange County, CA. This project is partially in the developed land bounded by the USPS Distribution Center (south), Susan Street (west), Lake Center (north), and Greenville Banning Channel (GBC) (east); and within the undeveloped, dirt lot bounded by a private road adjacent to commercial businesses (south), railroad tracks (west), Lake Center (north), and Susan Street (east). The purpose of this report is to determine the pre-and post-project peak runoffs during the 10-year storm event for use in the analysis and design of the on-site grading and storm drainage systems. This is a preliminary hydrology and hydraulics (HnH) report and is intended to show the project's intent and general compliance with quality engineering practices. As the design of the project progresses, this report will be updated to eventually be a final HnH report.

PROJECT DESCRIPTION

This project proposes 15.8 acres of developed commercial land and undeveloped open land to be improved into industrial buildings, with (3) warehouses, landscaping, surface parking, and subsurface improvements (see Appendix A).

Runoff from the existing site flows either off-site into the nearest roadway, where the water will sheet flow into the nearest catch basin (given the environment's grading), or into the existing, on-site storm water drainage system. All runoff eventually discharges into the GBC, which outfalls into the Santa Ana River.

Runoff from the proposed project will generally follow the same flow path; however, less water will surface flow off-site, compared to the existing conditions. A new on-site storm drain system will collect surface water from the on-site BMP catch basins. The piped system will be connected to the existing underground system near the perimeter of the project, which flows to the off-site GBC or south to the mainline under Sunflower Avenue (discharging to the GBC/Santa Ana River, as previously stated).

The project's site will discharge stormwater at a decreased peak rate compared the existing condition on the development east of Susan St, at an increased peak rate compared to the existing conditions on the development west of Susan St; however, at a decreased peak rate overall. Due to the site being in a "non-susceptible to hydromodification region", no additional hydromodification measures will need to be conducted (see the preliminary WQMP developed for the project.)

METHODOLOGY

HYDROLOGIC CALCULATIONS

The hydrology calculations were completed following the methodology prescribed by the Rational Method of the Orange County Hydrology Manual - 1986 edition, and the Orange County Hydrology Manual Addendum No. I, dated 1996. To complete the standard procedures within the manual, the project location was surveyed to determine the different drainage subareas of the site and their characteristics (for the proposed conditions, all statistics were based on a designed site plan) – see Appendix B for the maps of the existing and proposed drainage mapping conditions. From the site visit and a web soil survey report from the United States Department of Agriculture (updated September 30, 2022 and see Appendix D) the existing site's Hydrologic Soils Group, Curve Number, Cover Type, and Quality of Cover were estimated. As permissible by the hydrology manual, the hydrologic calculator program RATSCX from the Advanced Engineering Software (AES) was used to conduct the calculations. The results produced from the methodology described above are tabulated below, in Hydrology Calculation Results. See Appendix F for the software results of the hydrology calculations described above.

Additional hydrologic comparisons were conducted to determine the impact the site's design has on the offsite points of connection (see Table 3 from the Results section).

HYDRAULIC CALCULATIONS

The preliminary design of the on-site storm drainage system was based on the following criteria: ensure the adequate size and performance of the network's pipes for the proposed hydrologic conditions.

To calculate adequate pipe sizing of the system's mainlines, the site was divided per tributary area of each mainline. Using Manning's Equation, the maximum flow of the mainlines were used to determine the adequate size of pipes under the 10-year storm. The onsite storm drain network (see the Proposed Hydrology Map under Appendix B) was modeled using the following assumptions:

- Proposed Pipes are HDPE (n = 0.011).
- Existing RCP Pipe n = 0.013.
- Minimum allowed pipe slope = 0.25%.
- Desired for discharge to remain in pipe (<100% full)

See the Hydraulic Results section for the results and see Appendix G for the supporting figures based on the hydraulics methodology described above.

HYDROLOGY CALCULATION RESULTS

The following are the summarized results of the Orange County Rational Method calculations for the 10-year storm event:

Table 1: Existing Hydrology Results

Subarea	Area (ac)	Impervious Percentage	10-Year Peak Runoff (cfs)
E1	3.32	60%	7.28
E2	0.07	25%	0.25
E3	0.28	0%	1.02
E4	0.24	0%	0.87
E5	0.36	0%	1.31
E6	0.83	0%	3.01
E7	0.12	100%	0.41
E8	0.09	100%	0.31
E9	0.82	19%	2.96
E10	0.47	26%	1.69
E11	0.11	41%	0.39
E12	0.36	53%	1.03
E13	1.07	31%	3.08
E14	0.47	78%	1.59
E15	0.47	0%	1.71
E16	0.44	0%	1.60
E17	0.47	0%	1.71
E18	0.42	27%	1.22
E19	0.04	41%	0.14
E20	0.45	100%	1.51
W1	1.79	100%	3.10
W2	1.03	100%	2.50
W3	2.99	100%	6.64

Table 2: Proposed Hydrology Results

Subarea	Area (ac)	Impervious Percentage	10-Year Peak Runoff (cfs)
W1	0.50	72%	1.47
W2	0.27	66%	0.83
W3	0.67	68%	2.06
W4	0.59	100%	1.39
W5	0.81	69%	2.5
W6	0.59	100%	1.39
W7	0.64	100%	1.45
W8	0.42	71%	1.23
W9	0.43	87%	1.24
W10	0.26	100%	0.8

W11	0.59	100%	1.35
SE1	0.68	68%	1.62
SE2	0.97	77%	2.29
SE3	0.35	79%	0.81
SE4	0.90	84%	2.07
SE5	0.76	72%	1.77
SE6	0.63	100%	1.44
SE7	0.65	100%	1.52
SE8	0.65	100%	1.49
SE9	0.63	100%	1.44
SE10	0.22	100%	0.72
E1	0.63	60%	1.61
E2	1.39	80%	3.45
E3	0.50	87%	1.23
E4	0.20	100%	0.65
E5	0.46	100%	1.13
E6	0.45	100%	1.12
E7	0.38	100%	0.94
E8	0.46	100%	1.07

Table 3: Project Hydrology Runoff to Watershed Outfalls Summary

Return Period 10-YR	Existing Site Runoff (cfs)	Proposed Site Runoff (cfs)
Susan Street (E1 and W3)	13.92	7.45
Southeast GBC Pipe	6.87	0
East GBC Pipe	18.09	25.99
Railroad Space (W2)	2.50	0
Private Street CB (W1)	3.10	7.40
TOTAL	44.48	40.84

Note: The values in Table 3 are only concerning the subareas/land that have changed from the proposed development (any conditions that will not change, are not considered for analysis). See the Watershed Maps in Appendix B for the location of the outfalls.

The calculations and results produced by the AES software are included in Appendix F.

HYDRAULIC CALCULATION RESULTS

The following are the summarized results of the storm drain analysis.

Table 4: Storm Drain Mainline Capacity Summary

Mainline Location	Mainline Pipe Size	Pipe Fullness (%)	Discharge Capacity (cfs)*
W1 Watershed	18" DIA (RCP)	95	7.43
E Watershed	24" DIA	95	14.64
	27" DIA	95	20.05
	39" DIA (RCP)	95	36.92

Note: Table 4 depicts the worst-case scenario that would occur.
* Discharge Capacities expected to increase when evaluated during final design and accounting for HGL above pipe soffit.

Watershed W1's storm drain system is connecting to an existing 18" RCP line, that of which is to be protected in place. The proposed flow beyond determined capacity of the pipe (to be confirmed during final design), will discharge to under sidewalk culverts placed along Lake Center Ave. and Susan St. to discharge excess water into the existing curb and gutters. The existing site is currently discharging to the adjacent streets, such that the proposed design will utilize the adjacent infrastructure as necessary. (The underside walk culverts will be placed east of Susan as well)

The mainlines under watershed E will be conveying the watershed's runoff and upstream discharge to the GBC. Upstream of watershed E are (2) existing 24" lines that will be used for the development of the site (east and west mainlines). The westerly line will be rerouted through the proposed development. The design of it will match the existing size until stepping up to a 27" line to convey the discharge to the existing manhole, combining flows from the westerly and easterly halves of the watershed. The easterly existing 24" line will be protected in place and utilized accordingly. The existing 39" line, downstream of the intersection manhole, discharges into the GBC. The existing southeast storm drain connection to the GBC will also be protected in place and available for discharge during final design as needed.

The calculations are included in Appendix G.

CONCLUSION

The project will increase imperviousness; however, due to modifications in the stormwater flow paths, resulting in an increase in time of concentration, the peak runoff produced from the project is expected to decrease or have no change.

The development has been designed to effectively capture and convey the project's storm water to the existing/public systems during a 10-year storm. This system continues the flow patterns of the existing conditions, utilizing the street's infrastructure and an onsite storm drain system.

See the following appendices for supporting calculations and graphics.

REFERENCES

City of Santa Ana Zoning Map, February 2023.

Orange County Hydrology Manual, 1986.

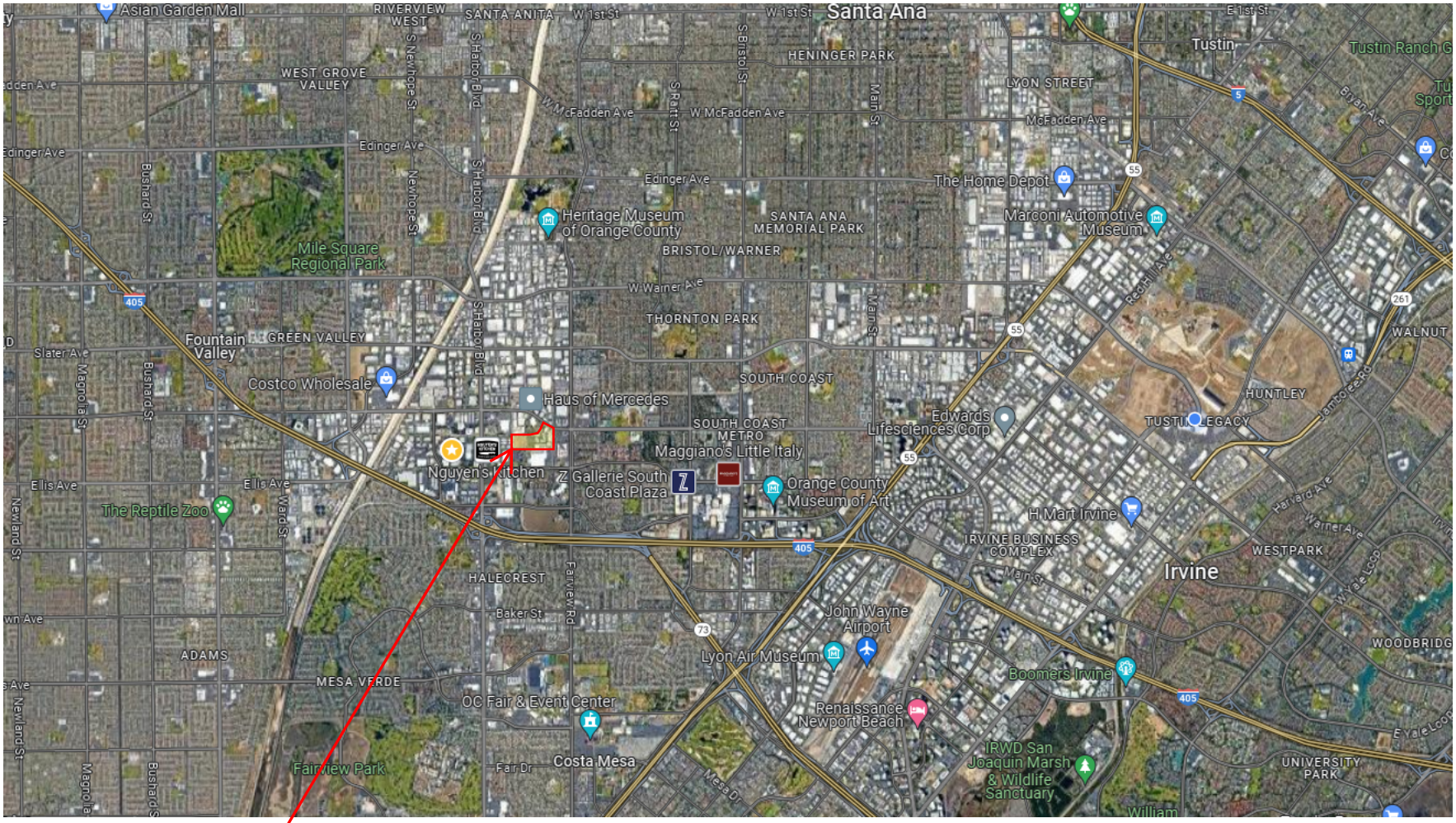
Orange County Hydrology Manual Addendum No. I, 1996.

National Oceanic and Atmospheric Administration - Atlas 14 Point Precipitation Frequency Estimates: CA.

Orange County Local Drainage Manual, May 2021.

United States Department of Agriculture – National Resources Conservation Services Web Soil Survey, September 2022.

APPENDIX A- PROJECT LOCATION MAPS



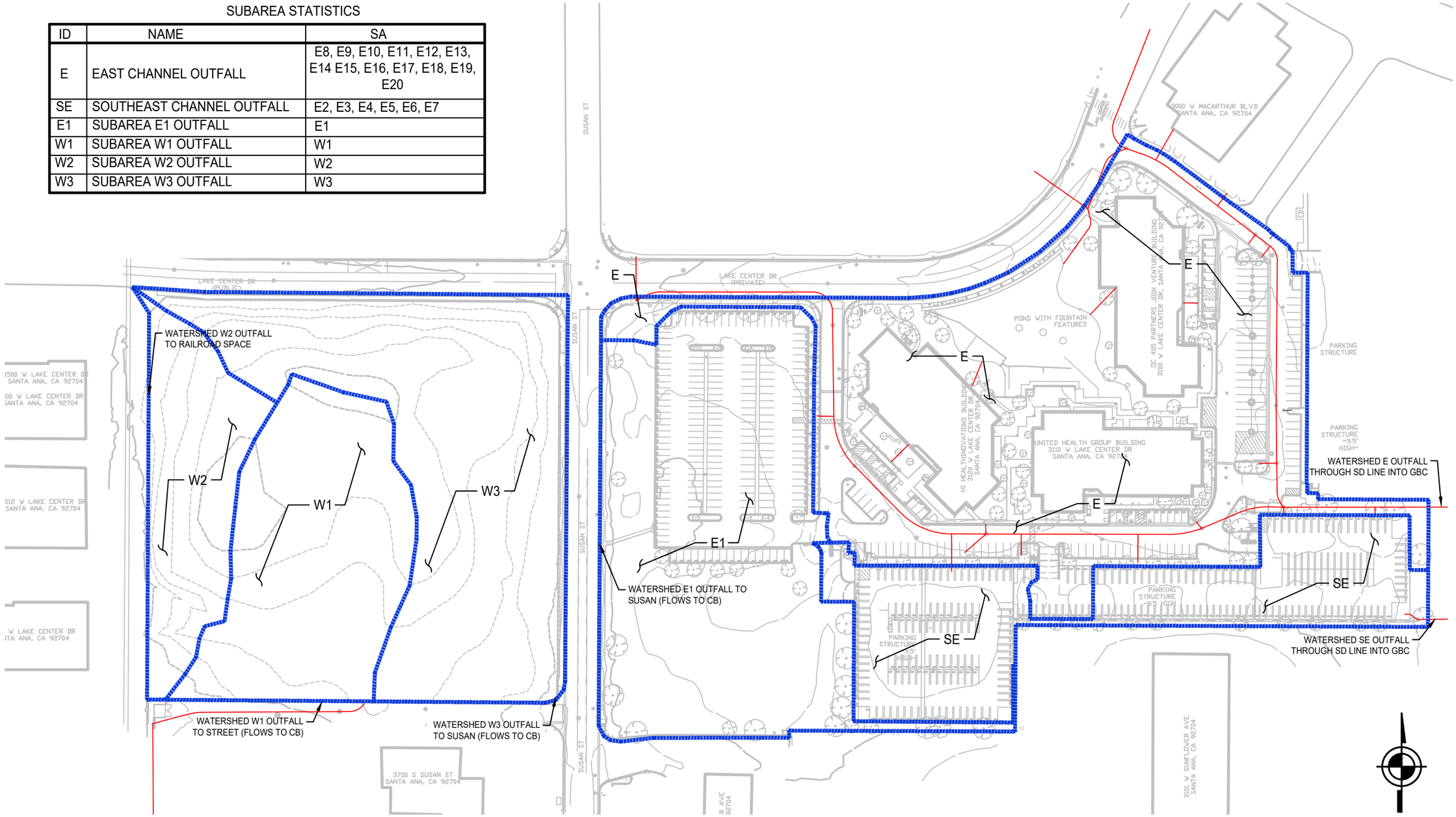
LOCATION MAP
SOUTH COAST TECHNOLOGY CENTER DEVELOPMENT

VICINITY MAP
SOUTH COAST TECHNOLOGY CENTER DEVELOPMENT

APPENDIX B- PROJECT DRAINAGE MAPS

SUBAREA STATISTICS

ID	NAME	SA
E	EAST CHANNEL OUTFALL	E8, E9, E10, E11, E12, E13, E14 E15, E16, E17, E18, E19, E20
SE	SOUTHEAST CHANNEL OUTFALL	E2, E3, E4, E5, E6, E7
E1	SUBAREA E1 OUTFALL	E1
W1	SUBAREA W1 OUTFALL	W1
W2	SUBAREA W2 OUTFALL	W2
W3	SUBAREA W3 OUTFALL	W3



LEGEND:

WATERSHED BOUNDARY

STORM DRAIN CONVEYANCE

ABANDONED OR DEMOLISHED STORM DRAIN

INCLEDON CONSULTING GROUP
Civil Engineering • Surveying • Planning

EXISTING WATERSHED MAP

SOUTH COAST TECHNOLOGY CENTER
DECEMBER 2023

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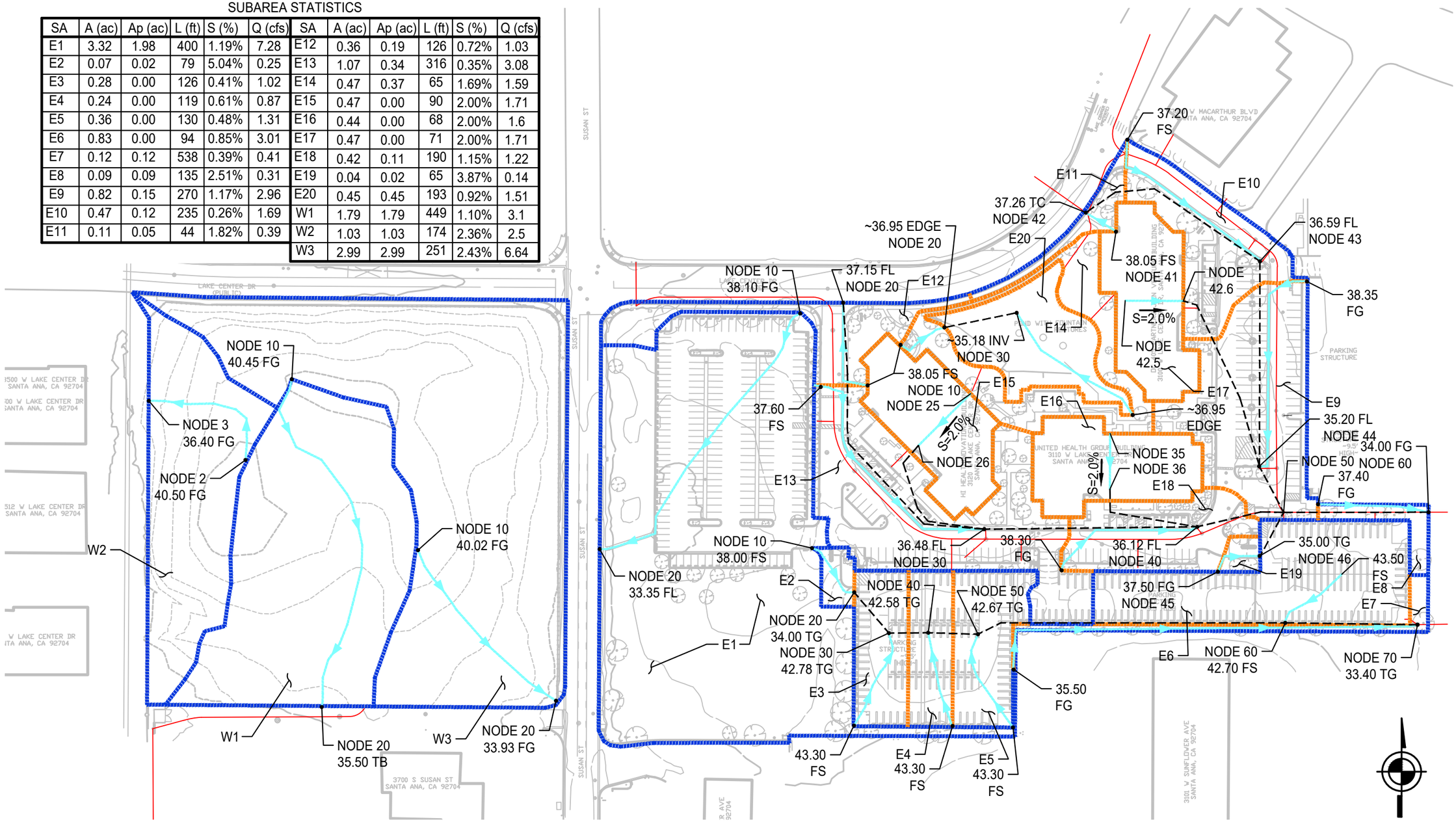
1/15/2024

SUBAREA STATISTICS

SA	A (ac)	Ap (ac)	L (ft)	S (%)	Q (cfs)
E1	3.32	1.98	400	1.19%	7.28
E2	0.07	0.02	79	5.04%	0.25
E3	0.28	0.00	126	0.41%	1.02
E4	0.24	0.00	119	0.61%	0.87
E5	0.36	0.00	130	0.48%	1.31
E6	0.83	0.00	94	0.85%	3.01
E7	0.12	0.12	538	0.39%	0.41
E8	0.09	0.09	135	2.51%	0.31
E9	0.82	0.15	270	1.17%	2.96
E10	0.47	0.12	235	0.26%	1.69
E11	0.11	0.05	44	1.82%	0.39
E12	0.36	0.19	126	0.72%	1.03
E13	1.07	0.34	316	0.35%	3.08
E14	0.47	0.37	65	1.69%	1.59
E15	0.47	0.00	90	2.00%	1.71
E16	0.44	0.00	68	2.00%	1.6
E17	0.47	0.00	71	2.00%	1.71
E18	0.42	0.11	190	1.15%	1.22
E19	0.04	0.02	65	3.87%	0.14
E20	0.45	0.45	193	0.92%	1.51
W1	1.79	1.79	449	1.10%	3.1
W2	1.03	1.03	174	2.36%	2.5
W3	2.99	2.99	251	2.43%	6.64



LEGEND:

SUBAREA BOUNDARY — WATERSHED BOUNDARY — HYDROLOGIC ROUTING PATH (SUBSEQUENT TO FLOW LINE)

FLOW LINE — STORM DRAIN CONVEYANCE — ABANDONED OR DEMOLISHED STORM DRAIN

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NOTE:
ALL MAPPING AND STATISTICS SHOWN HEREON ARE IDENTICAL FOR ALL STORM EVENTS. 10-YEAR Q VALUES SHOWN FOR REFERENCE.

NOTE:
ROUTING NODES SHOWN HEREON MATCH NODES WITHIN CALCULATIONS. LARGER NODES ARE DOWNSTREAM OF SMALLER NODES.

EXISTING HYDROLOGY PLAN
SOUTH COAST TECHNOLOGY CENTER
DECEMBER 2023

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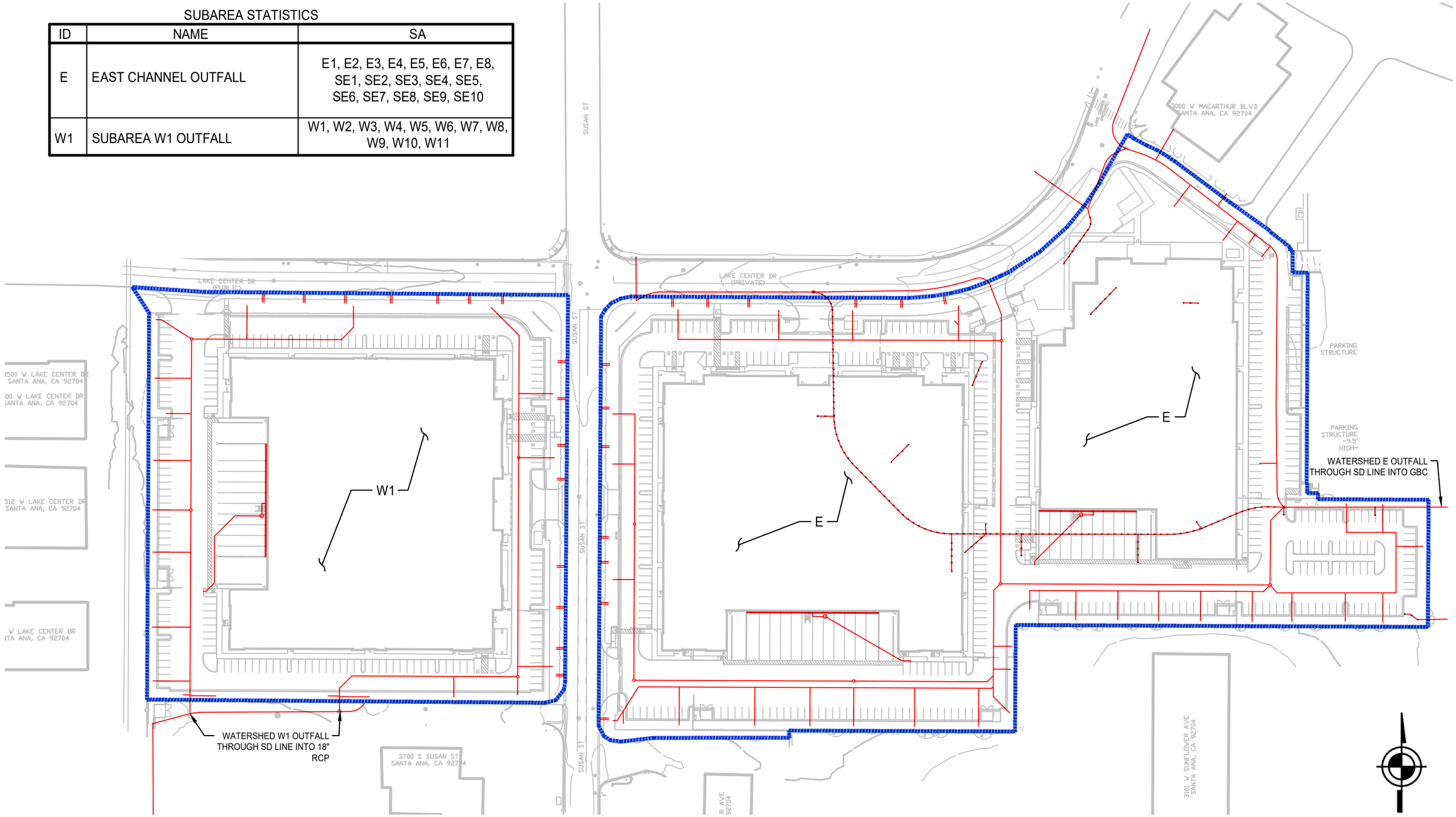
SUBAREA STATISTICS

ID	NAME	SA
E	EAST CHANNEL OUTFALL	E1, E2, E3, E4, E5, E6, E7, E8, SE1, SE2, SE3, SE4, SE5, SE6, SE7, SE8, SE9, SE10
W1	SUBAREA W1 OUTFALL	W1, W2, W3, W4, W5, W6, W7, W8, W9, W10, W11



LEGEND:

WATERSHED BOUNDARY

STORM DRAIN CONVEYANCE

ABANDONED OR DEMOLISHED STORM DRAIN

0 60 120

1"=120'

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PROPOSED WATERSHED MAP

SOUTH COAST TECHNOLOGY CENTER

APRIL 2024

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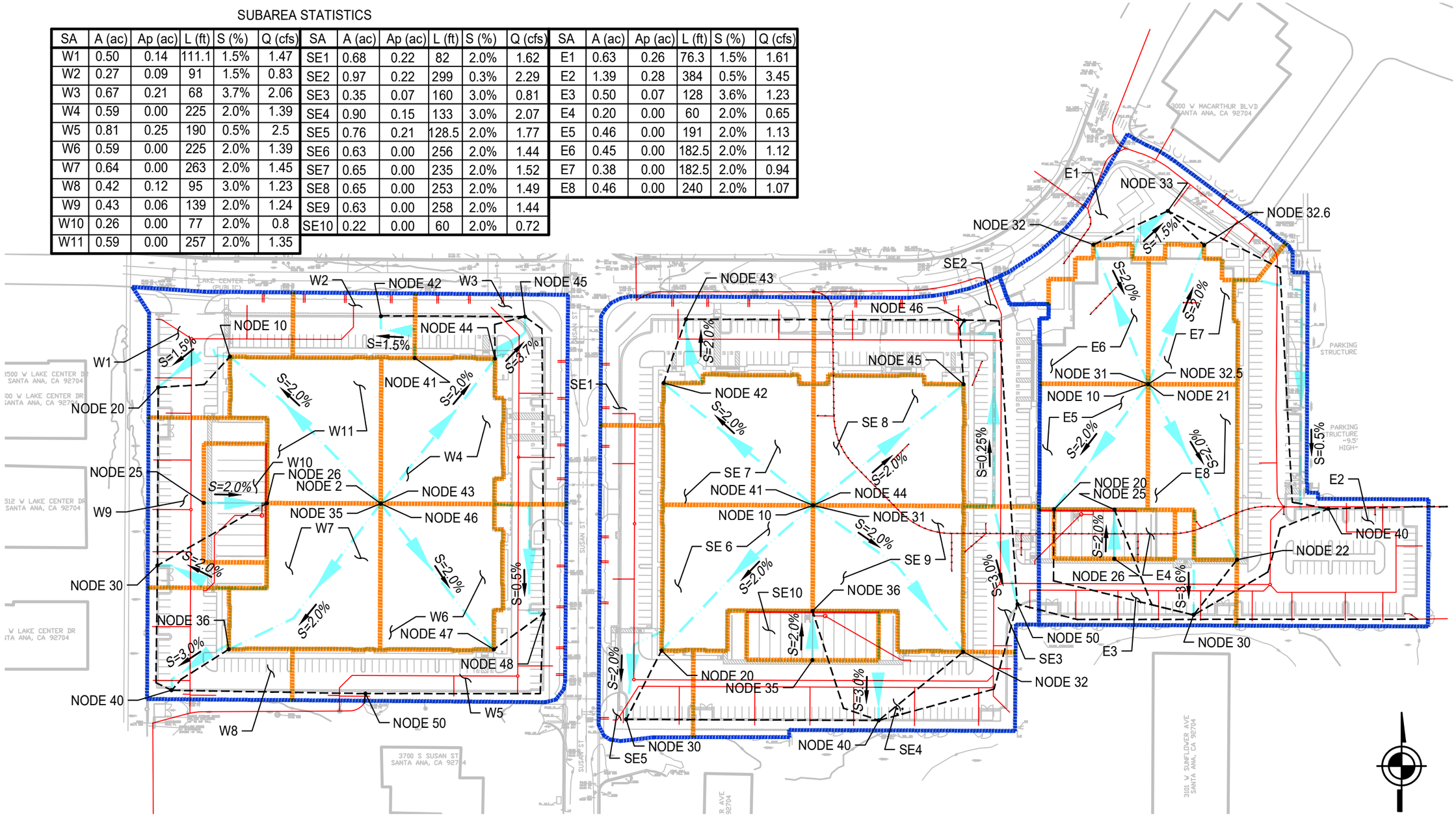
4/4/2024

SUBAREA STATISTICS

SA	A (ac)	Ap (ac)	L (ft)	S (%)	Q (cfs)
W1	0.50	0.14	111.1	1.5%	1.47
W2	0.27	0.09	91	1.5%	0.83
W3	0.67	0.21	68	3.7%	2.06
W4	0.59	0.00	225	2.0%	1.39
W5	0.81	0.25	190	0.5%	2.5
W6	0.59	0.00	225	2.0%	1.39
W7	0.64	0.00	263	2.0%	1.45
W8	0.42	0.12	95	3.0%	1.23
W9	0.43	0.06	139	2.0%	1.24
W10	0.26	0.00	77	2.0%	0.8
W11	0.59	0.00	257	2.0%	1.35

SA	A (ac)	Ap (ac)	L (ft)	S (%)	Q (cfs)
SE1	0.68	0.22	82	2.0%	1.62
SE2	0.97	0.22	299	0.3%	2.29
SE3	0.35	0.07	160	3.0%	0.81
SE4	0.90	0.15	133	3.0%	2.07
SE5	0.76	0.21	128.5	2.0%	1.77
SE6	0.63	0.00	256	2.0%	1.44
SE7	0.65	0.00	235	2.0%	1.52
SE8	0.65	0.00	253	2.0%	1.49
SE9	0.63	0.00	258	2.0%	1.44
SE10	0.22	0.00	60	2.0%	0.72

SA	A (ac)	Ap (ac)	L (ft)	S (%)	Q (cfs)
E1	0.63	0.26	76.3	1.5%	1.61
E2	1.39	0.28	384	0.5%	3.45
E3	0.50	0.07	128	3.6%	1.23
E4	0.20	0.00	60	2.0%	0.65
E5	0.46	0.00	191	2.0%	1.13
E6	0.45	0.00	182.5	2.0%	1.12
E7	0.38	0.00	182.5	2.0%	0.94
E8	0.46	0.00	240	2.0%	1.07



LEGEND:

SUBAREA BOUNDARY

WATERSHED BOUNDARY

HYDROLOGIC ROUTING PATH (SUBSEQUENT TO FLOW LINE)

FLOW LINE

STORM DRAIN CONVEYANCE

ABANDONED OR DEMOLISHED STORM DRAIN

0 60 120

1"=120'

INCLEDON CONSULTING GROUP
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NOTE:
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NOTE:
ROUTING NODES SHOWN HEREON MATCH NODES WITHIN CALCULATIONS. LARGER NODES ARE DOWNSTREAM OF SMALLER NODES.

PROPOSED HYDROLOGY PLAN

SOUTH COAST TECHNOLOGY CENTER

APRIL 2024

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APPENDIX C- LAND USE MAPS

City of Santa Ana Zoning Map

Revised Date: February 16, 2023

PROJECT LOCATION:
SOUTH COAST TECHNOLOGY CENTER DEVELOPMENT

ZONE: SPECIFIC DEVELOPMENT (SD)

0 ½ 1
Miles

ZONING DISTRICTS

A1	GENERAL AGRICULTURAL	
R1	SINGLE-FAMILY RESIDENCE	
R2	TWO-FAMILY RESIDENCE	
R3	MULTIPLE-FAMILY RESIDENCE	
R4	SUBURBAN APARTMENT	
RE	RESIDENTIAL ESTATE	
C1	COMMUNITY COMMERCIAL	
C2	GENERAL COMMERCIAL	
C4	PLANNED SHOPPING CENTER	
C5	ARTERIAL COMMERCIAL	
CR	COMMERCIAL RESIDENTIAL	
CSM	SOUTH MAIN STREET COMMERCIAL DISTRICT	
P	PROFESSIONAL	
GC	GOVERNMENT CENTER	
SD	SPECIFIC DEVELOPMENT	
M1	LIGHT INDUSTRIAL	
M2	HEAVY INDUSTRIAL	
O	OPEN SPACE LAND	
OZ1	METRO EAST MIXED USE OVERLAY ZONE	

SPECIFIC PLANS

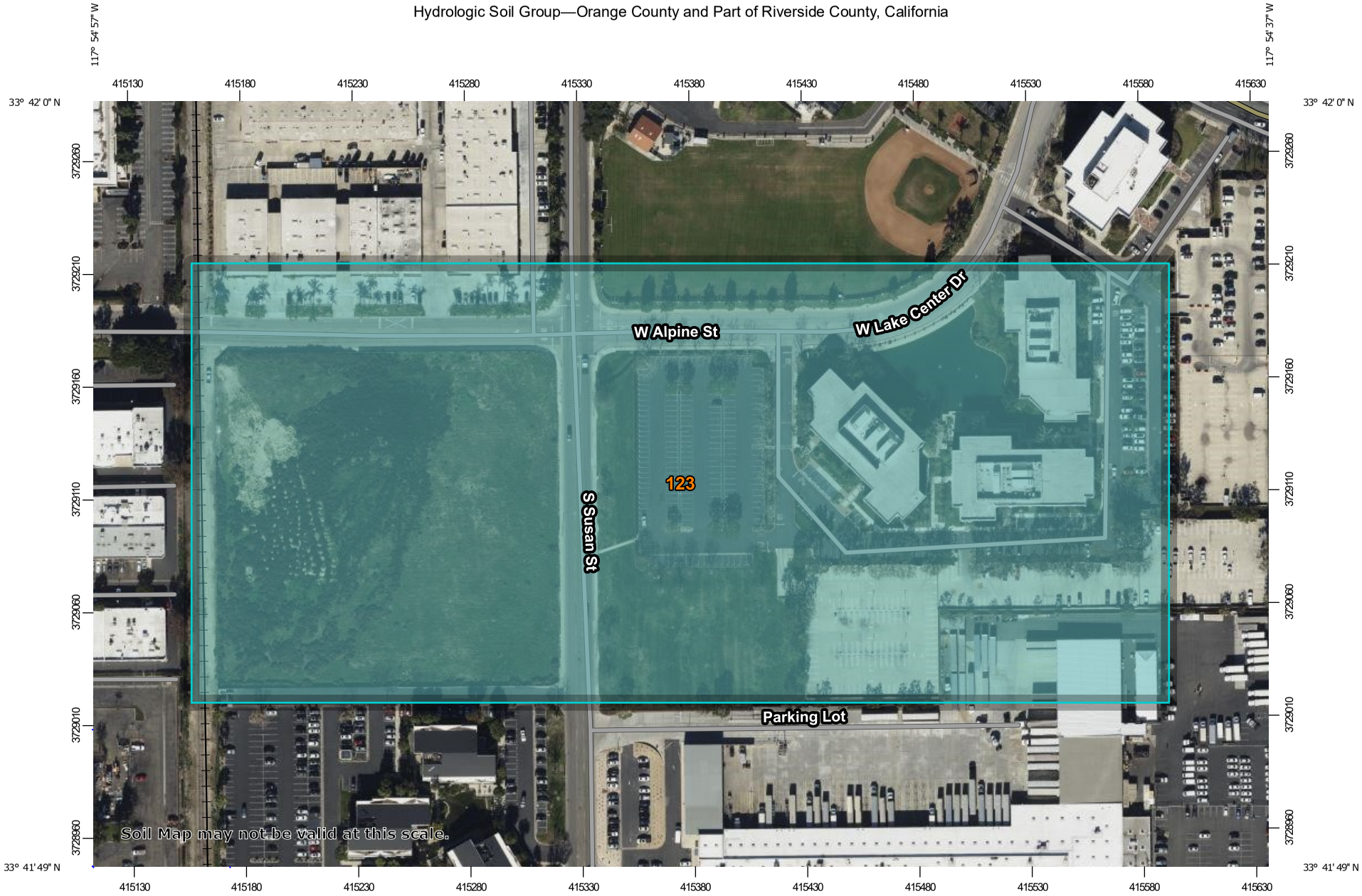
SP1	BRISTOL STREET CORRIDOR SPECIFIC PLAN
SP2	HARBOR MIXED USE TRANSIT CORRIDOR SPECIFIC PLAN
SP3	MIDTOWN SPECIFIC PLAN
SP4	MAINPLACE SPECIFIC PLAN

SUFFIXES

-B	PARKING MODIFICATION
-OZ1	METRO EAST MIXED USE OVERLAY ZONE
-OZ-M1/M2	TRANSIT ZONING CODE M1/M2 INDUSTRIAL OVERLAY ZONE
-PRD	PLANNED RESIDENTIAL DEVELOPMENT
-HDII	HEIGHT DISTRICT II
-MD	MUSEUM DISTRICT

Map Printed: December 5th, 2023

APPENDIX D- SOILS GROUP REPORT



Map Scale: 1:2,390 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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: Orange County and Part of Riverside County, California
Survey Area Data: Version 17, Aug 30, 2023

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

Date(s) aerial images were photographed: Jan 17, 2023—Feb 8, 2023

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
123	Bolsa silt loam, drained	C	21.0	100.0%
Totals for Area of Interest			**21.0**	**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.

Rating Options

Aggregation Method: Dominant Condition *Tie-break Rule:* Higher

Component Percent Cutoff: None Specified

APPENDIX E- RAINFALL INTENSITY REPORT

Note:
-Rainfall Intensity values were calculated from the AES values corresponding to the relative Time of Concentration.
-Time of Concentrations for durations less than 5-min are assumed to be 5-min.

NOAA Atlas 14, Volume 6, Version 2
Location name: Santa Ana, California, USA*
Latitude: 33.6987°, Longitude: -117.9118°
Elevation: 40 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**1.40** (1.18-1.68)	**1.85** (1.55-2.23)	**2.46** (2.05-2.98)	**2.98** (2.46-3.62)	**3.70** (2.95-4.68)	**4.28** (3.35-5.53)	**4.88** (3.72-6.49)	**5.54** (4.09-7.57)	**6.46** (4.56-9.23)	**7.20** (4.91-10.7)
10-min	**1.00** (0.840-1.21)	**1.33** (1.11-1.60)	**1.76** (1.47-2.13)	**2.13** (1.76-2.60)	**2.65** (2.12-3.35)	**3.07** (2.39-3.97)	**3.50** (2.67-4.65)	**3.97** (2.93-5.43)	**4.63** (3.27-6.62)	**5.16** (3.52-7.66)
15-min	**0.808** (0.680-0.976)	**1.07** (0.896-1.29)	**1.42** (1.19-1.72)	**1.72** (1.42-2.10)	**2.14** (1.71-2.70)	**2.47** (1.93-3.20)	**2.82** (2.15-3.75)	**3.20** (2.36-4.38)	**3.73** (2.64-5.34)	**4.16** (2.84-6.17)
30-min	**0.564** (0.472-0.678)	**0.744** (0.624-0.896)	**0.988** (0.826-1.19)	**1.19** (0.990-1.46)	**1.49** (1.19-1.88)	**1.72** (1.34-2.22)	**1.97** (1.50-2.61)	**2.23** (1.64-3.04)	**2.60** (1.83-3.71)	**2.89** (1.97-4.29)
60-min	**0.387** (0.325-0.466)	**0.511** (0.428-0.615)	**0.679** (0.568-0.821)	**0.821** (0.680-1.00)	**1.02** (0.816-1.29)	**1.18** (0.923-1.53)	**1.35** (1.03-1.79)	**1.53** (1.13-2.09)	**1.78** (1.26-2.55)	**1.99** (1.36-2.95)
2-hr	**0.277** (0.232-0.333)	**0.366** (0.307-0.441)	**0.487** (0.407-0.588)	**0.588** (0.487-0.717)	**0.732** (0.585-0.925)	**0.847** (0.662-1.10)	**0.969** (0.737-1.28)	**1.10** (0.812-1.50)	**1.28** (0.907-1.84)	**1.44** (0.977-2.13)
3-hr	**0.227** (0.191-0.274)	**0.300** (0.252-0.362)	**0.399** (0.333-0.482)	**0.482** (0.399-0.588)	**0.600** (0.479-0.758)	**0.694** (0.543-0.898)	**0.794** (0.605-1.05)	**0.902** (0.666-1.23)	**1.06** (0.745-1.51)	**1.18** (0.804-1.75)
6-hr	**0.159** (0.133-0.192)	**0.210** (0.176-0.253)	**0.278** (0.232-0.336)	**0.336** (0.278-0.409)	**0.417** (0.333-0.527)	**0.482** (0.376-0.623)	**0.551** (0.419-0.731)	**0.624** (0.461-0.854)	**0.729** (0.515-1.04)	**0.815** (0.555-1.21)
12-hr	**0.103** (0.087-0.124)	**0.136** (0.114-0.164)	**0.180** (0.150-0.218)	**0.217** (0.180-0.265)	**0.269** (0.215-0.341)	**0.311** (0.243-0.402)	**0.355** (0.270-0.472)	**0.402** (0.297-0.550)	**0.468** (0.331-0.669)	**0.521** (0.355-0.774)
24-hr	**0.068** (0.060-0.079)	**0.090** (0.079-0.104)	**0.119** (0.105-0.138)	**0.144** (0.126-0.168)	**0.179** (0.152-0.216)	**0.207** (0.172-0.255)	**0.237** (0.192-0.299)	**0.268** (0.211-0.347)	**0.312** (0.236-0.421)	**0.348** (0.255-0.486)
2-day	**0.042** (0.037-0.048)	**0.056** (0.049-0.064)	**0.074** (0.065-0.086)	**0.090** (0.079-0.105)	**0.112** (0.095-0.135)	**0.130** (0.108-0.160)	**0.148** (0.120-0.187)	**0.168** (0.132-0.218)	**0.196** (0.148-0.265)	**0.219** (0.160-0.305)
3-day	**0.031** (0.028-0.036)	**0.042** (0.037-0.048)	**0.056** (0.049-0.065)	**0.068** (0.060-0.080)	**0.085** (0.072-0.103)	**0.099** (0.082-0.122)	**0.113** (0.092-0.143)	**0.129** (0.101-0.167)	**0.150** (0.113-0.202)	**0.167** (0.122-0.234)
4-day	**0.025** (0.022-0.029)	**0.034** (0.030-0.039)	**0.046** (0.040-0.053)	**0.056** (0.049-0.065)	**0.070** (0.059-0.084)	**0.081** (0.067-0.100)	**0.093** (0.075-0.117)	**0.105** (0.083-0.137)	**0.123** (0.093-0.166)	**0.137** (0.100-0.192)
7-day	**0.016** (0.014-0.019)	**0.022** (0.019-0.025)	**0.030** (0.026-0.034)	**0.036** (0.032-0.042)	**0.046** (0.038-0.055)	**0.053** (0.044-0.065)	**0.061** (0.049-0.077)	**0.069** (0.055-0.090)	**0.081** (0.062-0.110)	**0.091** (0.067-0.127)
10-day	**0.012** (0.011-0.014)	**0.016** (0.014-0.019)	**0.022** (0.020-0.026)	**0.027** (0.024-0.032)	**0.034** (0.029-0.042)	**0.040** (0.033-0.050)	**0.046** (0.037-0.059)	**0.053** (0.042-0.069)	**0.062** (0.047-0.084)	**0.070** (0.051-0.098)
20-day	**0.007** (0.006-0.008)	**0.010** (0.009-0.011)	**0.013** (0.012-0.016)	**0.017** (0.014-0.019)	**0.021** (0.018-0.026)	**0.025** (0.020-0.031)	**0.029** (0.023-0.036)	**0.033** (0.026-0.043)	**0.039** (0.029-0.053)	**0.044** (0.032-0.062)
30-day	**0.005** (0.005-0.006)	**0.008** (0.007-0.009)	**0.010** (0.009-0.012)	**0.013** (0.011-0.015)	**0.017** (0.014-0.020)	**0.020** (0.016-0.024)	**0.023** (0.018-0.029)	**0.026** (0.021-0.034)	**0.031** (0.023-0.042)	**0.035** (0.026-0.049)
45-day	**0.004** (0.004-0.005)	**0.006** (0.005-0.007)	**0.008** (0.007-0.009)	**0.010** (0.009-0.012)	**0.013** (0.011-0.016)	**0.015** (0.013-0.019)	**0.018** (0.014-0.023)	**0.020** (0.016-0.027)	**0.024** (0.018-0.033)	**0.028** (0.020-0.039)
60-day	**0.004** (0.003-0.004)	**0.005** (0.004-0.006)	**0.007** (0.006-0.008)	**0.009** (0.008-0.010)	**0.011** (0.009-0.014)	**0.013** (0.011-0.016)	**0.015** (0.012-0.019)	**0.018** (0.014-0.023)	**0.021** (0.016-0.028)	**0.024** (0.017-0.033)

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

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

Please refer to NOAA Atlas 14 document for more information.

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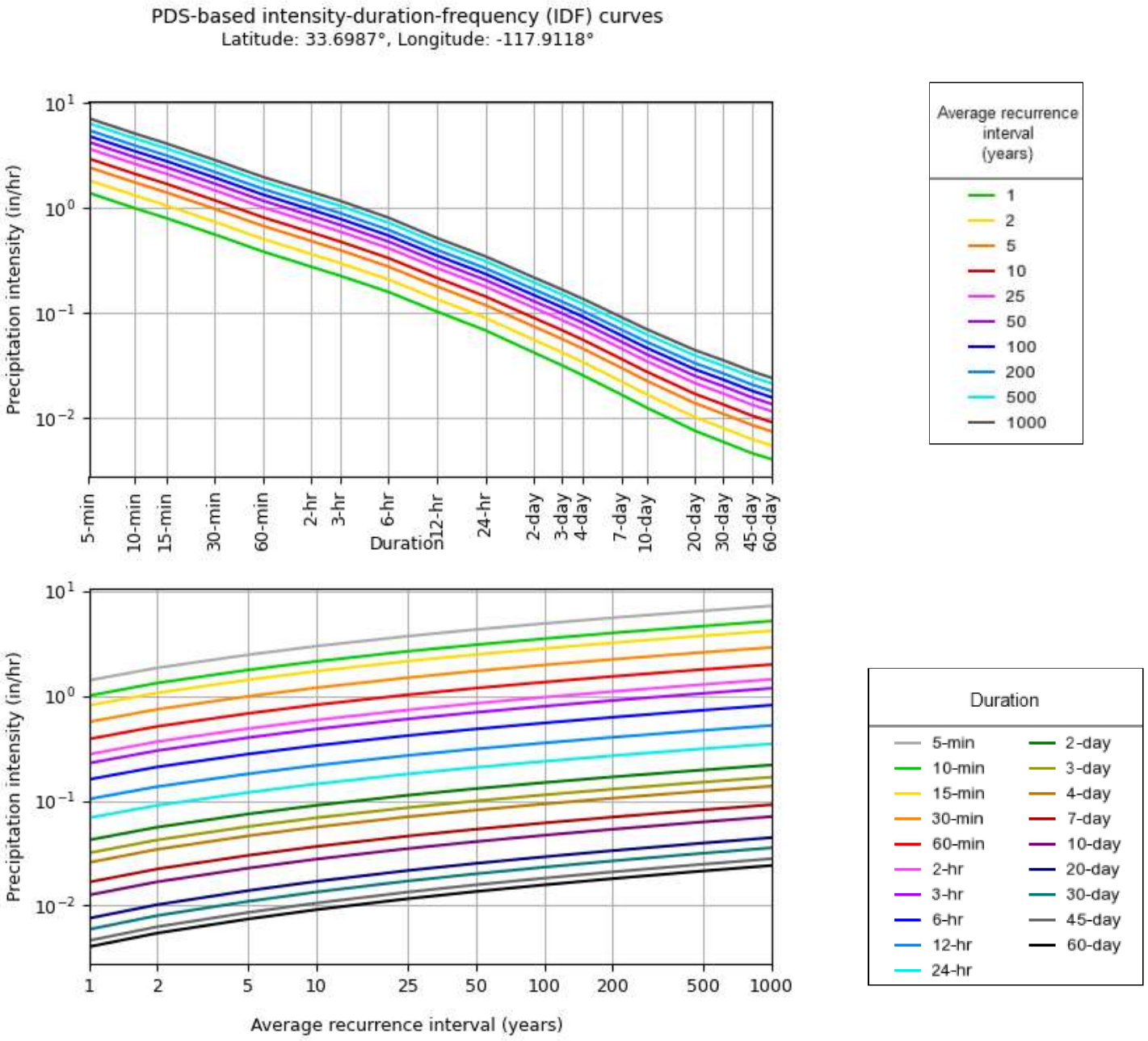
PF graphical



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Tue Dec 26 17:53:46 2023

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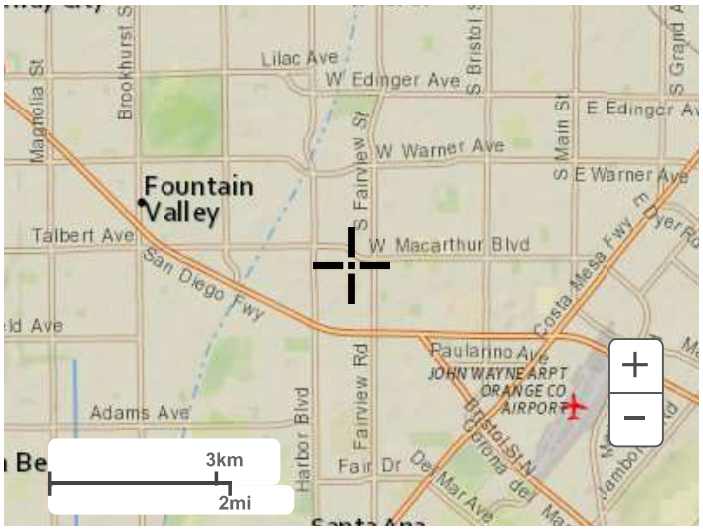
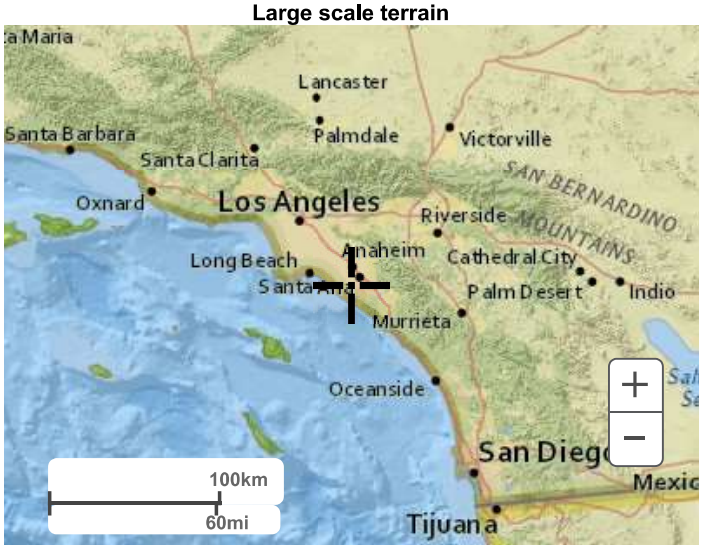
Maps & aerials

Small scale terrain

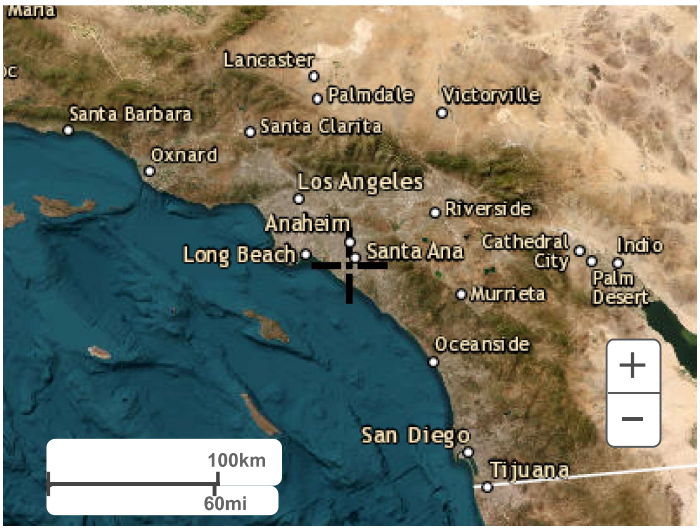


Large scale terrain



Large scale map

Large scale aerial



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

APPENDIX F- HYDROLOGY CALCULATIONS

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 21.0  Release Date: 06/01/2014  License ID 1624

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* 503.027 LAKE CENTER INDUSTRIAL COMPLEX                                *
* EXISTING 10-YEAR HYDRO STUDY                                          *
* SUBAREA W1                                                            *
 ************************************************************************

  FILE NAME: E10W1.DAT
  TIME/DATE OF STUDY: 15:55 12/29/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   449.00
  ELEVATION DATA: UPSTREAM(FEET) =     40.45  DOWNSTREAM(FEET) =     35.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.879
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.173
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   C        1.79      0.25     1.000    91   14.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.10
  TOTAL AREA(ACRES) =      1.79   PEAK FLOW RATE(CFS) =      3.10
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.8  TC(MIN.) =     14.88
  EFFECTIVE AREA(ACRES) =      1.79  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       3.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**********************************************************************
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                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* 503.027 LAKE CENTER INDUSTRIAL COMPLEX                                *
* EXISTING 10-YEAR HYDRO STUDY                                          *
* SUB AREA W2                                                           *
 ************************************************************************

  FILE NAME: E10W2.DAT
  TIME/DATE OF STUDY: 16:06 12/29/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   174.00
  ELEVATION DATA: UPSTREAM(FEET) =     40.50  DOWNSTREAM(FEET) =     36.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.748
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.946
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   C        1.03      0.25     1.000    91    8.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.50
  TOTAL AREA(ACRES) =      1.03   PEAK FLOW RATE(CFS) =      2.50
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.0  TC(MIN.) =      8.75
  EFFECTIVE AREA(ACRES) =      1.03  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       2.50
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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             Ver. 21.0  Release Date: 06/01/2014  License ID 1624

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* 503.027 LAKE CENTER INDUSTRIAL COMPLEX                                *
* EXISTING 10-YEAR HYDRO STUDY                                          *
* SUB AREA W3                                                           *
 ************************************************************************

  FILE NAME: E10W3.DAT
  TIME/DATE OF STUDY: 16:09 12/29/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =     40.00  DOWNSTREAM(FEET) =     33.93

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.077
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.717
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   C        2.99      0.25     1.000    91   10.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      6.64
  TOTAL AREA(ACRES) =      2.99   PEAK FLOW RATE(CFS) =      6.64
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.0  TC(MIN.) =     10.08
  EFFECTIVE AREA(ACRES) =      2.99  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       6.64
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
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                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* 503.027 LAKE CENTER INDUSTRIAL COMPLEX                                *
* EXISTING 10-YEAR HYDRO STUDY                                          *
* SUB AREA E1                                                           *
 ************************************************************************

  FILE NAME: E10E1.DAT
  TIME/DATE OF STUDY: 16:15 12/29/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   400.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.10  DOWNSTREAM(FEET) =     33.35

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.985
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.586
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     C        3.32      0.25      0.600    69   10.98
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      7.28
  TOTAL AREA(ACRES) =      3.32   PEAK FLOW RATE(CFS) =      7.28
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.3  TC(MIN.) =     10.98
  EFFECTIVE AREA(ACRES) =      3.32  AREA-AVERAGED Fm(INCH/HR)=  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.600
  PEAK FLOW RATE(CFS)   =       7.28
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**********************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2014 Advanced Engineering Software (aes)
             Ver. 21.0  Release Date: 06/01/2014  License ID 1624

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* 503.027 LAKE CENTER INDUSTRIAL COMPLEX                                *
* EXSITING 10-YEAR HYDRO STUDY                                          *
* SOUTHEAST OUTFALL                                                     *
 **********************************************************************

  FILE NAME: E10.DAT
  TIME/DATE OF STUDY: 15:43 12/29/2023
======================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
======================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    79.30
  ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     34.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  MOBILE HOME PARK           C        0.07      0.25     0.250    69    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.28      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    1.02
  EFFECTIVE AREA(ACRES) =      0.35   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.13
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       1.27

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.24      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.87
  EFFECTIVE AREA(ACRES) =      0.59   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.12
  TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       2.14

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.36      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.36      SUBAREA RUNOFF(CFS) =    1.31
  EFFECTIVE AREA(ACRES) =      0.95   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.11
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       3.45

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.83      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    3.01
  EFFECTIVE AREA(ACRES) =      1.78   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.11
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       6.46

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     70.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "WOODLAND"                 C        0.12      0.25     1.000    70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.41
```

```
  EFFECTIVE AREA(ACRES) =      1.90   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       6.87
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.9  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      1.90  AREA-AVERAGED Fm(INCH/HR)=  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.162
  PEAK FLOW RATE(CFS)   =       6.87
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 21.0  Release Date: 06/01/2014  License ID 1624

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* 503.027 LAKE CENTER INDUSTRIAL COMPLEX                                *
* EXISTING 10-YEAR HYDRO STUDY                                          *
* EAST OUTFALL                                                          *
 ************************************************************************

  FILE NAME: E10E.DAT
  TIME/DATE OF STUDY: 11:07 01/03/2024
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   125.50
  ELEVATION DATA: UPSTREAM(FEET) =     38.05  DOWNSTREAM(FEET) =     37.15

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.216
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.290
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.36      0.25     0.500    69    7.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.03
  TOTAL AREA(ACRES) =      0.36   PEAK FLOW RATE(CFS) =      1.03

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.22
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.290
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                C        1.07      0.25      0.350    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    3.08
  EFFECTIVE AREA(ACRES) =      1.43   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       4.11

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    89.50
  ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    498.21

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        0.47      0.25      0.100    69    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.71
  TOTAL AREA(ACRES) =      0.47   PEAK FLOW RATE(CFS) =      1.71

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     30.00 IS CODE =  11
```

```
------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
========================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.71    5.00    4.060  0.25( 0.03) 0.10       0.5      25.00
  LONGEST FLOWPATH FROM NODE     25.00 TO NODE     30.00 =      89.50 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.11    7.22    3.290  0.25( 0.10) 0.39       1.4      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     125.50 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.24    5.00    4.060  0.25( 0.07) 0.30       1.5      25.00
      2        5.49    7.22    3.290  0.25( 0.08) 0.32       1.9      10.00
    TOTAL AREA(ACRES) =         1.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        5.49  Tc(MIN.) =    7.216
  EFFECTIVE AREA(ACRES) =      1.90  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        1.9
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     125.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.22
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.290
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  MOBILE HOME PARK         C        0.42      0.25      0.250    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
  SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    1.22
  EFFECTIVE AREA(ACRES) =      2.32   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =        2.3       PEAK FLOW RATE(CFS) =       6.71

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.75    5.00    4.060  0.25( 0.07) 0.29       1.9      25.00
      2        6.71    7.22    3.290  0.25( 0.08) 0.30       2.3      10.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =       6.75  Tc(MIN.) =    5.00
  AREA-AVERAGED Fm(INCH/HR) =  0.07  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.29  EFFECTIVE AREA(ACRES) =       1.88

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    67.80
  ELEVATION DATA: UPSTREAM(FEET) =    501.00  DOWNSTREAM(FEET) =    499.64

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE             GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN  (MIN.)
  COMMERCIAL                C        0.44      0.25      0.100    69    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.60
  TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.60

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     40.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.60    5.00    4.060  0.25( 0.03) 0.10       0.4      35.00
  LONGEST FLOWPATH FROM NODE     35.00 TO NODE     40.00 =      67.80 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.75    5.00    4.060  0.25( 0.07) 0.29       1.9      25.00
      2        6.71    7.22    3.290  0.25( 0.08) 0.30       2.3      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     125.50 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.35    5.00    4.060  0.25( 0.06) 0.25       2.3      35.00
      2        8.35    5.00    4.060  0.25( 0.06) 0.25       2.3      25.00
      3        8.00    7.22    3.290  0.25( 0.07) 0.27       2.8      10.00
    TOTAL AREA(ACRES) =         2.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        8.35  Tc(MIN.) =    5.000
  EFFECTIVE AREA(ACRES) =      2.32  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =        2.8
```

```
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     125.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    30.00  DOWNSTREAM(FEET) =    29.58
 FLOW LENGTH(FEET) =   105.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.46
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.35
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    5.39
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     50.00 =     230.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    43.50
 ELEVATION DATA: UPSTREAM(FEET) =     38.05  DOWNSTREAM(FEET) =     37.26

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
```

```
  "8-10 DWELLINGS/ACRE"      C        0.11      0.25     0.400    69    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.39

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  MOBILE HOME PARK           C        0.47      0.25     0.250    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
  SUBAREA AREA(ACRES) =    0.47      SUBAREA RUNOFF(CFS) =    1.69
  EFFECTIVE AREA(ACRES) =      0.58   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       2.08

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     43.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     43.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     42.50 TO NODE     42.60 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.70
  ELEVATION DATA: UPSTREAM(FEET) =    502.00  DOWNSTREAM(FEET) =    500.59

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        0.47      0.25     0.100    69    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.71
  TOTAL AREA(ACRES) =      0.47   PEAK FLOW RATE(CFS) =      1.71

********************************************************************************
  FLOW PROCESS FROM NODE     42.60 TO NODE     43.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.71    5.00    4.060  0.25( 0.03) 0.10       0.5      42.50
  LONGEST FLOWPATH FROM NODE     42.50 TO NODE     43.00 =      70.70 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.08    5.00    4.060  0.25( 0.07) 0.28       0.6      41.00
  LONGEST FLOWPATH FROM NODE     41.00 TO NODE     43.00 =      43.50 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
      1        3.79    5.00    4.060  0.25( 0.05) 0.20       1.0      42.50
      2        3.79    5.00    4.060  0.25( 0.05) 0.20       1.0      41.00
    TOTAL AREA(ACRES) =         1.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        3.79  Tc(MIN.) =    5.000
  EFFECTIVE AREA(ACRES) =      1.05  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.0
  LONGEST FLOWPATH FROM NODE     42.50 TO NODE     43.00 =      70.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 C        0.82      0.25     0.200    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    2.96
  EFFECTIVE AREA(ACRES) =      1.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       6.75

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     44.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
```

```
==============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.75    5.00    4.060  0.25( 0.05) 0.20       1.9      42.50
      2        6.75    5.00    4.060  0.25( 0.05) 0.20       1.9      41.00
  LONGEST FLOWPATH FROM NODE     42.50 TO NODE     50.00 =      70.70 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.35    5.39    3.888  0.25( 0.06) 0.25       2.3      35.00
      2        8.35    5.39    3.888  0.25( 0.06) 0.25       2.3      25.00
      3        8.00    7.61    3.191  0.25( 0.07) 0.27       2.8      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     50.00 =     230.50 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       14.84    5.00    4.060  0.25( 0.06) 0.23       4.0      42.50
      2       14.84    5.00    4.060  0.25( 0.06) 0.23       4.0      41.00
      3       14.81    5.39    3.888  0.25( 0.06) 0.23       4.2      35.00
      4       14.81    5.39    3.888  0.25( 0.06) 0.23       4.2      25.00
      5       13.29    7.61    3.191  0.25( 0.06) 0.24       4.6      10.00
    TOTAL AREA(ACRES) =         4.6

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       14.84  Tc(MIN.) =    5.000
  EFFECTIVE AREA(ACRES) =      4.02  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =        4.6
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     50.00 =     230.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     46.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    64.60
  ELEVATION DATA: UPSTREAM(FEET) =     37.50  DOWNSTREAM(FEET) =     35.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.04      0.25      0.400    69    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.04   PEAK FLOW RATE(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        0.14    5.00    4.060  0.25( 0.10) 0.40        0.0       45.00
```

```
 LONGEST FLOWPATH FROM NODE     45.00 TO NODE     50.00 =      64.60 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       14.84    5.00    4.060  0.25( 0.06) 0.23        4.0       42.50
     2       14.84    5.00    4.060  0.25( 0.06) 0.23        4.0       41.00
     3       14.81    5.39    3.888  0.25( 0.06) 0.23        4.2       35.00
     4       14.81    5.39    3.888  0.25( 0.06) 0.23        4.2       25.00
     5       13.29    7.61    3.191  0.25( 0.06) 0.24        4.6       10.00
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     50.00 =     230.50 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       14.98    5.00    4.060  0.25( 0.06) 0.23        4.1       45.00
     2       14.98    5.00    4.060  0.25( 0.06) 0.23        4.1       42.50
     3       14.98    5.00    4.060  0.25( 0.06) 0.23        4.1       41.00
     4       14.94    5.39    3.888  0.25( 0.06) 0.23        4.2       35.00
     5       14.94    5.39    3.888  0.25( 0.06) 0.23        4.2       25.00
     6       13.40    7.61    3.191  0.25( 0.06) 0.24        4.7       10.00
   TOTAL AREA(ACRES) =         4.7

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       14.98  Tc(MIN.) =    5.000
 EFFECTIVE AREA(ACRES) =      4.06  AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =        4.7
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     50.00 =     230.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN
  NATURAL GOOD COVER
  "WOODLAND"                C        0.09      0.25     1.000    70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.31
  EFFECTIVE AREA(ACRES) =      4.15   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      14.98
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.8  TC(MIN.) =      5.00
  EFFECTIVE AREA(ACRES) =      4.15  AREA-AVERAGED Fm(INCH/HR)=  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.245
  PEAK FLOW RATE(CFS)   =      14.98

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1       14.98    5.00    4.060  0.25( 0.06) 0.24       4.2      45.00
      2       14.98    5.00    4.060  0.25( 0.06) 0.24       4.2      42.50
      3       14.98    5.00    4.060  0.25( 0.06) 0.24       4.2      41.00
      4       14.94    5.39    3.888  0.25( 0.06) 0.25       4.3      35.00
      5       14.94    5.39    3.888  0.25( 0.06) 0.25       4.3      25.00
      6       13.40    7.61    3.191  0.25( 0.06) 0.26       4.8      10.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____________________________________________________________________________
*****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2014 Advanced Engineering Software (aes)
              Ver. 21.0  Release Date: 06/01/2014  License ID 1624

                            Analysis prepared by:
```

```
 ************************** DESCRIPTION OF STUDY **************************
* 503.027 LAKE CENTER INDUSTRIAL COMPLEX                                  *
* EXISTING 10-YEAR HYDRO STUDY                                            *
* LAKE OUTFALL                                                            *
 *************************************************************************

  FILE NAME: E10L.DAT
  TIME/DATE OF STUDY: 10:05 01/03/2024
=============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.05  DOWNSTREAM(FEET) =     36.95

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.259
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.944
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "2 DWELLINGS/ACRE"         C        0.47      0.25     0.700    69    5.26
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA RUNOFF(CFS) =      1.59
  TOTAL AREA(ACRES) =      0.47   PEAK FLOW RATE(CFS) =      1.59

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.26
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.944
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 C        0.45      0.25      0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    1.51
  EFFECTIVE AREA(ACRES) =      0.92   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.77
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       3.11
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.9  TC(MIN.) =      5.26
  EFFECTIVE AREA(ACRES) =      0.92  AREA-AVERAGED Fm(INCH/HR)=  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.773
  PEAK FLOW RATE(CFS)   =       3.11
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2014 Advanced Engineering Software (aes)
             Ver. 21.0  Release Date: 06/01/2014  License ID 1624

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* 503.027 LAKE CENTER INDUSTRIAL COMPLEX                                *
* PROPOSED 10-YAR HYDRO STUDY                                           *
* WATERSHED W1                                                          *
 ************************************************************************

  FILE NAME: P10W.DAT
  TIME/DATE OF STUDY: 17:51 01/08/2024
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   111.10
  ELEVATION DATA: UPSTREAM(FEET) =     37.25  DOWNSTREAM(FEET) =     35.58

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.674
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.441
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "2 DWELLINGS/ACRE"         C        0.50      0.25     0.700    69    6.67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA RUNOFF(CFS) =      1.47
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.47

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.67
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.441
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.43      0.25      0.900    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    0.43      SUBAREA RUNOFF(CFS) =    1.24
  EFFECTIVE AREA(ACRES) =      0.93   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.79
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       2.71

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  ELEVATION DATA: UPSTREAM(FEET) =     37.25  DOWNSTREAM(FEET) =     35.71

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.052
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.639
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.26      0.25      0.900    69    6.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.26   PEAK FLOW RATE(CFS) =      0.80
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     30.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        0.80    6.05    3.639  0.25( 0.22) 0.90       0.3      25.00
 LONGEST FLOWPATH FROM NODE     25.00 TO NODE     30.00 =      77.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.71    6.67    3.441  0.25( 0.20) 0.79       0.9      10.00
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     111.10 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.41    6.05    3.639  0.25( 0.20) 0.82       1.1      25.00
     2        3.47    6.67    3.441  0.25( 0.20) 0.82       1.2      10.00
   TOTAL AREA(ACRES) =         1.2

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        3.47  Tc(MIN.) =    6.674
 EFFECTIVE AREA(ACRES) =      1.19  AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.82
 TOTAL AREA(ACRES) =        1.2
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     111.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

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

```
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  13
----------------------------------------------------------------------------
 >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      2.00 TO NODE     10.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   257.00
 ELEVATION DATA: UPSTREAM(FEET) =     37.25  DOWNSTREAM(FEET) =     32.11

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.802
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.760
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 ".4 DWELLING/ACRE"         C        0.59      0.25     0.900    69    9.80
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA RUNOFF(CFS) =      1.35
 TOTAL AREA(ACRES) =      0.59   PEAK FLOW RATE(CFS) =      1.35

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        1.35    9.80    2.760  0.25( 0.22) 0.90       0.6       2.00
 LONGEST FLOWPATH FROM NODE      2.00 TO NODE     10.00 =     257.00 FEET.
```

```
 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.41    6.05    3.639  0.25( 0.20) 0.82       1.1      25.00
     2        3.47    6.67    3.441  0.25( 0.20) 0.82       1.2      10.00
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     10.00 =     111.10 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        4.53    6.05    3.639  0.25( 0.21) 0.84       1.5      25.00
     2        4.63    6.67    3.441  0.25( 0.21) 0.84       1.6      10.00
     3        4.08    9.80    2.760  0.25( 0.21) 0.84       1.8       2.00
   TOTAL AREA(ACRES) =         1.8

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        4.63  Tc(MIN.) =    6.674
 EFFECTIVE AREA(ACRES) =      1.59  AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.84
 TOTAL AREA(ACRES) =        1.8
 LONGEST FLOWPATH FROM NODE      2.00 TO NODE     10.00 =     257.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.67
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.441
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "2 DWELLINGS/ACRE"         C        0.42      0.25     0.700    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
 SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    1.23
 EFFECTIVE AREA(ACRES) =      2.01   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.81
```

```
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       5.86

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   263.00
  ELEVATION DATA: UPSTREAM(FEET) =     37.25  DOWNSTREAM(FEET) =     31.99

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.746
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.64      0.25     0.900    69    9.89
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
```

```
  SUBAREA RUNOFF(CFS) =      1.45
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      1.45

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     40.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.45    9.89    2.746  0.25( 0.22) 0.90       0.6      35.00
  LONGEST FLOWPATH FROM NODE     35.00 TO NODE     40.00 =     263.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.84    6.05    3.639  0.25( 0.20) 0.81       1.9      25.00
      2        5.86    6.67    3.441  0.25( 0.20) 0.81       2.0      10.00
      3        5.06    9.80    2.760  0.25( 0.20) 0.82       2.2       2.00
  LONGEST FLOWPATH FROM NODE      2.00 TO NODE     40.00 =     257.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        7.04    6.05    3.639  0.25( 0.21) 0.82       2.3      25.00
      2        7.11    6.67    3.441  0.25( 0.21) 0.82       2.4      10.00
      3        6.51    9.80    2.760  0.25( 0.21) 0.84       2.8       2.00
      4        6.48    9.89    2.746  0.25( 0.21) 0.84       2.8      35.00
    TOTAL AREA(ACRES) =        2.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.11  Tc(MIN.) =    6.674
  EFFECTIVE AREA(ACRES) =     2.44  AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       2.8
  LONGEST FLOWPATH FROM NODE     35.00 TO NODE     40.00 =     263.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.91
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.11
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =    7.45
  LONGEST FLOWPATH FROM NODE     35.00 TO NODE     50.00 =     493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    91.00
  ELEVATION DATA: UPSTREAM(FEET) =     37.25  DOWNSTREAM(FEET) =     35.89

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.169
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.599
```

```
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "2 DWELLINGS/ACRE"         C        0.27      0.25     0.700    69    6.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA RUNOFF(CFS) =      0.83
  TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      0.83

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     45.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.599
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "2 DWELLINGS/ACRE"         C        0.67      0.25     0.700    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    2.06
  EFFECTIVE AREA(ACRES) =      0.94   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.70
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       2.90

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   225.00
  ELEVATION DATA: UPSTREAM(FEET) =     37.25  DOWNSTREAM(FEET) =     32.75

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.294
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.846
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.59      0.25     0.900    69    9.29
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      1.39
  TOTAL AREA(ACRES) =      0.59   PEAK FLOW RATE(CFS) =      1.39

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.39    9.29    2.846  0.25( 0.22) 0.90       0.6      43.00
  LONGEST FLOWPATH FROM NODE     43.00 TO NODE     45.00 =     225.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.90    6.17    3.599  0.25( 0.17) 0.70       0.9      41.00
  LONGEST FLOWPATH FROM NODE     41.00 TO NODE     45.00 =      91.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
      1        4.09    6.17    3.599  0.25( 0.19) 0.76       1.3      41.00
      2        3.65    9.29    2.846  0.25( 0.19) 0.78       1.5      43.00
    TOTAL AREA(ACRES) =         1.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        4.09  Tc(MIN.) =    6.169
  EFFECTIVE AREA(ACRES) =      1.33  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.78
  TOTAL AREA(ACRES) =        1.5
  LONGEST FLOWPATH FROM NODE     43.00 TO NODE     45.00 =     225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     48.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.599
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "2 DWELLINGS/ACRE"          C        0.81      0.25     0.700    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =    0.81      SUBAREA RUNOFF(CFS) =    2.50
  EFFECTIVE AREA(ACRES) =      2.14   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =        2.3       PEAK FLOW RATE(CFS) =       6.58

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
----------------------------------------------------------------------------
```

```
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     47.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   225.00
  ELEVATION DATA: UPSTREAM(FEET) =     37.25  DOWNSTREAM(FEET) =     32.75

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.294
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.846
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.59      0.25     0.900    69    9.29
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      1.39
  TOTAL AREA(ACRES) =      0.59   PEAK FLOW RATE(CFS) =      1.39

********************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.39    9.29    2.846  0.25( 0.22) 0.90       0.6      46.00
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     48.00 =     225.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        6.58    6.17    3.599  0.25( 0.18) 0.74       2.1      41.00
    2        5.60    9.29    2.846  0.25( 0.19) 0.75       2.3      43.00
  LONGEST FLOWPATH FROM NODE     43.00 TO NODE     48.00 =     225.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        7.77    6.17    3.599  0.25( 0.19) 0.76       2.5      41.00
    2        6.99    9.29    2.846  0.25( 0.20) 0.78       2.9      46.00
    3        6.99    9.29    2.846  0.25( 0.20) 0.78       2.9      43.00
    TOTAL AREA(ACRES) =         2.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        7.77  Tc(MIN.) =    6.169
  EFFECTIVE AREA(ACRES) =      2.53  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.78
  TOTAL AREA(ACRES) =        2.9
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     48.00 =     225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   310.74   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.14
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.77
  PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =    7.18
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     50.00 =     535.74 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
```

```
==============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1        7.77    7.18    3.300  0.25( 0.19) 0.76        2.5      41.00
      2        6.99   10.35    2.675  0.25( 0.20) 0.78        2.9      46.00
      3        6.99   10.35    2.675  0.25( 0.20) 0.78        2.9      43.00
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     50.00 =     535.74 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1        7.04    6.83    3.394  0.25( 0.21) 0.82        2.3      25.00
      2        7.11    7.45    3.229  0.25( 0.21) 0.82        2.4      10.00
      3        6.51   10.59    2.640  0.25( 0.21) 0.84        2.8       2.00
      4        6.48   10.68    2.628  0.25( 0.21) 0.84        2.8      35.00
  LONGEST FLOWPATH FROM NODE     35.00 TO NODE     50.00 =     493.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1       14.67    6.83    3.394  0.25( 0.20) 0.79        4.7      25.00
      2       14.85    7.18    3.300  0.25( 0.20) 0.79        4.9      41.00
      3       14.82    7.45    3.229  0.25( 0.20) 0.79        5.0      10.00
      4       13.54   10.35    2.675  0.25( 0.20) 0.81        5.7      46.00
      5       13.54   10.35    2.675  0.25( 0.20) 0.81        5.7      43.00
      6       13.40   10.59    2.640  0.25( 0.20) 0.81        5.8       2.00
      7       13.34   10.68    2.628  0.25( 0.20) 0.81        5.8      35.00
    TOTAL AREA(ACRES) =         5.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       14.85  Tc(MIN.) =    7.176
  EFFECTIVE AREA(ACRES) =      4.90  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.79
  TOTAL AREA(ACRES) =        5.8
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     50.00 =     535.74 FEET.
==============================================================================
  END OF STUDY SUMMARY:
```

```
  TOTAL AREA(ACRES)     =        5.8  TC(MIN.) =      7.18
  EFFECTIVE AREA(ACRES) =       4.90  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.792
  PEAK FLOW RATE(CFS)   =      14.85

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       14.67    6.83    3.394  0.25( 0.20) 0.79       4.7      25.00
      2       14.85    7.18    3.300  0.25( 0.20) 0.79       4.9      41.00
      3       14.82    7.45    3.229  0.25( 0.20) 0.79       5.0      10.00
      4       13.54   10.35    2.675  0.25( 0.20) 0.81       5.7      46.00
      5       13.54   10.35    2.675  0.25( 0.20) 0.81       5.7      43.00
      6       13.40   10.59    2.640  0.25( 0.20) 0.81       5.8       2.00
      7       13.34   10.68    2.628  0.25( 0.20) 0.81       5.8      35.00
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____________________________________________________________________________
*****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2014 Advanced Engineering Software (aes)
              Ver. 21.0  Release Date: 06/01/2014  License ID 1624

                            Analysis prepared by:
```

```
 ************************** DESCRIPTION OF STUDY **************************
* 503.027 LAKE CENTER INDUSTRIAL COMPLEX                                  *
* PROPOSED 10-YEAR HYDRO STUDY                                            *
* WATERSHED SE (TO GBC)                                                   *
 *************************************************************************

  FILE NAME: P10SE.DAT
  TIME/DATE OF STUDY: 09:59 01/09/2024
=============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=============================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   256.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.75  DOWNSTREAM(FEET) =     33.63

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.786
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.63      0.25     0.900    69    9.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      1.44
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.44

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "2 DWELLINGS/ACRE"          C        0.76      0.25      0.700    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =    0.76      SUBAREA RUNOFF(CFS) =    1.77
  EFFECTIVE AREA(ACRES) =      1.39   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.79
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       3.21

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 C        0.90      0.25      0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.07
  EFFECTIVE AREA(ACRES) =      2.29   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =        2.3       PEAK FLOW RATE(CFS) =       5.27

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   258.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.75  DOWNSTREAM(FEET) =     33.59

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.817
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.758
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.63      0.25      0.900    69    9.82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      1.44
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.44

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     40.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.44    9.82    2.758  0.25( 0.22) 0.90       0.6      31.00
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     40.00 =     258.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.27    9.79    2.763  0.25( 0.20) 0.81       2.3      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     256.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
      1        6.71    9.79    2.763  0.25( 0.21) 0.83       2.9      10.00
      2        6.70    9.82    2.758  0.25( 0.21) 0.83       2.9      31.00
    TOTAL AREA(ACRES) =         2.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        6.71  Tc(MIN.) =    9.786
  EFFECTIVE AREA(ACRES) =      2.92  AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.83
  TOTAL AREA(ACRES) =        2.9
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     40.00 =     258.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.75  DOWNSTREAM(FEET) =     37.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.478
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.853
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
```

```
  ".4 DWELLING/ACRE"          C        0.22      0.25     0.900    69    5.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.22   PEAK FLOW RATE(CFS) =      0.72

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     40.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        0.72    5.48    3.853  0.25( 0.22) 0.90       0.2      35.00
  LONGEST FLOWPATH FROM NODE     35.00 TO NODE     40.00 =      60.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.71    9.79    2.763  0.25( 0.21) 0.83       2.9      10.00
      2        6.70    9.82    2.758  0.25( 0.21) 0.83       2.9      31.00
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     40.00 =     258.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.08    5.48    3.853  0.25( 0.21) 0.84       1.9      35.00
      2        7.21    9.79    2.763  0.25( 0.21) 0.84       3.1      10.00
      3        7.20    9.82    2.758  0.25( 0.21) 0.84       3.1      31.00
    TOTAL AREA(ACRES) =         3.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        7.21  Tc(MIN.) =    9.786
  EFFECTIVE AREA(ACRES) =      3.14  AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =        3.1
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     40.00 =     258.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          C        0.35      0.25     0.800    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    0.35      SUBAREA RUNOFF(CFS) =    0.81
  EFFECTIVE AREA(ACRES) =      3.49   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.83
  TOTAL AREA(ACRES) =        3.5       PEAK FLOW RATE(CFS) =       8.02

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   235.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.75  DOWNSTREAM(FEET) =     34.05

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.457
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.818
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.65      0.25      0.900    69    9.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      1.52
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.52

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.46
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.818
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "2 DWELLINGS/ACRE"          C        0.68      0.25      0.700    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    1.62
  EFFECTIVE AREA(ACRES) =      1.33   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       3.13

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.46
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.818
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  "1 DWELLING/ACRE"          C        0.97      0.25     0.800    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    2.29
  EFFECTIVE AREA(ACRES) =      2.30   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        2.3       PEAK FLOW RATE(CFS) =       5.42

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   253.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.75  DOWNSTREAM(FEET) =     33.69

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.740
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.770
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"           C        0.65      0.25     0.900    69    9.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      1.49
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.49

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     46.00 IS CODE =  11
----------------------------------------------------------------------------
```

```
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.49    9.74    2.770  0.25( 0.22) 0.90       0.6      44.00
  LONGEST FLOWPATH FROM NODE     44.00 TO NODE     46.00 =     253.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.42    9.46    2.818  0.25( 0.20) 0.80       2.3      41.00
  LONGEST FLOWPATH FROM NODE     41.00 TO NODE     46.00 =     235.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.89    9.46    2.818  0.25( 0.21) 0.82       2.9      41.00
      2        6.81    9.74    2.770  0.25( 0.21) 0.82       2.9      44.00
    TOTAL AREA(ACRES) =         2.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        6.89  Tc(MIN.) =    9.457
  EFFECTIVE AREA(ACRES) =      2.93  AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.82
  TOTAL AREA(ACRES) =        2.9
  LONGEST FLOWPATH FROM NODE     44.00 TO NODE     46.00 =     253.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.89    9.46    2.818  0.25( 0.21) 0.82       2.9      41.00
```

```
    2        6.81    9.74    2.770  0.25( 0.21) 0.82       2.9      44.00
 LONGEST FLOWPATH FROM NODE     44.00 TO NODE     50.00 =     253.00 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        7.23    5.48    3.853  0.25( 0.21) 0.83       2.2      35.00
     2        8.02    9.79    2.763  0.25( 0.21) 0.83       3.5      10.00
     3        8.01    9.82    2.758  0.25( 0.21) 0.83       3.5      31.00
 LONGEST FLOWPATH FROM NODE     31.00 TO NODE     50.00 =     258.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       12.80    5.48    3.853  0.25( 0.21) 0.83       3.9      35.00
     2       14.85    9.46    2.818  0.25( 0.21) 0.83       6.3      41.00
     3       14.82    9.74    2.770  0.25( 0.21) 0.83       6.4      44.00
     4       14.81    9.79    2.763  0.25( 0.21) 0.83       6.4      10.00
     5       14.79    9.82    2.758  0.25( 0.21) 0.83       6.4      31.00
   TOTAL AREA(ACRES) =         6.4

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       14.85  Tc(MIN.) =    9.457
 EFFECTIVE AREA(ACRES) =      6.32  AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.83
 TOTAL AREA(ACRES) =        6.4
 LONGEST FLOWPATH FROM NODE     31.00 TO NODE     50.00 =     258.00 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        6.4  TC(MIN.) =      9.46
 EFFECTIVE AREA(ACRES) =      6.32  AREA-AVERAGED Fm(INCH/HR)=  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.827
 PEAK FLOW RATE(CFS)   =      14.85

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       12.80    5.48    3.853  0.25( 0.21) 0.83       3.9      35.00
     2       14.85    9.46    2.818  0.25( 0.21) 0.83       6.3      41.00
```

3	14.82	9.74	2.770	0.25(0.21)	0.83	6.4	44.00
4	14.81	9.79	2.763	0.25(0.21)	0.83	6.4	10.00
5	14.79	9.82	2.758	0.25(0.21)	0.83	6.4	31.00

END OF RATIONAL METHOD ANALYSIS

```
_____________________________________________________________________________
*****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2014 Advanced Engineering Software (aes)
              Ver. 21.0  Release Date: 06/01/2014  License ID 1624

                            Analysis prepared by:
```

```
 ************************** DESCRIPTION OF STUDY **************************
* 503.027 LAKE CENTER INDUSTRIAL COMPLEX                                  *
* PROPOSED 10-YEAR HYDRO STUDY                                            *
* WATERSHED E (TO GBC)                                                    *
 *************************************************************************

  FILE NAME: P10E.DAT
  TIME/DATE OF STUDY: 10:26 01/09/2024
=============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=============================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   191.00
  ELEVATION DATA: UPSTREAM(FEET) =     39.00  DOWNSTREAM(FEET) =     35.18

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.704
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.46      0.25     0.900    69    8.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      1.13
  TOTAL AREA(ACRES) =      0.46   PEAK FLOW RATE(CFS) =      1.13

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.70
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.50      0.25      0.900    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.23
  EFFECTIVE AREA(ACRES) =      0.96   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       2.36

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   240.00
  ELEVATION DATA: UPSTREAM(FEET) =     39.00  DOWNSTREAM(FEET) =     34.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.537
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.804
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.46      0.25      0.900    69    9.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      1.07
  TOTAL AREA(ACRES) =      0.46   PEAK FLOW RATE(CFS) =      1.07
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     30.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.07    9.54    2.804  0.25( 0.22) 0.90       0.5      21.00
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     30.00 =     240.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.36    8.70    2.955  0.25( 0.22) 0.90       1.0      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     191.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        3.39    8.70    2.955  0.25( 0.22) 0.90       1.4      10.00
      2        3.30    9.54    2.804  0.25( 0.22) 0.90       1.4      21.00
    TOTAL AREA(ACRES) =         1.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        3.39  Tc(MIN.) =    8.704
  EFFECTIVE AREA(ACRES) =      1.38  AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        1.4
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     30.00 =     240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

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

```
 FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
 ELEVATION DATA: UPSTREAM(FEET) =     39.00  DOWNSTREAM(FEET) =     37.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.478
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.853
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 ".4 DWELLING/ACRE"         C        0.20      0.25     0.900    69    5.48
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA RUNOFF(CFS) =      0.65
 TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.65

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     30.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        0.65    5.48    3.853  0.25( 0.22) 0.90       0.2      25.00
 LONGEST FLOWPATH FROM NODE     25.00 TO NODE     30.00 =      60.00 FEET.
```

```
 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.39    8.70    2.955  0.25( 0.22) 0.90       1.4      10.00
     2        3.30    9.54    2.804  0.25( 0.22) 0.90       1.4      21.00
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     30.00 =     240.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.49    5.48    3.853  0.25( 0.22) 0.90       1.1      25.00
     2        3.88    8.70    2.955  0.25( 0.22) 0.90       1.6      10.00
     3        3.76    9.54    2.804  0.25( 0.22) 0.90       1.6      21.00
   TOTAL AREA(ACRES) =         1.6

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        3.88  Tc(MIN.) =    8.704
 EFFECTIVE AREA(ACRES) =      1.58  AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.90
 TOTAL AREA(ACRES) =        1.6
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     30.00 =     240.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.70
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "1 DWELLING/ACRE"          C        1.39      0.25     0.800    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 SUBAREA AREA(ACRES) =    1.39      SUBAREA RUNOFF(CFS) =    3.45
 EFFECTIVE AREA(ACRES) =      2.97   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.85
```

```
 TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       7.33

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        8.06    5.48    3.853  0.25( 0.21) 0.84       2.5      25.00
     2        7.33    8.70    2.955  0.25( 0.21) 0.85       3.0      10.00
     3        7.02    9.54    2.804  0.25( 0.21) 0.85       3.0      21.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       8.06  Tc(MIN.) =    5.48
 AREA-AVERAGED Fm(INCH/HR) =  0.21  AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.84  EFFECTIVE AREA(ACRES) =       2.46

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   182.50
 ELEVATION DATA: UPSTREAM(FEET) =     39.00  DOWNSTREAM(FEET) =     35.35

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.547
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.986
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 ".4 DWELLING/ACRE"         C        0.45      0.25     0.900    69    8.55
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA RUNOFF(CFS) =      1.12
```

```
  TOTAL AREA(ACRES) =      0.45   PEAK FLOW RATE(CFS) =      1.12

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.55
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.986
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.63      0.25     0.600    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    0.63      SUBAREA RUNOFF(CFS) =    1.61
  EFFECTIVE AREA(ACRES) =      1.08   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =       2.73

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     32.50 TO NODE     32.60 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   182.50
  ELEVATION DATA: UPSTREAM(FEET) =     39.00  DOWNSTREAM(FEET) =     35.35

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.547
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.986
```

```
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 ".4 DWELLING/ACRE"          C        0.38      0.25      0.900    69    8.55
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA RUNOFF(CFS) =      0.94
 TOTAL AREA(ACRES) =      0.38   PEAK FLOW RATE(CFS) =      0.94

****************************************************************************
 FLOW PROCESS FROM NODE     32.60 TO NODE     33.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        0.94    8.55    2.986  0.25( 0.22) 0.90       0.4      32.50
 LONGEST FLOWPATH FROM NODE     32.50 TO NODE     33.00 =     182.50 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.73    8.55    2.986  0.25( 0.18) 0.73       1.1      31.00
 LONGEST FLOWPATH FROM NODE     31.00 TO NODE     33.00 =     182.50 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.67    8.55    2.986  0.25( 0.19) 0.77       1.5      32.50
     2        3.67    8.55    2.986  0.25( 0.19) 0.77       1.5      31.00
   TOTAL AREA(ACRES) =         1.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        3.67  Tc(MIN.) =    8.547
 EFFECTIVE AREA(ACRES) =      1.46  AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.77
```

```
  TOTAL AREA(ACRES) =        1.5
  LONGEST FLOWPATH FROM NODE     32.50 TO NODE     33.00 =     182.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     40.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        3.67    8.55    2.986  0.25( 0.19) 0.77       1.5      32.50
      2        3.67    8.55    2.986  0.25( 0.19) 0.77       1.5      31.00
  LONGEST FLOWPATH FROM NODE     32.50 TO NODE     40.00 =     182.50 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.06    5.48    3.853  0.25( 0.21) 0.84       2.5      25.00
      2        7.33    8.70    2.955  0.25( 0.21) 0.85       3.0      10.00
      3        7.02    9.54    2.804  0.25( 0.21) 0.85       3.0      21.00
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     40.00 =     240.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       11.14    5.48    3.853  0.25( 0.21) 0.82       3.4      25.00
      2       11.03    8.55    2.986  0.25( 0.21) 0.83       4.4      31.00
      3       11.03    8.55    2.986  0.25( 0.21) 0.83       4.4      32.50
      4       10.96    8.70    2.955  0.25( 0.21) 0.83       4.4      10.00
      5       10.45    9.54    2.804  0.25( 0.21) 0.83       4.5      21.00
    TOTAL AREA(ACRES) =         4.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       11.14  Tc(MIN.) =    5.478
  EFFECTIVE AREA(ACRES) =      3.39  AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.83
  TOTAL AREA(ACRES) =        4.5
```

```
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     40.00 =     240.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        4.5  TC(MIN.) =      5.48
  EFFECTIVE AREA(ACRES) =      3.39  AREA-AVERAGED Fm(INCH/HR)=  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.823
  PEAK FLOW RATE(CFS)   =      11.14

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       11.14    5.48    3.853  0.25( 0.21) 0.82       3.4      25.00
      2       11.03    8.55    2.986  0.25( 0.21) 0.83       4.4      31.00
      3       11.03    8.55    2.986  0.25( 0.21) 0.83       4.4      32.50
      4       10.96    8.70    2.955  0.25( 0.21) 0.83       4.4      10.00
      5       10.45    9.54    2.804  0.25( 0.21) 0.83       4.5      21.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Storm Drain Pipe Mainline Capacity Calculation

Existing 18" Mainline

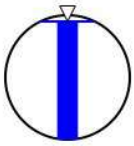
Outfall Pipe of W1

Inputs

Pipe diameter, d_0	18	in
Manning roughness, n	0.013	
Pressure slope (possibly ? equal to pipe slope), S_0	0.5	% rise/run
Relative flow depth, y/d_0	.95	fraction

Results

Flow depth, y	17.1000	in
Flow area, a	249.7127	sq. in.
Pipe area, a0	254.4695	sq. in.
Relative area, a/a0	0.9813	fraction
Wetted perimeter, P_w	4.0358	ft
Hydraulic radius, R_h	0.4297	ft
Top width, T	0.6538	ft
Velocity, v	4.6021	ft/sec
Velocity head, h_v	0.3292	ft H2O
Froude number, F	0.50	
Average shear stress (tractive force), tau	0.1341	psf
Flow, Q (See notes)	7.9804	cfs
Full flow, Q0	7.4270	cfs
Ratio to full flow, Q/Q0	1.0745	fraction



Proposed 24" Mainline

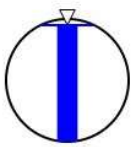
Watershed E Mainline

Inputs

Pipe diameter, d_0	24	in
Manning roughness, n	0.011	
Pressure slope (possibly ? equal to pipe slope), S_0	0.3	% rise/run
Relative flow depth, y/d_0	.95	fraction

Results

Flow depth, y	22.8000	in
Flow area, a	443.9337	sq. in.
Pipe area, a0	452.3902	sq. in.
Relative area, a/a0	0.9813	fraction
Wetted perimeter, P_w	5.3811	ft
Hydraulic radius, R_h	0.5729	ft
Top width, T	0.8718	ft
Velocity, v	5.1036	ft/sec
Velocity head, h_v	0.4048	ft H2O
Froude number, F	0.48	
Average shear stress (tractive force), tau	0.1073	psf
Flow, Q (See notes)	15.7333	cfs
Full flow, Q0	14.6423	cfs
Ratio to full flow, Q/Q0	1.0745	fraction



Proposed 27" Mainline

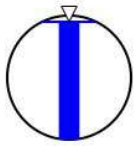
Watershed E Mainline

Inputs

Pipe diameter, d_0	27	in
Manning roughness, n	0.011	
Pressure slope (possibly ? equal to pipe slope), S_0	0.3	% rise/run
Relative flow depth, y/d_0	.95	fraction

Results

Flow depth, y	25.6500	in
Flow area, a	561.8536	sq. in.
Pipe area, a0	572.5564	sq. in.
Relative area, a/a0	0.9813	fraction
Wetted perimeter, P_w	6.0537	ft
Hydraulic radius, R_h	0.6445	ft
Top width, T	0.9807	ft
Velocity, v	5.5205	ft/sec
Velocity head, h_v	0.4737	ft H2O
Froude number, F	0.49	
Average shear stress (tractive force), tau	0.1207	psf
Flow, Q (See notes)	21.5391	cfs
Full flow, Q0	20.0454	cfs
Ratio to full flow, Q/Q0	1.0745	fraction



Existing 39" Mainline

Outfall Pipe to GBC

Inputs

Pipe diameter, d_0	39	in
Manning roughness, n	0.013	
Pressure slope (possibly ? equal to pipe slope), S_0	0.2	% rise/run
Relative flow depth, y/d_0	.95	fraction

Results

Flow depth, y	37.0500	in
Flow area, a	1172.2624	sq. in.
Pipe area, a0	1194.5930	sq. in.
Relative area, a/a0	0.9813	fraction
Wetted perimeter, P_w	8.7443	ft
Hydraulic radius, R_h	0.9310	ft
Top width, T	1.4166	ft
Velocity, v	4.8736	ft/sec
Velocity head, h_v	0.3691	ft H2O
Froude number, F	0.36	
Average shear stress (tractive force), tau	0.1162	psf
Flow, Q (See notes)	39.6734	cfs
Full flow, Q0	36.9222	cfs
Ratio to full flow, Q/Q0	1.0745	fraction