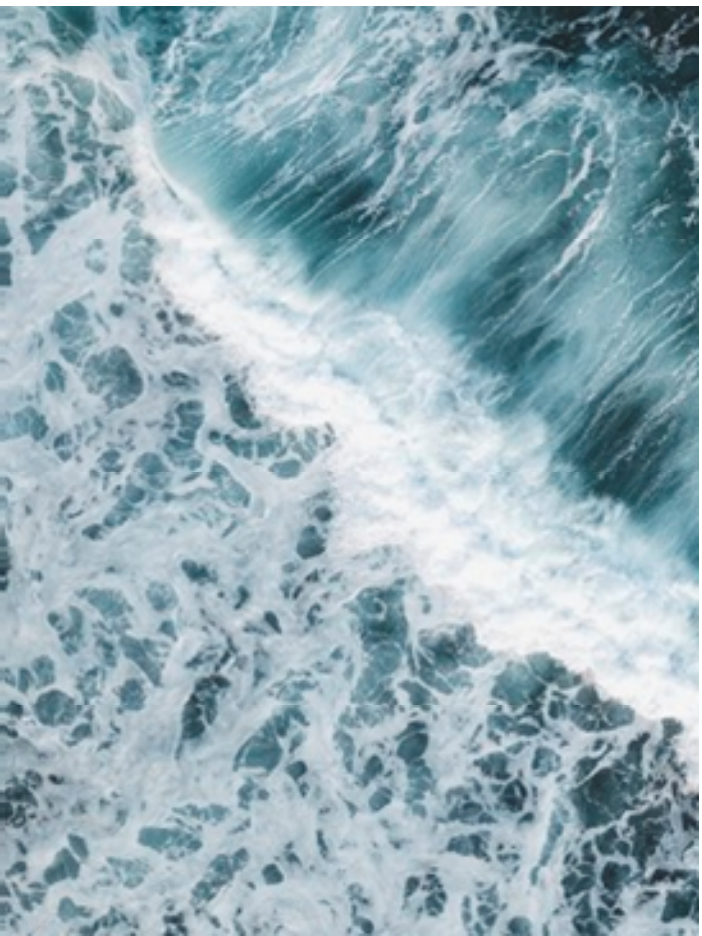


Snug Harbor

Preliminary Hydrology Report

Prepared for:
Back Bay Barrels, LLC
3857 Birch Street #521
Newport Beach, CA 92660
949.836.3055

Prepared By
Fuscoe Engineering, Inc.
15535 Sand Canyon, Suite 100
Irvine, California 92618
949.474.1960
www.fuscoe.com

Oriana Slasor
VP, Engineering
#C63451

Date Prepared: 11/5/2024

Project Number: 4206-001

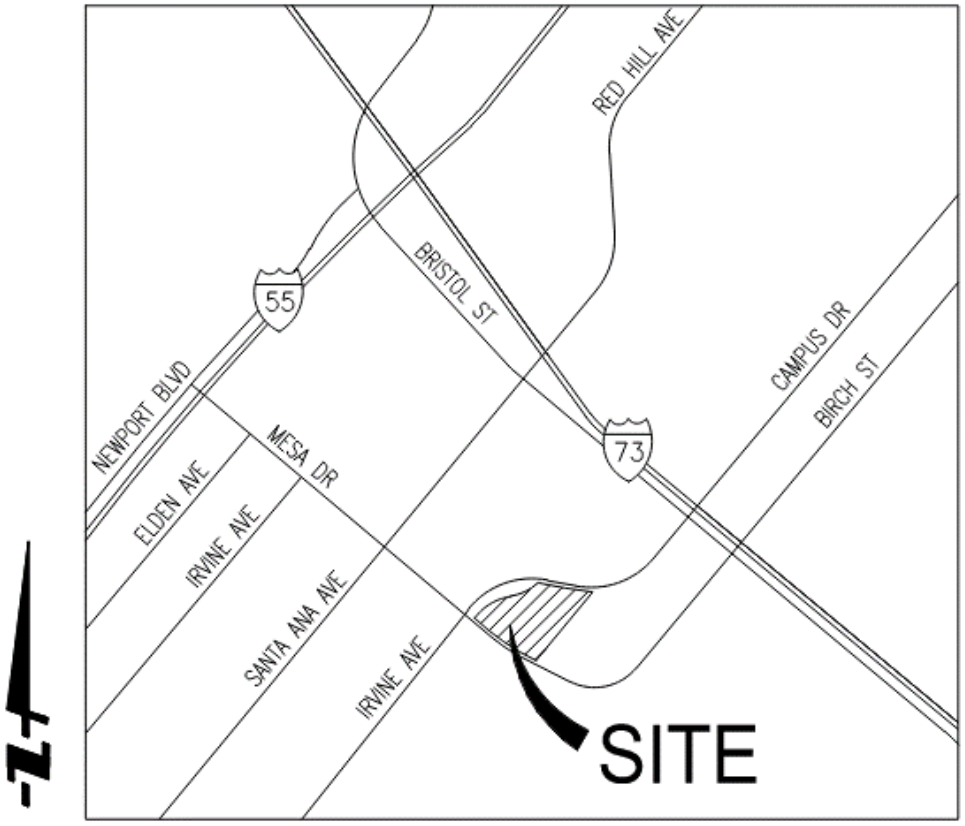
TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 GEOGRAPHIC SETTING

The Snug Harbor project site encompasses a total area of approximately 15.4 acres, and is located at 3100 Irvine Avenue in the City of Newport Beach.

The project site is located at the Newport Beach Golf Course easterly of the intersection of Irvine Avenue and Mesa Drive. The site includes three holes, a driving range, pro shop, clubhouse, sports bar, and an at-grade parking lot. The Orange County Flood Control District (OCFCD) Santa Ana-Delhi Channel and Irvine Avenue border the northerly boundary of the property. Mesa Drive borders the southerly boundary. Commercial properties border the easterly boundary. A Vicinity Map is shown as Figure 1 below.



VICINITY MAP
NOT TO SCALE

Figure 1

1.2 PROJECT DESCRIPTION

The proposed project development will consist of demolition and removals of existing buildings, parking lot, golf course, and onsite infrastructure. The project will construct a surf park which will include wave lagoons, a clubhouse building, pools, spas, athlete lodging, and parking with solar-power canopies.

1.3 PURPOSE OF THIS REPORT

The purpose of this report is to provide hydrologic and hydraulics calculations and maps for existing and proposed conditions for the proposed project.

1.4 REFERENCES

- Orange County Hydrology Manual
- A.E.S. hydrologic software
- City of Newport Beach GIS
- Orange County Flood Control District (OCFCD) Santa Ana-Delhi As-built Plans
- OCFCD Base Map of Drainage Facilities

2.0 EXISTING DRAINAGE

2.1 EXISTING TOPOGRAPHY

The topography of the site slopes in a northwesterly direction, toward OCFCD's Santa Ana – Delhi Channel and Irvine Avenue. An existing 15- to 20- foot high slope descends from the southeast boundary of the property from about elevation +54 (NAVD88). The remainder of the site generally slopes more gently from an elevation of about +40 (NAVD88) toward the westerly boundary of the project, with elevations approximately +15 to + 20 (NAVD88).

2.2 EXISTING DRAINAGE PATTERN

The existing site is a golf course, with most of the site containing grass and trees, and a portion of the site dedicated to shops and parking. The existing drainage pattern is generally in a westerly direction. There are currently five (5) discharge points; with two points in Irvine Avenue, and three to pipes which are discharged to the Santa Ana – Delhi Channel. From the two discharge points in Irvine Avenue, the drainage is conveyed in the roadway to local catch basins, and is discharged into the Sana Ana – Delhi Channel. The City of Newport Beach's storm drain GIS map, along with OCFCD Base Map of Drainage Facilities, both showing the location of the channel adjacent to the project site, are included in Appendix 1 of this report.

The previously-mentioned Santa Ana – Delhi Channel, owned and maintained by OCFCD, is a 55 feet wide by 16 feet high reinforced-concrete channel that runs in a southerly direction, along the westerly boundary of the site. The as-built channel plans are included in Appendix 2 of this report. The channel currently accepts drainage from the site at three locations, as follows:

- Station 40+79 42-inch (Inv.11.0 +/- NAVD88)
- Station 44+85 18-inch (Inv. 18.4+/- NAVD88)
- Station 48+95 18-inch (Inv. 16.7 +/- NAVD88)

There is currently offsite drainage from properties located along the easterly boundary of the golf course. This drainage is conveyed to the golf course via surface gutter or pipes. The drainage is conveyed through the golf course and combines with the onsite drainage and is included with the discharge locations discussed above into the Santa Ana – Delhi Channel.

2.3 OFFSITE TRIBUTARY DRAINAGE

The As mentioned previously, there is offsite tributary drainage from the existing development to the east. The proposed design includes collecting and conveying the offsite drainage through the site, to discharge to the existing channel. The tributary area, approximately 3.9 acres, is shown on the existing condition hydrology map, included in Appendix 3; and the calculations are included in Appendix 4 of this report.

3.0 PROPOSED DRAINAGE

The proposed development will include construction of the surf lagoons, and associated amenities and parking. The proposed onsite drainage will be collected and conveyed through the site, to discharge at the existing locations, with the goal of mimicking existing condition discharge rates. Evaluation of the drainage amount will confirm the need for detention facilities. The lagoon basin area will be self-contained, and will not discharge to the channel. Lastly, water quality BMP's have been designed and located; calculations and worksheets are included in the Preliminary Water Quality Management Plan (PWQMP).

4.0 HYDROLOGIC ANALYSIS

4.1 STORM FREQUENCY

The 25-year and 100-year storm events have been evaluated be used for the existing and proposed conditions. Additionally the 2-year storm event was analyzed to confirm hydromodification requirements.

4.2 METHODOLOGY

This study was prepared in conformance with the Orange County Hydrology Manual. Orange County Rational Method was used. A.E.S. Computer Software was utilized to compile the hydrologic data and to determine the peak discharges. The Soil Type Map is included in Appendix 3. The Existing Condition Hydrology Calculations and Map are included in Appendices 4 and 5, respectively. The Proposed Condition Hydrology Calculations and Map are included in Appendices 6 and 7, respectively.

5.0 FEMA

The site is in Zone X (area of minimal flood hazard), as shown on FIRM Number 06059C0267J effective 12/3/2009. Since the site is not within a Special Flood Hazard Area, as defined by FEMA, a CLOMR/LOMR will not be required. A copy of the Firmette is included in Appendix 8.

6.0 HYDRAULICS ANALYSIS

Hydraulic computations for the online area drain system have been prepared to confirm adequate sizing of the proposed system. The hydraulic calculations are provided, and are included in Appendix 9 of this report.

7.0 RESULTS AND CONCLUSIONS

As discussed in this report, the proposed condition drainage patterns will generally mimic those of the existing condition. The results show that the proposed condition flows do not exceed those of existing condition for the onsite property. The existing and proposed drainage systems have capacities to provide drainage interception and conveyance for the proposed project. The hydrology maps (Appendices 4 and 5) show the

Q2, Q25 and Q100 flow rates at the various discharge locations. The results are tabulated below.

Summary Table: Offsite

SUB AREA	ACRES	Q_{100} (CFS)	Q_{25} (CFS)	Q_2 (CFS)
OS (Offsite)	3.94	17.2	13.4	6.2

Summary Table: Existing Conditions

SUB AREA	NODE	ACRES	Q_{100} (CFS)	Q_{25} (CFS)	Q_2 (CFS)
A	13	3.18	10.6	8.0	3.3
B	21	0.09	0.5	0.4	0.2
C	31	0.69	3.2	2.5	1.1
D	43	3.38	11.1	8.6	3.5
E	58	8.09	19.8	14.9	5.8
TOTAL	-	15.43	45.2	34.4	13.9

Summary Table: Proposed Conditions

SUB AREA	NODE	ACRES	Q_{100} (CFS)	Q_{25} (CFS)	Q_2 (CFS)
A	23	5.03	19.2	15.0	6.8
B	35	1.24	3.8	3.0	1.3
C	55	3.44	16.2	12.6	5.7
D	61	0.19	1.0	0.8	0.3
E (Lagoon)	-	5.53	0.0	0.0	0.0
TOTAL	-	15.43	40.2	31.4	14.1

As discussed previously, the proposed lagoon basins will not discharge to the storm drain system. Therefore, this area is not included in the drainage, and will ultimately discharge to the sanitary sewer system. Due to the 5.5-acre lagoon area not discharging to the storm drain system, the proposed condition discharge rates do not exceed those of the existing condition. Since proposed condition peak flows do not exceed existing condition peak flows, detention mitigation will not be required for this project. Proposed water quality BMP's will be evaluated and designed in accordance with applicable codes. The water quality design is included in the WQMP for this project.

8.0 APPENDICES

Appendix 1 *Storm Drain Atlas Maps*

Appendix 2 *Storm Drain As-Built Plans*

Appendix 3 *Soil Type Map*

Appendix 4 *Existing Condition Hydrology Calculations*

Appendix 5 *Existing Condition Hydrology Map*

Appendix 6 *Proposed Condition Hydrology Calculations*

Appendix 7 *Proposee Condition Hydrology Map*

Appendix 8 *FEMA Map*

Appendix 9 *Hydraulic Calculations*

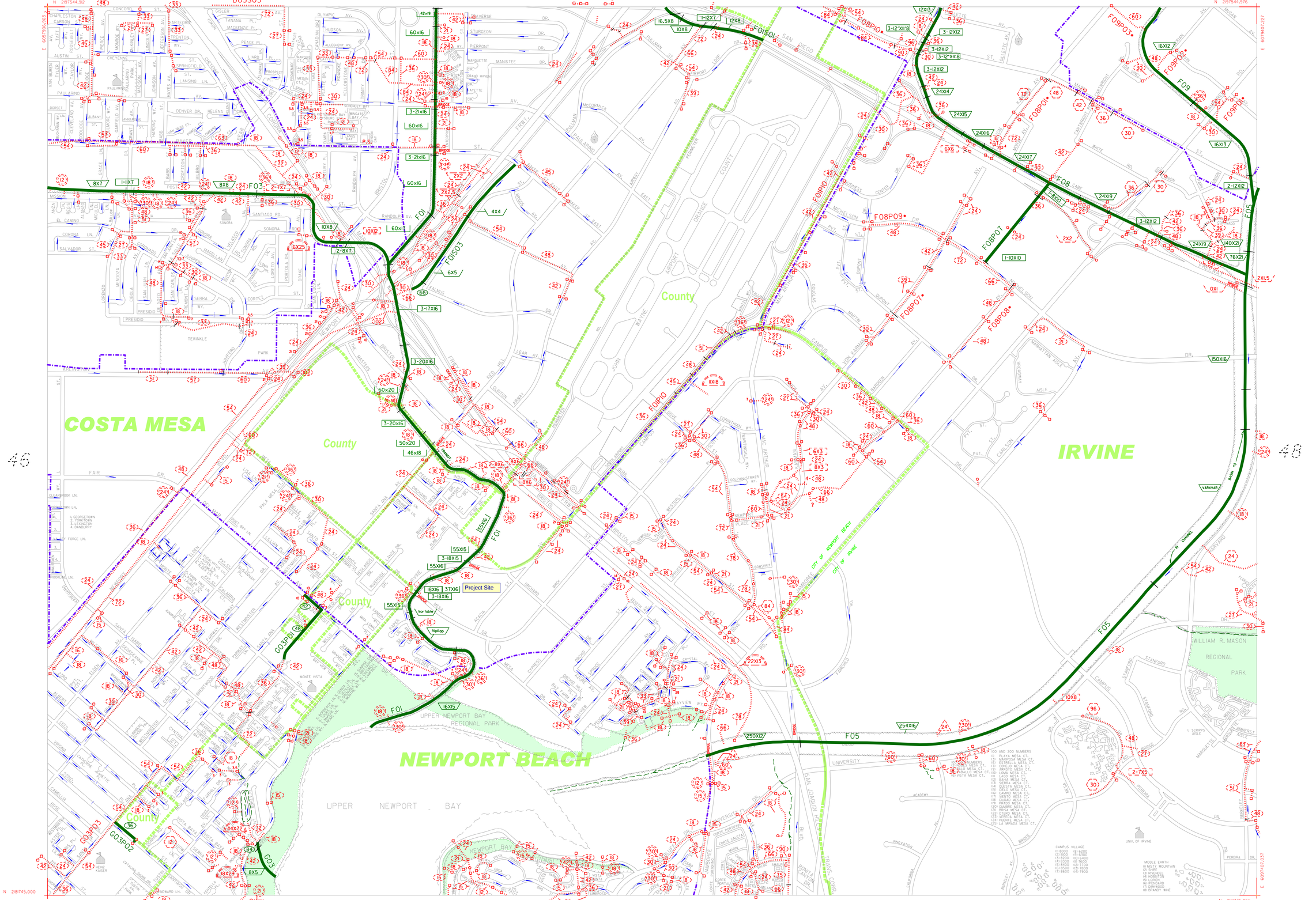
Appendix 1

Storm Drain Atlas Maps

NBGIS NEWPORT BEACH

Disclaimer:
Every reasonable effort has been made to assure the accuracy of the data provided, however, The City of Newport Beach and its employees and agents disclaim any and all responsibility from or relating to any results obtained in its use.

8/7/2024



NOTICE

The drainage information has been prepared for information purposes only. The location, ownership, facility information and limits have been determined from available information provided by public agencies, but may not be exact, accurate, or up-to-date. The user of this information is responsible for verifying exact location, ownership, accuracy, and the regional versus local character of drainage facilities.

Additional information may be obtained from public plans and recorded deeds. Facility designations included with this information are for convenience only and are not controlling or intended to imply ownership by the County or the Orange County Flood Control District (OCFCD). The information is being provided as a courtesy and neither the County of Orange nor OCFCD assume any liabilities for inaccuracy of the information.

To notify OC Public Works Flood Control Section of additions or corrections, please contact Sal Gutierrez at (714) 647-3992 or by email at sal.gutierrez@ocpw.ocgov.com

ORANGE COUNTY FLOOD CONTROL DISTRICT

BASE MAP OF DRAINAGE FACILITIES IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
S. GUTIERREZ	JAN. 26 2012	47	MAPS-113-3

- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- G G Greenbelt
- P.S. P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- OCFCD Basins or Reservoirs

Ownership (If other than City or County): Private = P State = S Federal = F

EXISTING FACILITIES

O.C.F.C.D.	LOCAL	
		Earth Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Rectangular Channel (base width by height in feet)
		Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
		Reinforced Concrete Pipe (RCP) (diameter in inches)
		Metal Sheet Channel (MSC) (Base width by pile height in feet /Sheet pile total length)
		Corrugated Metal Pipe (CMP) (diameter in inches)
		Concrete Pipe (diameter in inches)
		Concrete Oval Pipe (width by height in inches)
		Steel Pipe (diameter in inches)
		Reinforced Concrete Arch (base span by height in inches)
		Corrugated Metal Arch (base span by height in inches)

0 200 400 600 800 FEET

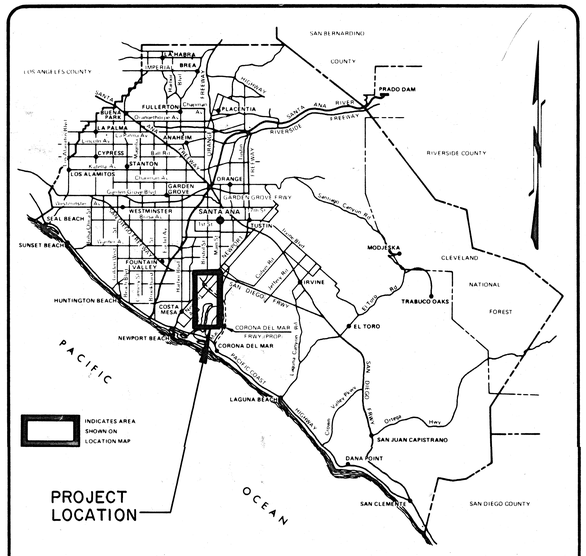
47

Appendix 2

Storm Drain As-Built Plans

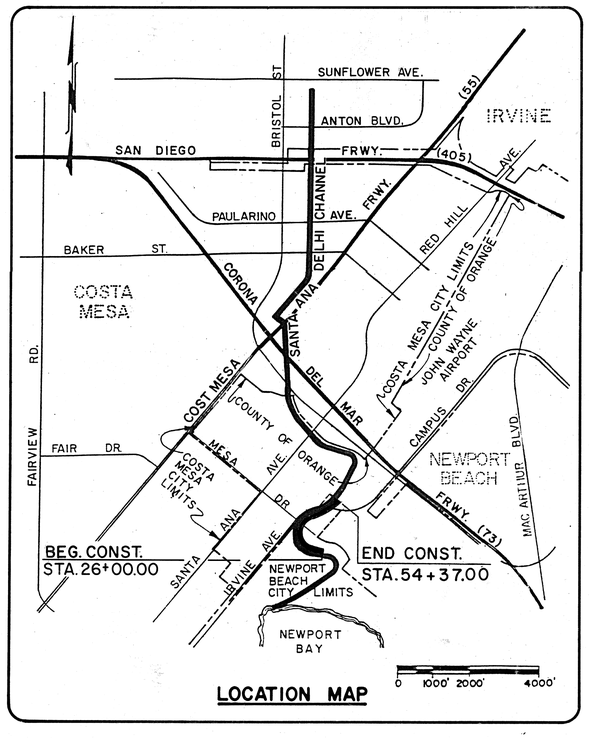
SHEET 1 OF 40

F01-701-11A



VICINITY MAP

1 0 5 10
SCALE IN MILES



LOCATION MAP

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA, CALIFORNIA

E. SCHNEIDER, DIRECTOR

PLANS FOR CONSTRUCTION OF

THAT PORTION OF

SANTA ANA – DELHI CHANNEL

(FACILITY NO. F01)

FROM

DOWNSTREAM OF MESA DRIVE TO UPSTREAM OF IRVINE AVENUE

APRIL, 1987 *AS BUILT*

CONTRACTOR : KIEWIT PACIFIC CO.
INSPECTOR : G.D. EVANS
R.C.E. : O.N. MARSHALL
COMPLETED : OCT. 1988

REGISTERED PROFESSIONAL ENGINEER VIOLET JAKAB OHU C 26879 Exp. 3-31-89 CIVIL STATE OF CALIFORNIA

MAINTAINED BY: O.C.F.C.D.

FUNDED BY: O.C.F.C.D.

INDEX OF SHEETS

UTILITY	PHONE NO.
UNDERGROUND SERVICE ALERT	1-800-422-4133
SEWER – COSTA MESA SANITARY DIST.	714-631-1731
SO. CALIFORNIA GAS COMPANY	714-634-3122
PACIFIC BELL TELEPHONE	714-259-4488
SO. CALIFORNIA EDISON COMPANY	714-895-0220
CITY OF NEWPORT BEACH, WATER DIV.	714-644-3011
MESA CONSOLIDATED WATER DIST.	714-631-1291
SANTA ANA HEIGHTS WATER COMPANY	714-545-1060

UTILITIES

APPROVED: _____ DATE

FOR CONSTRUCTION OF SANTA ANA HEIGHTS WATER MAIN

APPROVED: Jeff Stewart 5-4-87 DATE

FOR CONSTRUCTION OF CITY OF NEWPORT BEACH WATER MAIN

CITY OF NEWPORT BEACH

FOR PORTION WITHIN CITY OF NEWPORT BEACH

APPROVED: _____ CITY ENGINEER

APPROVED: Richard M. Edmonston TRAFFIC ENGINEER

APPROVED FOR CONCEPT & ADHERENCE TO CITY STDS. & REQUIREMENTS ONLY. CITY IS NOT RESPONSIBLE FOR DESIGN ASSUMPTION & ACCURACY.

EMA-PUBLIC WORKS

SUBMITTED: _____ FLOOD CONTROL DESIGN (EXP. 12-31-89) 5-5-87

RECOMMENDED: _____ DIVISION MANAGER RCE 13154 (EXP. 12-31-89)

APPROVED: _____ for DIRECTOR OF PUBLIC WORKS 5-6-87

REGISTERED PROFESSIONAL ENGINEER JAMES W. WILLIAMS No. 13154 Exp. 12-31-89 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER KENNETH E. SMITH No. 23209 Exp. 12-31-89 CIVIL STATE OF CALIFORNIA

PREPARED BY:

CSI CONSULTANTS, INC.
Consultants to Governmental Agencies
1415 East Seventeenth St. Santa Ana, CA 92701
(714) 558-1952

PREPARED UNDER THE SUPERVISION OF:

Violet Jakab Ohu 4-7-87
RCE 26879
(EXP. 3-31-89)

BENCH MARK: CM-20-70

IN THE S.E. PART OF THE INT. OF IRVINE AVE. AND MESA DR.; 59' S.E. OF THE CENTERLINE OF IRVINE AVE., 38' S.W. OF THE CENTERLINE OF MESA DR., 59' S.E. OF THE CENTER OF THE MEDIAN, 0.7' N.E. OF THE S.W. END OF A CONCRETE RETAINING WALL, LEVEL WITH THE SIDEWALK.

ELEVATION: 25.871 FT. - 1976 ADJ.

BASIS OF BEARING:

N49°21'07"W BEING THE CENTERLINE OF MESA DR. EAST AND WEST OF IRVINE AVE. AS PER

RECORD OF SURVEY 85-1012

BK. 110, PG. 39-42

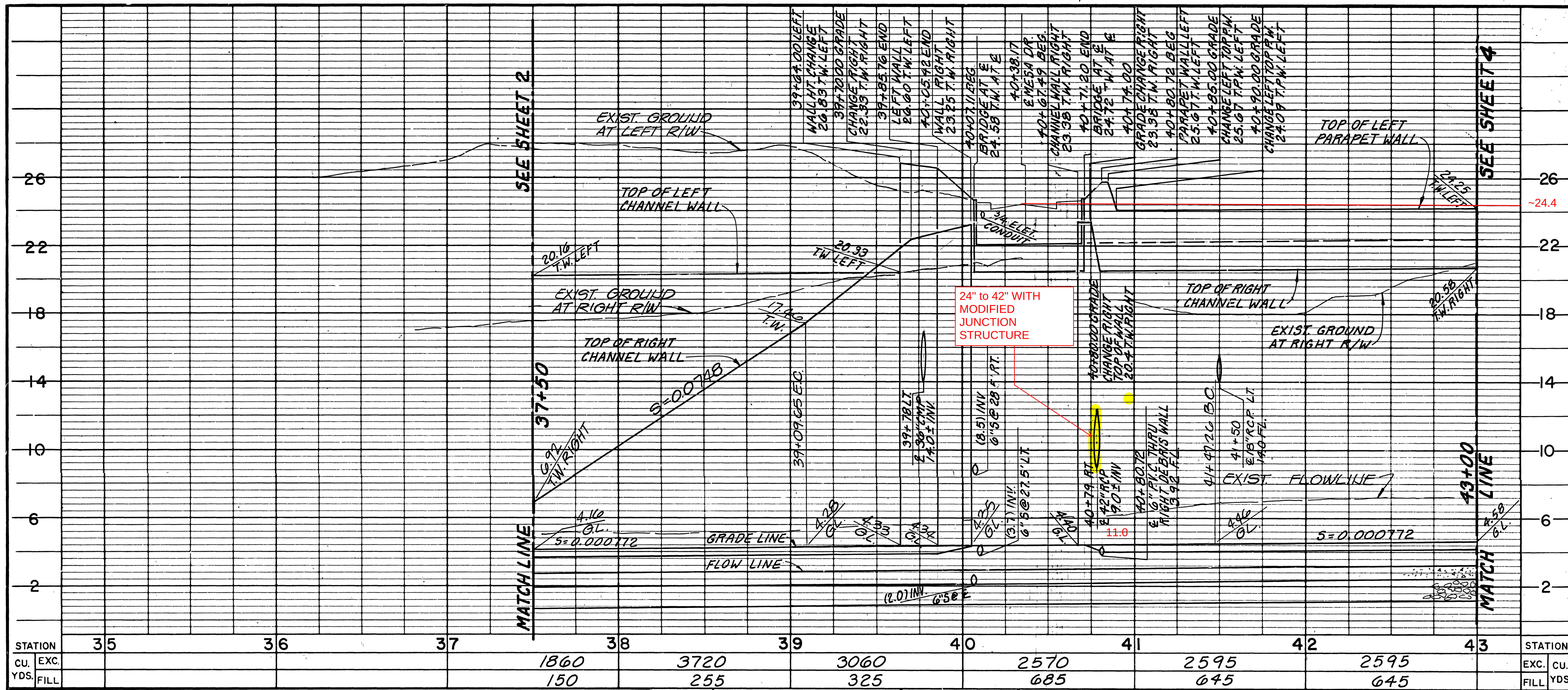
NO.	DESCRIPTION	SHT.	APPROVED	DATE
A	AS BUILT	ALL		4-20-88

REVISIONS

W.O. NO. F07203

DWG. NO. F01-701-11A

SHEET 1 OF 40



CONSTRUCTION NOTES

- [1] CONSTRUCT R.C. RECT. CHANNEL PER PLAN, PROFILE AND TYPICAL SECTION AND PER STRUCTURAL DETAILS ON SHEET 18.
- [2] CONSTRUCT R.C. BOX PER PLAN AND PROFILE AND PER STRUCTURAL DETAILS ON SHEET 25 (MESA DR.).
- [4] CONSTRUCT R.C. BOX AND RECT. CHANNEL PER PLAN, PROFILE AND TYPICAL SECTION AND PER STRUCTURAL DETAILS ON SHEET 25.
- [5] CONSTRUCT 5' C.L. FENCE AND/OR GATE PER PLAN AND TYPICAL SECTION AND PER STD. PLAN 1412.
- [6] CONSTRUCT GUARD CABLE FENCE PER PLAN AND TYPICAL SECTIONS AND PER STD. PLAN 1413.
- [7] REMOVE AND RECONSTRUCT 8" STL. WATER MAIN PER SHEET 36.
- [9] CONSTRUCT 3" ASPHALT CONCRETE PAVEMENT WITH TACK COAT PER PLANS AND TYPICAL SECTIONS.
- [10] CONSTRUCT ACCESS RAMP WALL "A" PER DETAILS ON SHEET 19.
- [11] CONSTRUCT DEBRIS WALL PER DETAILS ON SHTS. 26 & 27.
- [14] CONSTRUCT JUNCTION STRUCTURE TYPE V PER PLAN AND PROFILE AND PER STD. PLAN 1314.
- [22] CONSTRUCT CONCRETE BLOCK RETAINING WALL 'B' PER PLAN AND PROFILE AND PER DETAILS ON SHEETS 19 & 30.
- [24] CONSTRUCT DRAINAGE GROOVE PER DETAIL ON SHT. 15.
- [28] CONSTRUCT CURB AND GUTTER, TYPE A-2, PER PLAN AND PER STD. PLAN 104-0-0C.
- [29] CONSTRUCT P.C.C. SIDEWALK PER PLAN AND PER STD. PLAN 1205
- [31] CONSTRUCT 5" C.F. CURB PER STD. PLAN 104-0-0C, TYPE C1-5 (C1-6 MODIFIED).
- [37] CONSTRUCT 0.85 ASPHALT CONCRETE OVER NATIVE SOIL OR 0.35 ASPHALT CONCRETE OVER 1.10' AGGREGATE BASE.
- [38] CONSTRUCT VARIABLE THICKNESS ASPHALT CONCRETE.
- [39] REPAIR LANDSCAPING AND CONCRETE DITCH DAMAGED WITHIN CONSTRUCTION AREA.
- [40] REMOVE AND RECONSTRUCT 8" V.C.P. SEWER SYPHON PER SHEET 38.
- [44] CONSTRUCT MODIFIED JUNCTION STRUCTURE TYPE V WITH AUTOMATIC FLAP GATE PER STD. PLAN 1314 AND PER DETAIL ON SHEET 15.
- [47] CONSTRUCT EQUESTRIAN TRAIL TEST BINS PER DETAILS ON SHEET 16.
- [43] INSTALL AND REMOVE TEMPORARY CHAIN LINK FENCE.
- [23] CONSTRUCT GAGING STATION CONDUIT PER DETAILS ON SHEET 16.
- [66] REINSTALL SALVAGED TRAFFIC SIGNALS AND PULL BOXES PER SHEET 10.

LEGEND

- (1) PROTECT IN PLACE
- (2) REMOVE
- (3) TO BE RELOCATED BY OWNER
- (4) REMOVE AND SALVAGE
- (5) REMOVE TO 12" MIN BELOW SUB-GRADE
- (7) REMOVE INTERFERING PORTION OF EXISTING PIPE AND OUTLET STRUCTURE.

PER SURVEY CREST IN CENTER OF ROAD ABOVE CHANNEL AT MESA AVE IS ~26.4'. THEREFORE ADJUSTMENT IS ELEVATION ON THIS PLAN SHEET +2.0' TO MATCH OUR PLANS.

HYDRAULIC DATA

STATION TO STATION	Q	b	z	S	n=0.014 Dn	n=0.014 Vn	F	n=0.016 Dn	n=0.016 Vn	F	Dc
37+50.00 - 39+85.76	8550	55'	0	0.000772	12.54'	12.39	0.62	13.75'	11.30	0.54	9.09
40+07.11 - 43+00.00	2327	18'	0	0.000772	14.18'	9.20	0.43	15.67'	8.25	0.37	8.04
40+07.11 - 40+71.20	3112	2x18	0	0.000772	17.80	9.71	0.41	19.87	8.70	0.34	9.76
40+71.20 - 43+00.00	6223	37'	0	0.000772	14.18	11.82	0.55	15.67	10.73	0.48	9.58

PROFILE

HORIZ: 1" = 40'
VERT: 1" = 4'

℄ CURVE DATA

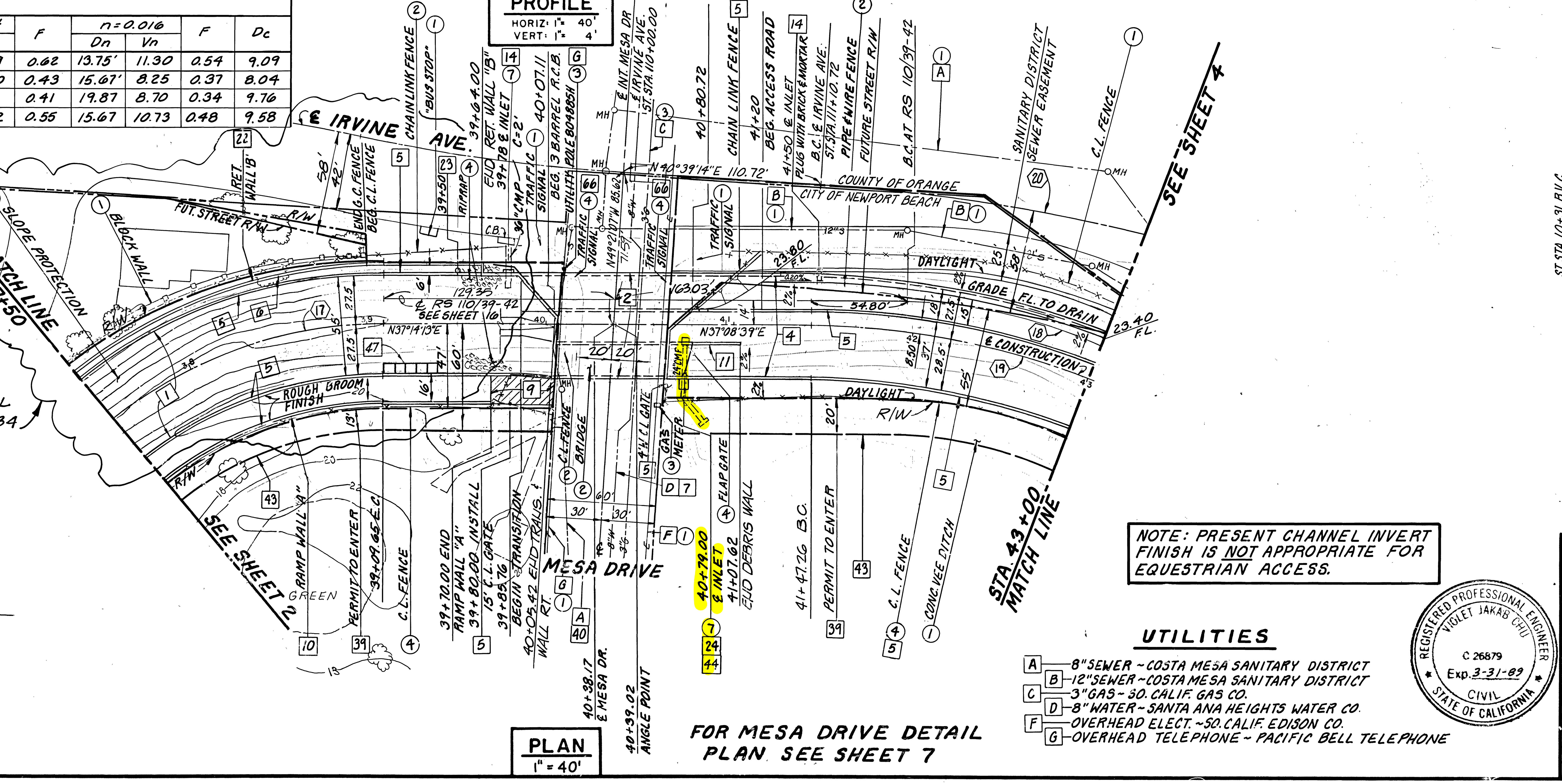
(17) Δ = 50°58'10", R = 236.00', L = 209.94', T = 112.49'

(19) Δ = 35°57'04", R = 425.00', L = 266.67', T = 137.89'

(18) Δ = 35°53'05", R = 250.00', L = 156.58', T = 80.95'

(20) Δ = 70°07'41", R = 1000.00', L = 1223.97', T = 701.87

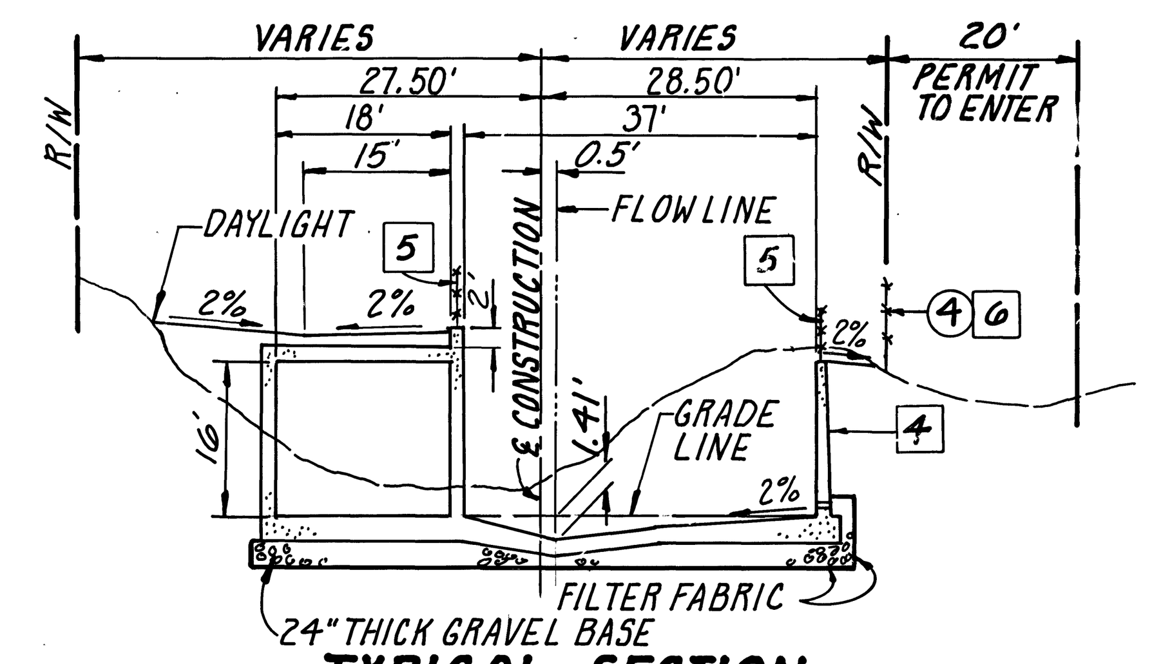
(A) MODIFIED "B" WALL SEE SHEET NO. 34



PLAN

1" = 40'

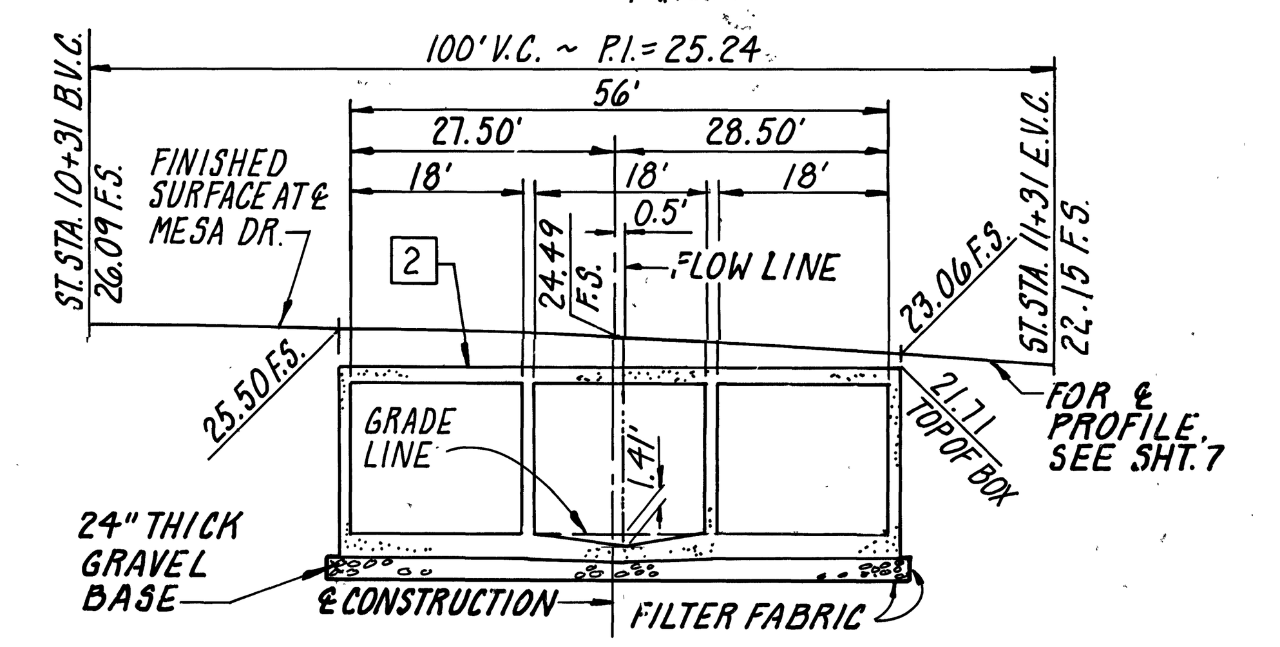
FOR MESA DRIVE DETAIL PLAN SEE SHEET 7



TYPICAL SECTION

STA. 40+81.53 TO STA. 43+00.00

N.T.S.



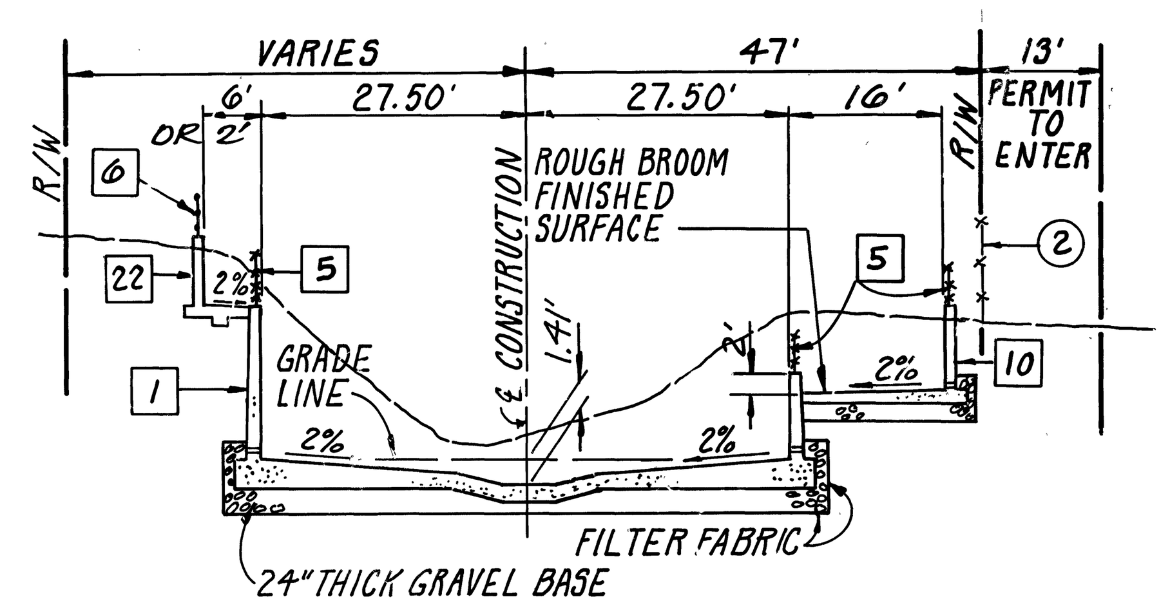
TYPICAL SECTION

STA. 40+07.11 TO STA. 40+69.23

N.T.S.

1/2 0 1 2

3 inches on original drawing



TYPICAL SECTION

STA. 37+50.00 TO STA. 39+70.00

N.T.S.

NOTE: PRESENT CHANNEL INVERT FINISH IS NOT APPROPRIATE FOR EQUESTRIAN ACCESS.

UTILITIES

- [A] 8" SEWER ~ COSTA MESA SANITARY DISTRICT
- [B] 12" SEWER ~ COSTA MESA SANITARY DISTRICT
- [C] 3" GAS ~ SO. CALIF. GAS CO.
- [D] 8" WATER ~ SANTA ANA HEIGHTS WATER CO.
- [F] OVERHEAD ELECT. ~ SO. CALIF. EDISON CO.
- [G] OVERHEAD TELEPHONE ~ PACIFIC BELL TELEPHONE

REGISTERED PROFESSIONAL ENGINEER VIOLET JAKAB CHU C 26879 Exp. 3-31-89 CIVIL STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION

REVISIONS

DESIGNED AWM
DRAWN HCC, MSB CHECKED VJC

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA-DELHI CHANNEL (FOI)

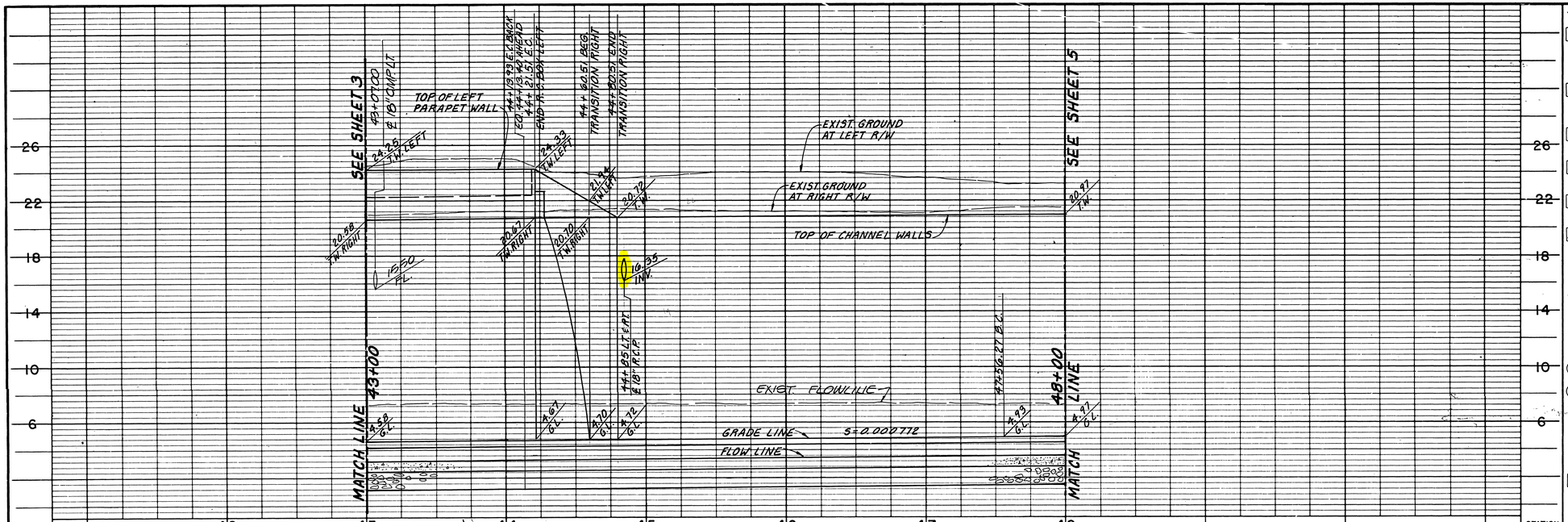
PLAN AND PROFILE

STA. 37+50.00 TO STA. 43+00.00

PREPARED UNDER SUPERVISION OF [signature] RCE 26879 DATE

SCALE	DATE	DWG. NO.	SHEET
AS SHOWN	APR 1987	FOI-701-11A	3 OF 40

FOI-701-11A



STATION	42	43	44	45	46	47	48
CU. YDS. EXC.		2840	2930	2760	2685	2690	
CU. YDS. FILL		640	360	285	290	285	

CONSTRUCTION NOTES

1 CONSTRUCT R.C. RECT. CHANNEL PER PLAN, PROFILE AND TYPICAL SECTION AND PER STRUCTURAL DETAILS ON SHEET 18.
4 CONSTRUCT R.C. BOX AND RECT. CHANNEL PER PLAN, PROFILE AND TYPICAL SECTION AND PER STRUCTURAL DETAILS ON SHEET 25.
5 CONSTRUCT 5' C.L. FENCE AND/OR GATE PER PLAN AND TYPICAL SECTION AND PER STD. PLAN 1412.
6 CONSTRUCT GUARD CABLE FENCE PER PLAN AND TYPICAL SECTIONS AND PER STD. PLAN 1413.
11 CONSTRUCT DEBRIS WALL PER DETAILS ON SHTS. 26 & 27.
13 CONSTRUCT INLET TYPE V PER PLAN AND PER STD PLAN 1305.
14 CONSTRUCT JUNCTION STRUCTURE TYPE V PER PLAN AND PROFILE AND PER STD. PLAN 1314.
15 INSTALL 18" R.C.P. 2000-D, BEDDING PER STD. PLAN 1319.
17 CONSTRUCT REINFORCED CONCRETE COLLAR PER STD. PLAN 1317.
24 CONSTRUCT DRAINAGE GROOVE PER DETAIL ON SHT. 15.
39 REPAIR LANDSCAPING AND CONCRETE DITCH DAMAGED WITHIN CONSTRUCTION AREA.
43 INSTALL AND REMOVE TEMPORARY CHAIN LINK FENCE.

LEGEND

(1) PROTECT IN PLACE.
(2) REMOVE.
(4) REMOVE AND SALVAGE.
(7) REMOVE INTERERING PORTION OF EXISTING PIPE AND OUTLET STRUCTURE.

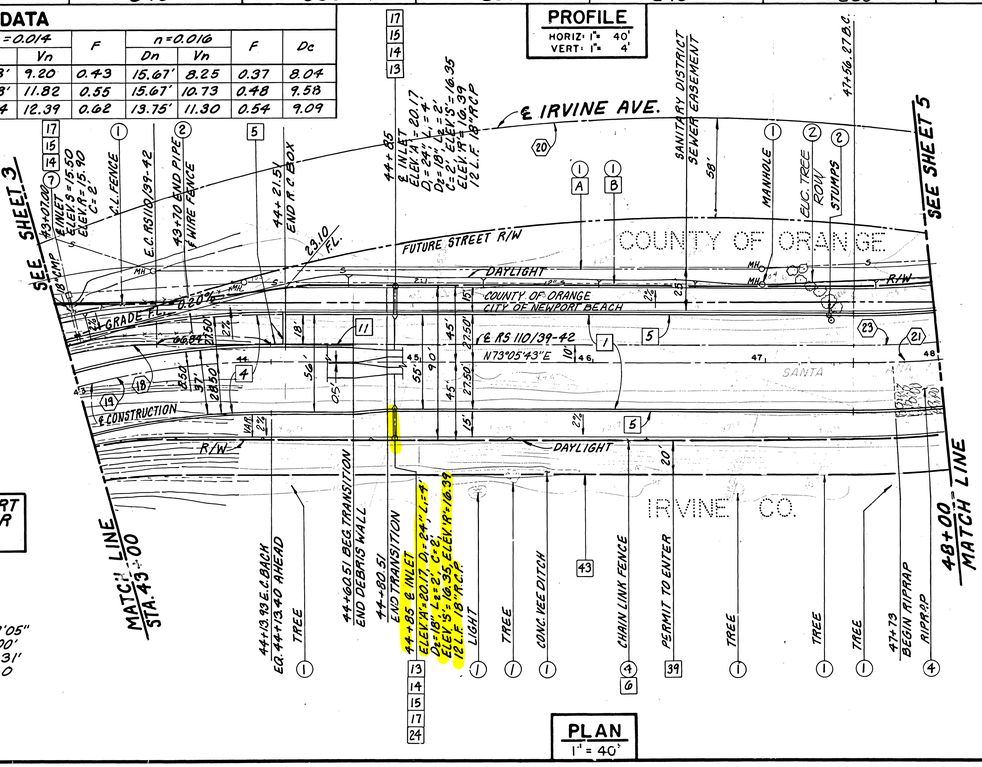
UTILITIES

A 8" SEWER - COSTA MESA SANITARY DISTRICT
B 12" SEWER - COSTA MESA SANITARY DISTRICT

HYDRAULIC DATA

STATION TO STATION	Q	b	z	S	n=0.014 Dn	n=0.014 Vn	F	n=0.016 Dn	n=0.016 Vn	F	Dc
43+00.00 ~ 44+17.07	2327	18'	0	0.000772	14.18'	9.20	0.43	15.67'	8.25	0.37	8.04
43+00.00 ~ 44+17.07	6223	37'	0	0.000772	14.18'	11.82	0.55	15.67'	10.73	0.48	9.58
44+17.07 ~ 48+00.00	8550	55'	0	0.000772	12.54	12.39	0.62	13.75'	11.30	0.54	9.09

PROFILE
HORIZ: 1" = 40'
VERT: 1" = 4'

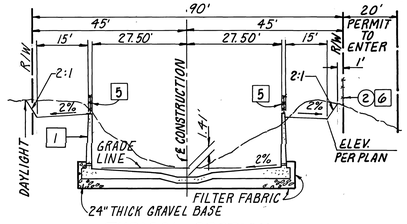


PLAN
1" = 40'

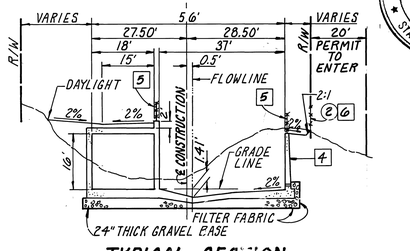
NOTE: PRESENT CHANNEL INVERT FINISH IS NOT APPROPRIATE FOR EQUESTRIAN ACCESS.

℄ CURVE DATA

(18) Δ = 35°53'05" R = 250.00' L = 156.58' T = 80.95'
(19) Δ = 35°57'04" R = 425.00' L = 266.67' T = 137.89'
(20) Δ = 70°07'41" R = 1000.00' L = 1223.97' T = 701.87'
(21) Δ = 25°49'05" R = 510.00' L = 229.81' T = 116.89'
(23) Δ = 25°49'05" R = 500.00' L = 225.31' T = 114.60



TYPICAL SECTION
STA. 44+80.51 TO STA. 48+00.00
N.T.S.



TYPICAL SECTION
STA. 43+00.00 TO STA. 44+21.51
N.T.S.

REGISTERED PROFESSIONAL VIDLET JAKAB CIVIL C 26879 Exp. 3-31-89 CIVIL STATE OF CALIFORNIA

1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA-DELHI CHANNEL (FOI)

PLAN AND PROFILE

STA. 43+00.00 TO STA. 48+00.00

MARK	DATE	DESCRIPTION
REVISIONS		

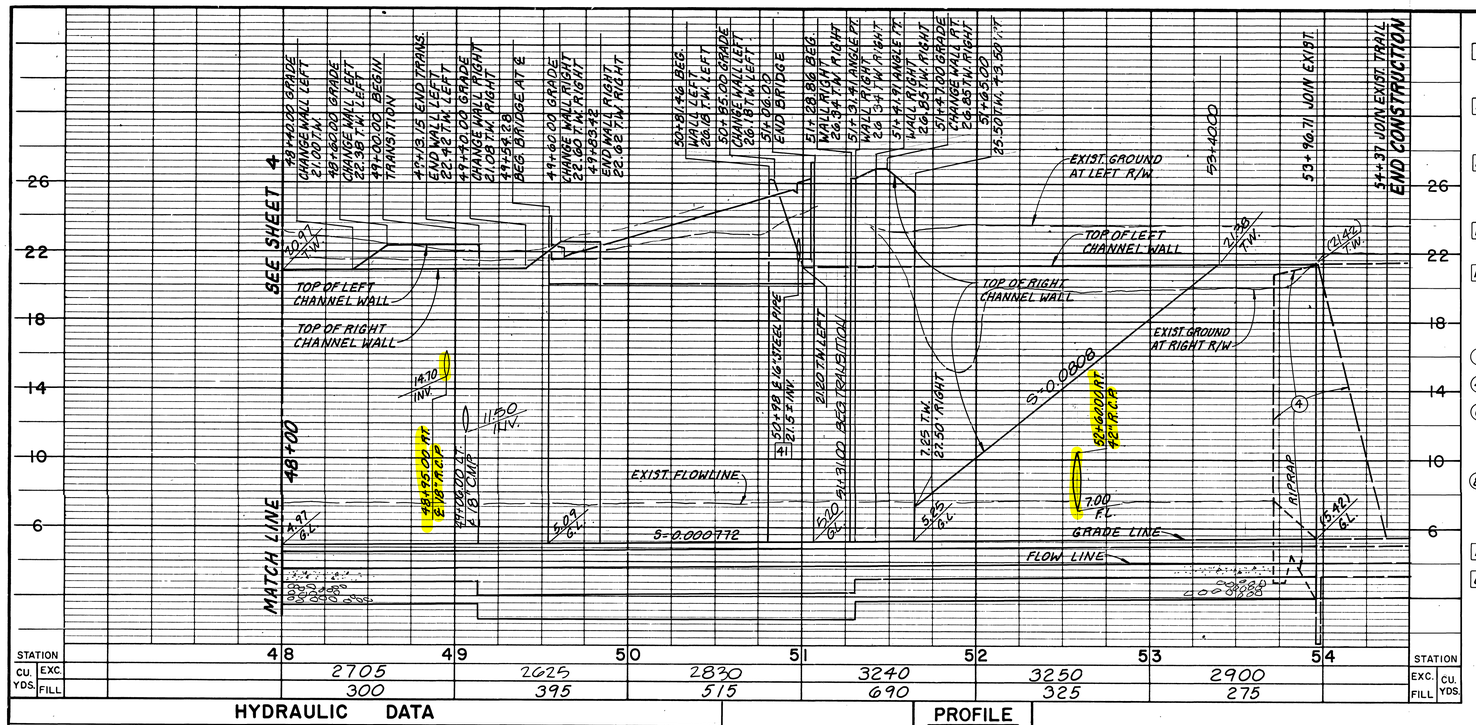
DESIGNED AWM
DRAWN HCC, MSB CHECKED VJC

PREPARED UNDER SUPERVISION OF [illegible] RCE 26879 DATE

SCALE AS SHOWN | DATE APR 1987 | DWG. NO. FOI-701-11A | SHEET 4 OF 40

FOI-701-11A

4 40



CONSTRUCTION NOTES

1. CONSTRUCT R.C. RECT. CHANNEL PER PLAN, PROFILE AND TYPICAL SECTION AND PER STRUCTURAL DETAILS ON SHT 18.
3. CONSTRUCT R.C. BOX PER PLAN AND PROFILE AND PER STRUCTURAL DETAILS ON SHT. 27.
5. CONSTRUCT 5' C.L. FENCE AND/OR GATE PER PLAN AND TYPICAL SECTION AND PER STD. PLAN 1412.
6. CONSTRUCT GUARD CABLE FENCE PER PLAN AND TYPICAL SECTIONS AND PER STD. PLAN 1413.
8. CONSTRUCT 8" THICK DECOMPOSED GRANITE SERVICE ROAD / EQUESTRIAN TRAIL PER PLANS AND TYPICAL SECTIONS.
9. CONSTRUCT 3" ASPHALT CONCRETE PAVEMENT WITH TACK COAT PER PLANS AND TYPICAL SECTIONS.
11. CONSTRUCT DEBRIS WALL PER DETAILS ON SHTS. 26 & 27.
13. CONSTRUCT INLET TYPE V PER PLAN AND PER STD. PLAN 1305.
14. CONSTRUCT JUNCTION STRUCTURE TYPE V PER PLAN AND PROFILE AND PER STD. PLAN 1314.
16. INSTALL 24" R.C.P. 2000-D, BEDDING PER STD. PLAN 1319.
17. CONSTRUCT REINFORCED CONCRETE COLLAR PER STD. PLAN 1317.
30. CONSTRUCT MODIFIED CURB AND GUTTER TYPE A2 PER STD. PLAN 104-0-0C. CURB FACE VARIES 6" TO 12". W = 1'-6"
33. CONSTRUCT ACCESS RAMP WALL 'C' PER DETAILS ON SHT. 20.
34. CONSTRUCT CONCRETE BLOCK RETAINING WALL 'D' PER PLAN AND PROFILE AND PER DETAILS ON SHT. 20.
39. REPAIR LANDSCAPING AND CONCRETE DITCH DAMAGED WITH CONSTRUCTION AREA.
41. REMOVE 16" AND CONSTRUCT 24" STL. WATER MAIN PER SHT. 37.
43. INSTALL AND REMOVE TEMPORARY CHAIN LINK FENCE.
44. CONSTRUCT MODIFIED JUNCTION STRUCTURE TYPE V WITH AUTOMATIC FLAP GATE PER STD. PLAN 1314 AND PER DETAIL ON SHEET 15.
45. INSTALL 2" STL. PIPE SCH. 40, INC. FITTINGS.
23. CONSTRUCT GAGING STATION CONDUIT PER DETAILS ON SHT. 16.

LEGEND

(1) PROTECT IN PLACE.
(2) REMOVE
(4) REMOVE AND SALVAGE.
(5) REMOVE TO 12" MIN BELOW SUB-GRADE.
(6) REMOVE WINGWALL TO CHANNEL WALL. BURN OFF REBARS TO 1" BELOW FACE. FILL HOLES WITH EPOXY AND FINISH TO SATISFACTION OF THE ENGINEER.
(7) REMOVE INTERFERING PORTION OF EXISTING PIPE AND OUTLET STRUCTURE.
(8) ADJUST TO GRADE.
(3) TO BE RELOCATED BY OWNER.

UTILITIES

A 8" SEWER ~ COSTA MESA SANITARY DISTRICT
B 12" SEWER ~ COSTA MESA SANITARY DISTRICT
E 16" WATER ~ CITY OF NEWPORT BEACH, WATER DIV.
H 2" GAS ~ SO. CALIF. GAS CO.

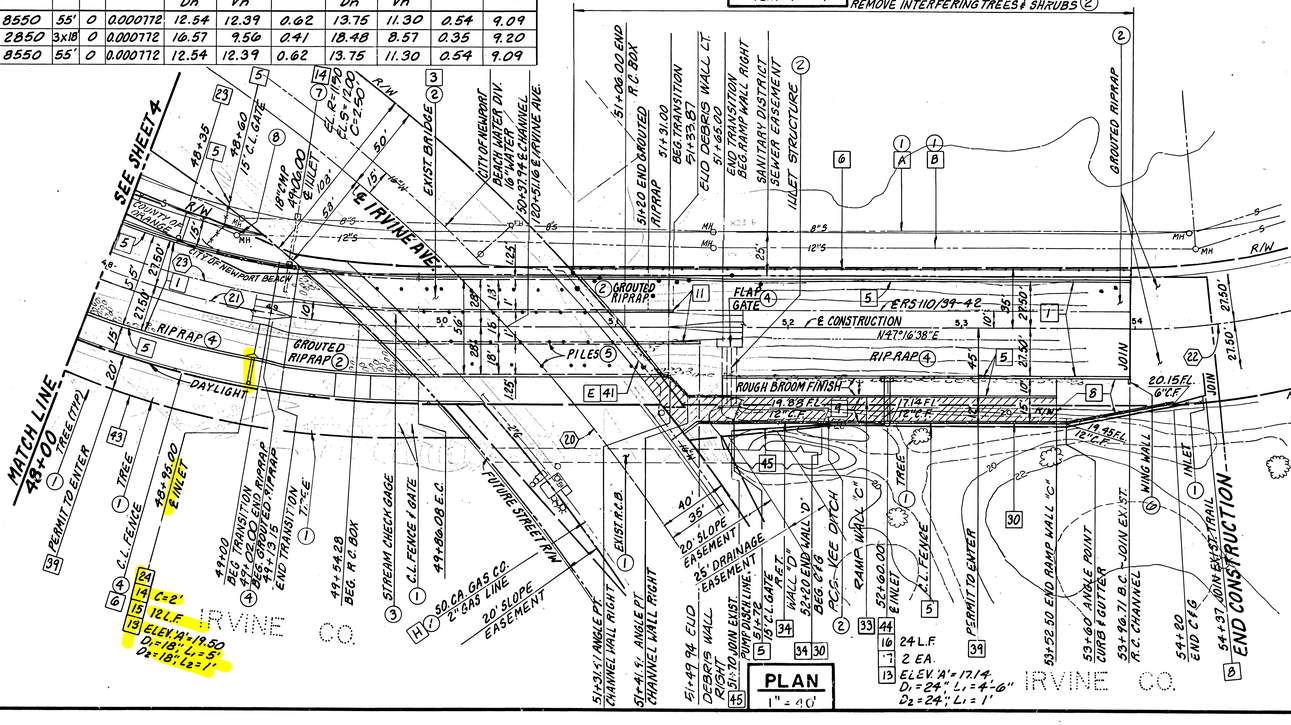
NOTE: PRESENT CHANNEL INVERT FINISH IS NOT APPROPRIATE FOR EQUESTRIAN ACCESS.

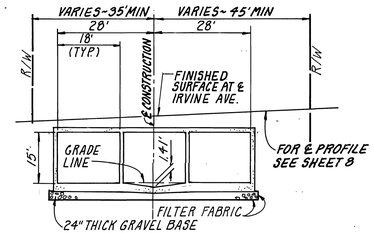
HYDRAULIC DATA

STATION TO STATION	Q	b	z	S	n=0.014 Dn	n=0.014 Vn	F	n=0.016 Dn	n=0.016 Vn	F	Dc
48+00.00 ~ 49+00.00	8550	55'	0	0.000772	12.54	12.39	0.62	13.75	11.30	0.54	9.09
49+54.28 ~ 50+06.00	2850	3x18	0	0.000772	10.57	9.56	0.41	10.48	8.57	0.35	9.20
51+31.00 ~ 53+96.71	8550	55'	0	0.000772	12.54	12.39	0.62	13.75	11.30	0.54	9.09

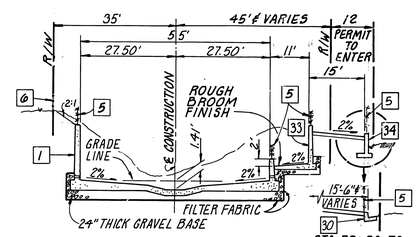
℄ CURVE DATA

(20) Δ = 70°07'41" R = 1000.00' L = 1223.97' T = 701.87'
(21) Δ = 25°49'05" R = 510.00' L = 229.81' T = 116.89'
(22) Δ = 20°17'20" R = 410.00' L = 145.18' T = 73.36'
(23) Δ = 25°49'05" R = 500.00' L = 225.31' T = 114.60'





TYPICAL SECTION
STA. 49+54.28 TO STA. 51+06.00
U.T.S.



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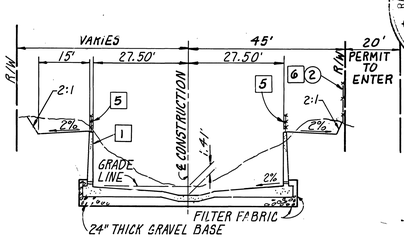
U.T.S.



TYPICAL SECTION
STA. 48+00.00 TO STA. 49+00.00
U.T.S.

REGISTERED PROFESSIONAL ENGINEER VIOLET JAKABCHO C 26879 Exp. 3-31-89 CIVIL STATE OF CALIFORNIA

1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA-DELHI CHANNEL (FOI)

PLAN AND PROFILE

STA. 48+00.00 TO STA. 54+37.00

MARK	DATE	DESCRIPTION
REVISIONS		

PREPARED UNDER SUPERVISION OF [illegible] RCE 26879 DATE

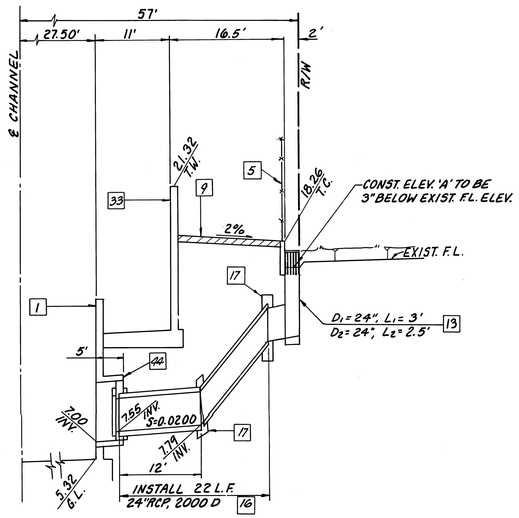
DESIGNED AWM DRAWN HCC, MSB CHECKED VJC

SCALE AS SHOWN | DATE APR 1987 | DWG. NO. FOI-701-11A

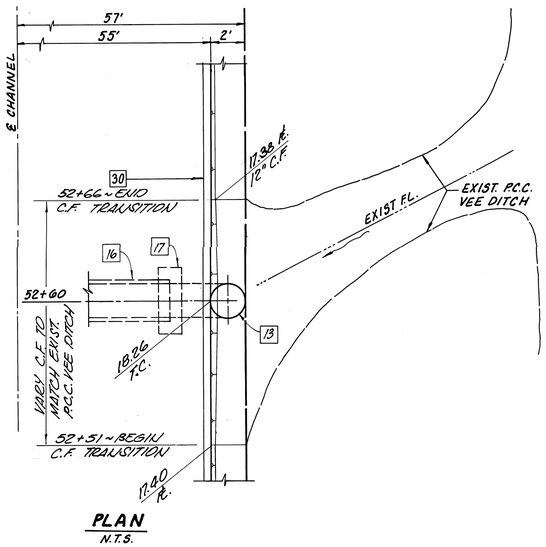
SHEET 5 OF 40

FOI-701-11A

5 40

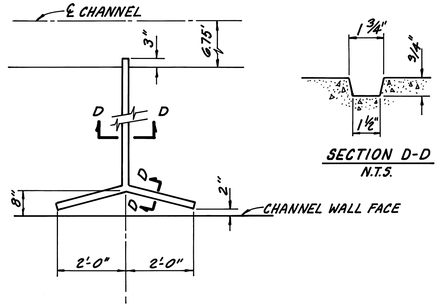


PROFILE
N.T.S.



PLAN
N.T.S.

INLET DETAIL AT STA. 52+60
SHEET 5

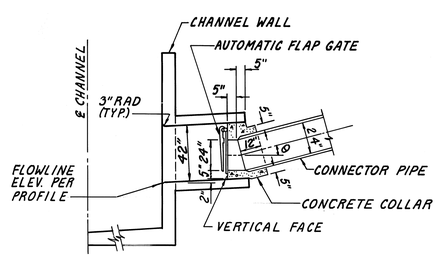


SECTION D-D
N.T.S.

DRAINAGE GROOVE DETAIL 24
1"= 2'-0"

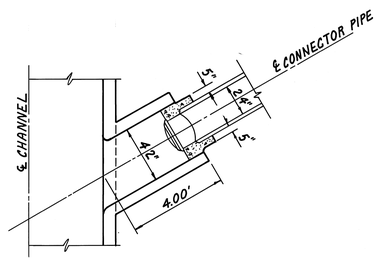
CONSTRUCTION NOTES

1 — CONSTRUCT R.C. RECT. CHANNEL PER PLAN, PROFILE AND TYPICAL SECTION AND PER STRUCTURAL DETAILS ON SHEET 18.
5 — CONSTRUCT 5' C.L. FENCE AND/OR GATE PER PLAN AND TYPICAL SECTION AND PER STD. PLAN 1412.
9 — CONSTRUCT 3" ASPHALT CONCRETE PAVEMENT WITH TACK COAT PER PLANS AND TYPICAL SECTIONS.
13 — CONSTRUCT INLET TYPE V PER PLAN AND PER STD. PLAN 1305.
16 — INSTALL 24" R.C.P. 2000-D, BEDDING PER STD. PLAIN 1319.
17 — CONSTRUCT REINFORCED CONCRETE COLLAR PER STD. PLAN 1317.
24 — CONSTRUCT DRAINAGE GROOVE PER DETAIL ON SHEET 15.
30 — CONSTRUCT MODIFIED CURB AND GUTTER TYPE A-2 PER STD. PLAN 104-0-OC. CURB FACE VARIES 6" TO 12". W=1'-6".
33 — CONSTRUCT ACCESS RAMP WALL 'C' PER DETAILS ON SHEET 20.
44 — CONSTRUCT MODIFIED JUNCTION STRUCTURE TYPE V WITH AUTOMATIC FLAP GATE PER STD. PLAN 1314 AND PER DETAIL ON SHEET 15.



NOTES

1. MOUNTING BOLTS SHALL BE OF STAINLESS STEEL.
2. THE FLAPGATE SHALL BE ARMCO, WATERMAN, CASCADE OR DISTRICT APPROVED EQUAL AUTOMATIC FLAPGATE, DESIGNED FOR 20 FEET OF SEATING HEAD UNLESS OTHERWISE SHOWN ON THE CONTRACT DRAWINGS.
3. THE CONCRETE COLLAR SHALL BE REINFORCED PER STD. DWG. No. 1317 WHEN ANGLE Θ EXCEEDS 10°.
4. FLAPGATE MAY BE EITHER SPIGOT BACK OF FLAT BACK.
5. BUSHINGS SHALL BE BRONZE.



MODIFIED JUNCTION STRUCTURE WITH AUTOMATIC FLAP GATE 44
NOT TO SCALE

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER — VIOLET JAKAB CIVIL — C 26879 — Exp. 3-31-89 — STATE OF CALIFORNIA

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA-DELHI CHANNEL (FOI)

MISCELLANEOUS DETAILS

MARK	DATE	DESCRIPTION
REVISIONS		

DESIGNED AWM
DRAWN HCC CHECKED

PREPARED UNDER SUPERVISION OF
RCE 26879 DATE

SCALE AS SHOWN | DATE APR 1987 | DWG. NO. FOI-701-11A | SHEET 15 OF 40

FOI-701-11A

15 40

Appendix 3

Soil Type Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Orange County and Part of Riverside County, California

July 31, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
173	Myford sandy loam, 2 to 9 percent slopes	19.5	16.7%
174	Myford sandy loam, 2 to 9 percent slopes, eroded	0.5	0.4%
175	Myford sandy loam, 9 to 15 percent slopes	35.4	30.3%
177	Myford sandy loam, 9 to 30 percent slopes, eroded	2.7	2.3%
178	Myford sandy loam, thick surface, 0 to 2 percent slopes	35.1	30.1%
210	Thapto-Histic Fluvaquents	17.1	14.7%
218	Xeralfic arents, loamy, 9 to 15 percent slopes	6.6	5.6%
Totals for Area of Interest		**116.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor

components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Orange County and Part of Riverside County, California

173—Myford sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcnl
Elevation: 0 to 1,560 feet
Mean annual precipitation: 11 to 18 inches
Mean annual air temperature: 62 to 65 degrees F
Frost-free period: 320 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Myford and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myford

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone

Typical profile

A1 - 0 to 1 inches: sandy loam
A2 - 1 to 4 inches: sandy loam
A3 - 4 to 12 inches: sandy loam
Bt1 - 12 to 18 inches: sandy clay
Bt2 - 18 to 28 inches: sandy clay loam
Btk1 - 28 to 35 inches: sandy clay loam
Btk2 - 35 to 41 inches: sandy clay loam
B't1 - 41 to 49 inches: sandy clay loam
B't2 - 49 to 61 inches: sandy clay loam
Bt3 - 61 to 71 inches: sandy clay loam
C - 71 to 79 inches: sandy loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: 8 to 20 inches to abrupt textural change
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
173. *Hydrologic Soil Group:* C
Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

Minor Components

Myford, thick surface

Percent of map unit: 10 percent
Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

Capistrano

Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Yorba, gravelly sandy loam

Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

Chesterton, loamy sand

Percent of map unit: 3 percent
Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

Water

Percent of map unit: 2 percent
Landform: Depressions

174—Myford sandy loam, 2 to 9 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcnm
Elevation: 20 to 1,070 feet
Mean annual precipitation: 11 to 17 inches
Mean annual air temperature: 63 to 65 degrees F
Frost-free period: 320 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Myford, eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myford, Eroded

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone

Typical profile

A - 0 to 7 inches: sandy loam
Bt - 7 to 11 inches: sandy clay
Btk - 11 to 21 inches: sandy clay loam
B't - 21 to 64 inches: sandy clay loam
C - 64 to 79 inches: sandy loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: 4 to 10 inches to abrupt textural change
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

Minor Components

Myford, sandy loam
Percent of map unit: 10 percent
Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Yorba, gravelly sandy loam
Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

175—Myford sandy loam, 9 to 15 percent slopes

Map Unit Setting
National map unit symbol: hcnn
Elevation: 1,500 feet
Mean annual precipitation: 12 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 270 to 350 days
Farmland classification: Not prime farmland

Map Unit Composition
Myford and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myford

Setting
Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Alluvium derived from mixed

Typical profile
H1 - 0 to 12 inches: sandy loam
H2 - 12 to 18 inches: sandy clay

H3 - 18 to 28 inches: sandy clay loam
H4 - 28 to 71 inches: sandy clay loam
H5 - 71 to 79 inches: sandy loam

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
175- *Hydrologic Soil Group:* D
Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

Minor Components

Capistrano, sandy loam

Percent of map unit: 5 percent
Hydric soil rating: No

Myford, sandy loam, eroded

Percent of map unit: 5 percent
Hydric soil rating: No

Yorba, gravelly sandy loam

Percent of map unit: 3 percent
Hydric soil rating: No

San andreas, sandy loam

Percent of map unit: 2 percent
Hydric soil rating: No

177—Myford sandy loam, 9 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcnq
Elevation: 0 to 2,100 feet
Mean annual precipitation: 11 to 18 inches
Mean annual air temperature: 62 to 65 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Myford and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myford

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone

Typical profile

A - 0 to 7 inches: sandy loam
Bt - 7 to 11 inches: sandy clay
Btk - 11 to 21 inches: sandy clay loam
B't - 21 to 64 inches: sandy clay loam
C - 64 to 79 inches: sandy loam

Properties and qualities

Slope: 9 to 30 percent
Depth to restrictive feature: 4 to 10 inches to abrupt textural change
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

Minor Components

Myford, sandy loam

Percent of map unit: 10 percent
Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

Cieneba, sandy loam

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R019XD060CA - SHALLOW LOAMY
Hydric soil rating: No

Yorba, cobbly sandy loam

Percent of map unit: 2 percent
Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

178—Myford sandy loam, thick surface, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hcnr
Elevation: 1,500 feet
Mean annual precipitation: 12 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 270 to 350 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Myford and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myford

Setting

Landform: Terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed

Typical profile

H1 - 0 to 22 inches: sandy loam
H2 - 22 to 28 inches: sandy clay
H3 - 28 to 38 inches: sandy clay loam
H4 - 38 to 71 inches: sandy clay loam

H5 - 71 to 79 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
178 *Hydrologic Soil Group:* D
Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

Minor Components

Myford, sandy loam

Percent of map unit: 10 percent
Hydric soil rating: No

Myford, steeper sloping

Percent of map unit: 5 percent
Hydric soil rating: No

Yorba, gravelly sandy loam

Percent of map unit: 3 percent
Hydric soil rating: No

Chesterson, loamy sand

Percent of map unit: 3 percent
Hydric soil rating: No

Capistrano, sandy loam

Percent of map unit: 3 percent
Hydric soil rating: No

Unnamed, ponded

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

210—Thapto-Histic Fluvaquents

Map Unit Setting

National map unit symbol: hcps

Elevation: 20 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 59 degrees F
Frost-free period: 365 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Thapto-histic fluvaquents and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Thapto-histic Fluvaquents

Setting

Landform: Beach plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Organic material and/or mixed alluvium

Typical profile

Ap - 0 to 9 inches: mucky clay
A - 9 to 21 inches: mucky silty clay
2Oa - 21 to 56 inches: highly decomposed plant material
3C - 56 to 68 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
210 *Hydrologic Soil Group:* D
Ecological site: R019XG902CA - Beaches
Hydric soil rating: Yes

Minor Components

Chino, silty clay loam

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed, steeper soils

Percent of map unit: 5 percent
Hydric soil rating: No

Bolsa, silty clay loam

Percent of map unit: 2 percent
Hydric soil rating: No

Bolsa, silt loam
Percent of map unit: 2 percent
Hydric soil rating: No

Omni, clay
Percent of map unit: 1 percent
Hydric soil rating: No

218—Xeralfic arents, loamy, 9 to 15 percent slopes

Map Unit Setting
National map unit symbol: hcq1
Elevation: 0 to 2,500 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 63 to 66 degrees F
Frost-free period: 365 days
Farmland classification: Not prime farmland

Map Unit Composition
Xeralfic arents and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Xeralfic Arents

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex

Typical profile
H1 - 0 to 60 inches: variable

Properties and qualities
Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups
Land capability classification (irrigated): None specified
Ecological site: F019XG913CA - Loamy Hills <30"ppt
Hydric soil rating: No

Minor Components

Unnamed, undisturbed

Percent of map unit: 15 percent
Hydric soil rating: No

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Appendix 4

Existing Condition Hydrology Calculations

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1355

                          Analysis prepared by:

                         Fuscoe Engineering, Inc.
                          15535 Sand Canyon Ave.
                                Suite 100
                             Irvine, CA 92618

 ************************ DESCRIPTION OF STUDY ************************
* SNUG HARBOR                                                         *
* EXISTING CONDITION                                                  *
* 2 YR                                                                *
 **********************************************************************

  FILE NAME: SNUG2EX.DAT
  TIME/DATE OF STUDY: 16:49 08/06/2024
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I 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

+----------------------------------------------------------------------------+
| SUBAREA A                                                                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

******************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     55.00  DOWNSTREAM(FEET) =     33.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.339
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.180
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
  COMMERCIAL                  D        0.88      0.20     0.100    57     5.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.71
  TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      1.71

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.34
  RAINFALL INTENSITY(INCH/HR) =   2.18
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.88
  TOTAL STREAM AREA(ACRES) =       0.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.71

****************************************************************************
  FLOW PROCESS FROM NODE     11.10 TO NODE     11.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     63.00  DOWNSTREAM(FEET) =     62.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.533
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  D        0.67      0.20     0.100    57     9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.91
  TOTAL AREA(ACRES) =      0.67   PEAK FLOW RATE(CFS) =      0.91

****************************************************************************
  FLOW PROCESS FROM NODE     11.20 TO NODE     11.30 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     62.00
  DOWNSTREAM NODE ELEVATION(FEET) =     55.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   173.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.160
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =  10.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.476
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.78      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.29
  AVERAGE FLOW DEPTH(FEET) =   0.19   FLOOD WIDTH(FEET) =    4.62
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.67   Tc(MIN.) =   10.53
  SUBAREA AREA(ACRES) =    0.78       SUBAREA RUNOFF(CFS) =    1.02
  EFFECTIVE AREA(ACRES) =    1.45     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
```

```
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.90

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOOD WIDTH(FEET) =    6.42
  FLOW VELOCITY(FEET/SEC.) =   4.41   DEPTH*VELOCITY(FT*FT/SEC) =   0.90
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.30 =     503.00 FEET.

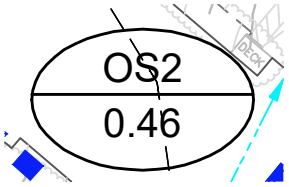
****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.40 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.00  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =    52.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.25
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.90
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   10.61
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.40 =     555.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.40 TO NODE     11.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     33.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE =  0.0300
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.90
  FLOW VELOCITY(FEET/SEC.) =   2.51   FLOW DEPTH(FEET) =   0.05
  TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =   11.60
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.00 =     705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.60
  RAINFALL INTENSITY(INCH/HR) =   1.40
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.45
  TOTAL STREAM AREA(ACRES) =       1.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.90

****************************************************************************
  FLOW PROCESS FROM NODE     11.50 TO NODE     11.60 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   265.00
  ELEVATION DATA: UPSTREAM(FEET) =     62.00  DOWNSTREAM(FEET) =     55.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.859
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.067
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.46      0.20     0.100    57    5.86
```



```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.46   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     11.60 TO NODE     11.70 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    53.00  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =    52.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.70
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.85
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    5.93
  LONGEST FLOWPATH FROM NODE     11.50 TO NODE     11.70 =     317.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.70 TO NODE     11.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     33.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   143.00   CHANNEL SLOPE =  0.0315
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.85
  FLOW VELOCITY(FEET/SEC.) =   1.69   FLOW DEPTH(FEET) =   0.03
  TRAVEL TIME(MIN.) =   1.41   Tc(MIN.) =    7.34
  LONGEST FLOWPATH FROM NODE     11.50 TO NODE     11.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.34
  RAINFALL INTENSITY(INCH/HR) =   1.82
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.46
  TOTAL STREAM AREA(ACRES) =       0.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.85

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.71    5.34    2.180  0.20( 0.02) 0.10       0.9      10.00
      2        1.90   11.60    1.396  0.20( 0.02) 0.10       1.5      11.10
      3        0.85    7.34    1.817  0.20( 0.02) 0.10       0.5      11.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.82    5.34    2.180  0.20( 0.02) 0.10       1.9      10.00
      2        3.84    7.34    1.817  0.20( 0.02) 0.10       2.3      11.50
      3        3.64   11.60    1.396  0.20( 0.02) 0.10       2.8      11.10
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.84    Tc(MIN.) =     7.34
  EFFECTIVE AREA(ACRES) =       2.26   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.8
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.00 =     705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     33.50  DOWNSTREAM(FEET) =     29.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   174.00   CHANNEL SLOPE =  0.0259
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.695
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        0.24      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.09
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.94
  Tc(MIN.) =    8.27
  SUBAREA AREA(ACRES) =     0.24       SUBAREA RUNOFF(CFS) =    0.36
  EFFECTIVE AREA(ACRES) =      2.50     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        3.0         PEAK FLOW RATE(CFS) =       3.84
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   2.95
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     12.00 =     879.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.82    6.27    1.987  0.20( 0.02) 0.10       2.1      10.00
      2        3.84    8.27    1.695  0.20( 0.02) 0.10       2.5      11.50
      3        3.64   12.54    1.336  0.20( 0.02) 0.10       3.0      11.10
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =       3.84  Tc(MIN.) =    8.27
  AREA-AVERAGED Fm(INCH/HR) =  0.02  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10  EFFECTIVE AREA(ACRES) =       2.50

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.27
  RAINFALL INTENSITY(INCH/HR) =   1.70
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.50
  TOTAL STREAM AREA(ACRES) =       3.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.84

****************************************************************************
  FLOW PROCESS FROM NODE     12.10 TO NODE     12.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   270.00
  ELEVATION DATA: UPSTREAM(FEET) =     58.00  DOWNSTREAM(FEET) =     54.00

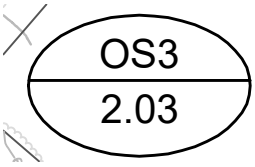
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.626
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.926
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        2.03      0.25      0.100    50    6.63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      3.47
  TOTAL AREA(ACRES) =      2.03   PEAK FLOW RATE(CFS) =      3.47

********************************************************************************
  FLOW PROCESS FROM NODE     12.20 TO NODE     12.30 IS CODE =  41
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    45.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.69
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.47
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    6.81
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     12.30 =     470.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     12.30 TO NODE     12.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     45.00  DOWNSTREAM(FEET) =     29.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.0457
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.683
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.26      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.72
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   1.57
  Tc(MIN.) =    8.38
  SUBAREA AREA(ACRES) =     1.26       SUBAREA RUNOFF(CFS) =    1.89
  EFFECTIVE AREA(ACRES) =      3.29     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.23  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =       4.91

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   4.04
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     12.00 =     820.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
```



```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.38
 RAINFALL INTENSITY(INCH/HR) =   1.68
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.23
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       3.29
 TOTAL STREAM AREA(ACRES) =       3.29
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.91

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        3.82    6.27    1.987  0.20( 0.02) 0.10       2.1      10.00
     1        3.84    8.27    1.695  0.20( 0.02) 0.10       2.5      11.50
     1        3.64   12.54    1.336  0.20( 0.02) 0.10       3.0      11.10
     2        4.91    8.38    1.683  0.23( 0.02) 0.10       3.3      12.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        8.18    6.27    1.987  0.22( 0.02) 0.10       4.6      10.00
     2        8.73    8.27    1.695  0.22( 0.02) 0.10       5.7      11.50
     3        8.75    8.38    1.683  0.22( 0.02) 0.10       5.8      12.10
     4        7.53   12.54    1.336  0.22( 0.02) 0.10       6.3      11.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       8.75    Tc(MIN.) =     8.38
 EFFECTIVE AREA(ACRES) =       5.80   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        6.3
 LONGEST FLOWPATH FROM NODE     11.10 TO NODE     12.00 =     879.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     29.00  DOWNSTREAM(FEET) =     26.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00   CHANNEL SLOPE =  0.0224
 CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.624
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.80      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.32
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.15
 AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   0.54
 Tc(MIN.) =    8.92
 SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    1.15
 EFFECTIVE AREA(ACRES) =      6.60     AREA-AVERAGED Fm(INCH/HR) =   0.02
 AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        7.1         PEAK FLOW RATE(CFS) =       9.52

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   4.24
 LONGEST FLOWPATH FROM NODE     11.10 TO NODE     13.00 =    1013.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.07    6.83    1.892  0.21( 0.02) 0.10       5.4      10.00
      2        9.50    8.81    1.635  0.22( 0.02) 0.10       6.5      11.50
      3        9.52    8.92    1.624  0.22( 0.02) 0.10       6.6      12.10
      4        8.21   13.10    1.302  0.21( 0.02) 0.10       7.1      11.10
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =       9.52  Tc(MIN.) =    8.92
  AREA-AVERAGED Fm(INCH/HR) =  0.02  AREA-AVERAGED Fp(INCH/HR) =  0.22
  AREA-AVERAGED Ap =  0.10  EFFECTIVE AREA(ACRES) =       6.60

+---------------------------------------------------------------------------+
| SUBAREA B                                                                 |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   122.00
  ELEVATION DATA: UPSTREAM(FEET) =     30.00  DOWNSTREAM(FEET) =     15.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.09      0.20     0.100    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.09   PEAK FLOW RATE(CFS) =      0.18

+---------------------------------------------------------------------------+
| SUBAREA C                                                                 |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   266.00
  ELEVATION DATA: UPSTREAM(FEET) =     31.00  DOWNSTREAM(FEET) =     22.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.870
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.886
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.69      0.20     0.400    57    6.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.12
  TOTAL AREA(ACRES) =      0.69   PEAK FLOW RATE(CFS) =      1.12

+---------------------------------------------------------------------------+
| SUBAREA D                                                                 |
|                                                                           |
|                                                                           |
```

```
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   278.00
  ELEVATION DATA: UPSTREAM(FEET) =     54.00  DOWNSTREAM(FEET) =     31.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.038
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.437
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN FAIR COVER
  "TURF"                     C        2.13      0.25     1.000    59   11.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.28
  TOTAL AREA(ACRES) =      2.13   PEAK FLOW RATE(CFS) =      2.28

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    29.00  DOWNSTREAM(FEET) =    21.40
  FLOW LENGTH(FEET) =   218.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.52
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.28
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   11.60
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     496.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.397
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                     D        1.25      0.20     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.25      SUBAREA RUNOFF(CFS) =    1.35
  EFFECTIVE AREA(ACRES) =      3.38   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       3.54

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    21.40  DOWNSTREAM(FEET) =    18.00
  FLOW LENGTH(FEET) =   354.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.15
```

```
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.54
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   12.18
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =     850.00 FEET.

+----------------------------------------------------------------------------+
| SUBAREA E                                                                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
  ELEVATION DATA: UPSTREAM(FEET) =     27.00  DOWNSTREAM(FEET) =     18.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.196
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.596
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN FAIR COVER
  "TURF"                      D        0.36      0.20     1.000    66    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.36   PEAK FLOW RATE(CFS) =      0.45

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     18.00  DOWNSTREAM(FEET) =     17.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE =  0.0062
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.385
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                      D        0.72      0.20     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.84
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.04
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   2.58
  Tc(MIN.) =   11.77
  SUBAREA AREA(ACRES) =     0.72       SUBAREA RUNOFF(CFS) =    0.77
  EFFECTIVE AREA(ACRES) =      1.08     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       1.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   1.17
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =     311.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.77
  RAINFALL INTENSITY(INCH/HR) =   1.38
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       1.08
  TOTAL STREAM AREA(ACRES) =       1.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.15

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     54.00  DOWNSTREAM(FEET) =     37.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.996
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.308
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN FAIR COVER
  "TURF"                      C        1.20      0.25     1.000    59   13.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.14
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      1.14

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     37.00  DOWNSTREAM(FEET) =     32.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   204.00   CHANNEL SLOPE =  0.0245
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.191
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                      C        1.80      0.25     1.000    59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.46
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   2.32
  Tc(MIN.) =   15.32
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    1.52
  EFFECTIVE AREA(ACRES) =      3.00     AREA-AVERAGED Fm(INCH/HR) =   0.25
  AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.0         PEAK FLOW RATE(CFS) =       2.54

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.66
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     55.00 =     534.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     32.00  DOWNSTREAM(FEET) =     19.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   261.00   CHANNEL SLOPE =  0.0479
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.110
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                     D        1.35      0.20     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.18
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   1.99
  Tc(MIN.) =   17.31
  SUBAREA AREA(ACRES) =     1.35       SUBAREA RUNOFF(CFS) =    1.11
  EFFECTIVE AREA(ACRES) =      4.35     AREA-AVERAGED Fm(INCH/HR) =   0.23
  AREA-AVERAGED Fp(INCH/HR) =   0.23  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.3         PEAK FLOW RATE(CFS) =       3.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   2.24
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     56.00 =     795.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     52.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     19.50  DOWNSTREAM(FEET) =     17.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.0227
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.43
  FLOW VELOCITY(FEET/SEC.) =   1.83   FLOW DEPTH(FEET) =   0.12
  TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =   18.31
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     52.00 =     905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.31
  RAINFALL INTENSITY(INCH/HR) =   1.07
  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       4.35
  TOTAL STREAM AREA(ACRES) =       4.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.15   11.77    1.385  0.20( 0.20) 1.00       1.1      50.00
      2        3.43   18.31    1.075  0.23( 0.23) 1.00       4.3      53.00

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

  ** PEAK FLOW RATE TABLE **
```

```
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1        4.17   11.77    1.385  0.22( 0.22) 1.00       3.9      50.00
    2        4.28   18.31    1.075  0.23( 0.23) 1.00       5.4      53.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.28    Tc(MIN.) =    18.31
 EFFECTIVE AREA(ACRES) =       5.43   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        5.4
 LONGEST FLOWPATH FROM NODE     53.00 TO NODE     52.00 =     905.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     57.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     17.00  DOWNSTREAM(FEET) =     16.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   253.00   CHANNEL SLOPE =  0.0040
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.500
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.997
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 URBAN FAIR COVER
 "TURF"                      D        1.44      0.20     1.000    66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.79
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.65
 AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   2.55
 Tc(MIN.) =   20.87
 SUBAREA AREA(ACRES) =     1.44       SUBAREA RUNOFF(CFS) =    1.03
 EFFECTIVE AREA(ACRES) =      6.87     AREA-AVERAGED Fm(INCH/HR) =   0.22
 AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        6.9         PEAK FLOW RATE(CFS) =       4.79

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.47   FLOW VELOCITY(FEET/SEC.) =   1.65
 LONGEST FLOWPATH FROM NODE     53.00 TO NODE     57.00 =    1158.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        4.87   14.34    1.236  0.22( 0.22) 1.00       5.3      50.00
     2        4.79   20.87    0.997  0.22( 0.22) 1.00       6.9      53.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       4.87  Tc(MIN.) =   14.34
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.22
 AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =       5.32

****************************************************************************
 FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     16.00  DOWNSTREAM(FEET) =     15.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   107.00   CHANNEL SLOPE =  0.0047
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.500
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.190
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 URBAN FAIR COVER
 "TURF"                      D        1.22      0.20     1.000    66
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.80
  AVERAGE FLOW DEPTH(FEET) =   0.48   TRAVEL TIME(MIN.) =   0.99
  Tc(MIN.) =   15.33
  SUBAREA AREA(ACRES) =     1.22       SUBAREA RUNOFF(CFS) =    1.09
  EFFECTIVE AREA(ACRES) =      6.54     AREA-AVERAGED Fm(INCH/HR) =   0.21
  AREA-AVERAGED Fp(INCH/HR) =   0.21  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        8.1         PEAK FLOW RATE(CFS) =       5.74

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   1.84
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     58.00 =    1265.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.74   15.33    1.190  0.21( 0.21) 1.00       6.5      50.00
      2        5.48   21.86    0.971  0.22( 0.22) 1.00       8.1      53.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =       5.74  Tc(MIN.) =   15.33
  AREA-AVERAGED Fm(INCH/HR) =  0.21  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =       6.54
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        8.1  TC(MIN.) =     15.33
  EFFECTIVE AREA(ACRES) =      6.54  AREA-AVERAGED Fm(INCH/HR)=  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       5.74

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.74   15.33    1.190  0.21( 0.21) 1.00       6.5      50.00
      2        5.48   21.86    0.971  0.22( 0.22) 1.00       8.1      53.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1355

                          Analysis prepared by:

                         Fuscoe Engineering, Inc.
                          15535 Sand Canyon Ave.
                                Suite 100
                             Irvine, CA 92618

 ************************ DESCRIPTION OF STUDY ************************
* SNUG HARBOR                                                         *
* EXISTING CONDITION                                                  *
* 25 YR                                                               *
 **********************************************************************

  FILE NAME: SNUG2EX.DAT
  TIME/DATE OF STUDY: 16:51 08/06/2024
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  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

+--------------------------------------------------------------------------+
| SUBAREA A                                                                |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     55.00  DOWNSTREAM(FEET) =     33.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.339
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.648
  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                  D        0.88      0.20     0.100    75    5.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      3.67
  TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      3.67

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.34
  RAINFALL INTENSITY(INCH/HR) =   4.65
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.88
  TOTAL STREAM AREA(ACRES) =       0.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.67

****************************************************************************
  FLOW PROCESS FROM NODE     11.10 TO NODE     11.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     63.00  DOWNSTREAM(FEET) =     62.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.284
  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                  D        0.67      0.20     0.100    75    9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.97
  TOTAL AREA(ACRES) =      0.67   PEAK FLOW RATE(CFS) =      1.97

****************************************************************************
  FLOW PROCESS FROM NODE     11.20 TO NODE     11.30 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     62.00
  DOWNSTREAM NODE ELEVATION(FEET) =     55.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   173.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.160
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =  10.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.170
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.78      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.52
  AVERAGE FLOW DEPTH(FEET) =   0.24   FLOOD WIDTH(FEET) =    9.54
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   10.50
  SUBAREA AREA(ACRES) =    0.78       SUBAREA RUNOFF(CFS) =    2.21
  EFFECTIVE AREA(ACRES) =    1.45     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
```

```
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       4.11

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOOD WIDTH(FEET) =   11.46
  FLOW VELOCITY(FEET/SEC.) =   4.66   DEPTH*VELOCITY(FT*FT/SEC) =   1.19
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.30 =     503.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.40 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.00  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =    52.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   2.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.45
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.11
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   10.56
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.40 =     555.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.40 TO NODE     11.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     33.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE =  0.0300
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.11
  FLOW VELOCITY(FEET/SEC.) =   3.16   FLOW DEPTH(FEET) =   0.09
  TRAVEL TIME(MIN.) =   0.79   Tc(MIN.) =   11.35
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.00 =     705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.35
  RAINFALL INTENSITY(INCH/HR) =   3.03
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.45
  TOTAL STREAM AREA(ACRES) =       1.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.11

****************************************************************************
  FLOW PROCESS FROM NODE     11.50 TO NODE     11.60 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   265.00
  ELEVATION DATA: UPSTREAM(FEET) =     62.00  DOWNSTREAM(FEET) =     55.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.859
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.410
  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                 D        0.46      0.20     0.100    75    5.86
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.82
  TOTAL AREA(ACRES) =      0.46   PEAK FLOW RATE(CFS) =      1.82

****************************************************************************
  FLOW PROCESS FROM NODE     11.60 TO NODE     11.70 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    53.00  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =    52.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.43
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.82
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE     11.50 TO NODE     11.70 =     317.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.70 TO NODE     11.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     33.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   143.00   CHANNEL SLOPE =  0.0315
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.82
  FLOW VELOCITY(FEET/SEC.) =   2.40   FLOW DEPTH(FEET) =   0.05
  TRAVEL TIME(MIN.) =   0.99   Tc(MIN.) =    6.91
  LONGEST FLOWPATH FROM NODE     11.50 TO NODE     11.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.91
  RAINFALL INTENSITY(INCH/HR) =   4.02
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.46
  TOTAL STREAM AREA(ACRES) =       0.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.82

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.67    5.34    4.648  0.20( 0.02) 0.10       0.9      10.00
      2        4.11   11.35    3.033  0.20( 0.02) 0.10       1.5      11.10
      3        1.82    6.91    4.017  0.20( 0.02) 0.10       0.5      11.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.26    5.34    4.648  0.20( 0.02) 0.10       1.9      10.00
      2        8.30    6.91    4.017  0.20( 0.02) 0.10       2.2      11.50
      3        7.87   11.35    3.033  0.20( 0.02) 0.10       2.8      11.10
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.30    Tc(MIN.) =     6.91
  EFFECTIVE AREA(ACRES) =       2.22   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.8
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.00 =     705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     33.50  DOWNSTREAM(FEET) =     29.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   174.00   CHANNEL SLOPE =  0.0259
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.803
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        0.24      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.14
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   0.70
  Tc(MIN.) =    7.61
  SUBAREA AREA(ACRES) =     0.24       SUBAREA RUNOFF(CFS) =    0.82
  EFFECTIVE AREA(ACRES) =      2.46     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        3.0         PEAK FLOW RATE(CFS) =       8.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   4.16
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     12.00 =     879.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.38    6.04    4.335  0.20( 0.02) 0.10       2.2      10.00
      2        8.39    7.61    3.803  0.20( 0.02) 0.10       2.5      11.50
      3        7.94   12.05    2.932  0.20( 0.02) 0.10       3.0      11.10
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =       8.39  Tc(MIN.) =    7.61
  AREA-AVERAGED Fm(INCH/HR) =  0.02  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10  EFFECTIVE AREA(ACRES) =       2.46

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.61
  RAINFALL INTENSITY(INCH/HR) =   3.80
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.46
  TOTAL STREAM AREA(ACRES) =       3.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.39

****************************************************************************
  FLOW PROCESS FROM NODE     12.10 TO NODE     12.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   270.00
  ELEVATION DATA: UPSTREAM(FEET) =     58.00  DOWNSTREAM(FEET) =     54.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.626
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.113
  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        2.03      0.25     0.100    69    6.63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      7.47
  TOTAL AREA(ACRES) =      2.03   PEAK FLOW RATE(CFS) =      7.47

****************************************************************************
  FLOW PROCESS FROM NODE     12.20 TO NODE     12.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    45.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  38.04
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.47
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.71
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     12.30 =     470.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.30 TO NODE     12.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     45.00  DOWNSTREAM(FEET) =     29.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.0457
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.735
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        1.26      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.11
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   1.14
  Tc(MIN.) =    7.86
  SUBAREA AREA(ACRES) =     1.26       SUBAREA RUNOFF(CFS) =    4.21
  EFFECTIVE AREA(ACRES) =      3.29     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.23  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =      10.99

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   5.45
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     12.00 =     820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.86
 RAINFALL INTENSITY(INCH/HR) =   3.74
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.23
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       3.29
 TOTAL STREAM AREA(ACRES) =       3.29
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.99

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        8.38    6.04    4.335  0.20( 0.02) 0.10       2.2      10.00
     1        8.39    7.61    3.803  0.20( 0.02) 0.10       2.5      11.50
     1        7.94   12.05    2.932  0.20( 0.02) 0.10       3.0      11.10
     2       10.99    7.86    3.735  0.23( 0.02) 0.10       3.3      12.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       18.19    6.04    4.335  0.22( 0.02) 0.10       4.7      10.00
     2       19.23    7.61    3.803  0.22( 0.02) 0.10       5.6      11.50
     3       19.35    7.86    3.735  0.22( 0.02) 0.10       5.8      12.10
     4       16.55   12.05    2.932  0.22( 0.02) 0.10       6.3      11.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      19.35    Tc(MIN.) =     7.86
 EFFECTIVE AREA(ACRES) =       5.78   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        6.3
 LONGEST FLOWPATH FROM NODE     11.10 TO NODE     12.00 =     879.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     29.00  DOWNSTREAM(FEET) =     26.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00   CHANNEL SLOPE =  0.0224
 CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.634
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.80      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.65
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.71
 AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   0.39
 Tc(MIN.) =    8.25
 SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    2.60
 EFFECTIVE AREA(ACRES) =      6.58     AREA-AVERAGED Fm(INCH/HR) =   0.02
 AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        7.1         PEAK FLOW RATE(CFS) =      21.41

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   5.73
 LONGEST FLOWPATH FROM NODE     11.10 TO NODE     13.00 =    1013.00 FEET.

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

```
      1       20.54    6.44    4.182  0.21( 0.02) 0.10       5.5      10.00
      2       21.33    8.00    3.696  0.22( 0.02) 0.10       6.4      11.50
      3       21.41    8.25    3.634  0.22( 0.02) 0.10       6.6      12.10
      4       18.29   12.47    2.876  0.21( 0.02) 0.10       7.1      11.10
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      21.41  Tc(MIN.) =    8.25
  AREA-AVERAGED Fm(INCH/HR) =  0.02  AREA-AVERAGED Fp(INCH/HR) =  0.22
  AREA-AVERAGED Ap =  0.10  EFFECTIVE AREA(ACRES) =       6.58

+----------------------------------------------------------------------------+
| SUBAREA B                                                                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   122.00
  ELEVATION DATA: UPSTREAM(FEET) =     30.00  DOWNSTREAM(FEET) =     15.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  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                 D        0.09      0.20     0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.09   PEAK FLOW RATE(CFS) =      0.39

+----------------------------------------------------------------------------+
| SUBAREA C                                                                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   266.00
  ELEVATION DATA: UPSTREAM(FEET) =     31.00  DOWNSTREAM(FEET) =     22.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.870
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.030
  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"      D        0.69      0.20     0.400    75    6.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.45
  TOTAL AREA(ACRES) =      0.69   PEAK FLOW RATE(CFS) =      2.45

+----------------------------------------------------------------------------+
| SUBAREA D                                                                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   278.00
  ELEVATION DATA: UPSTREAM(FEET) =     54.00  DOWNSTREAM(FEET) =     31.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.038
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.081
  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.)
  URBAN FAIR COVER
  "TURF"                      C        2.13      0.25     1.000    77   11.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.43
  TOTAL AREA(ACRES) =      2.13   PEAK FLOW RATE(CFS) =      5.43

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    29.00  DOWNSTREAM(FEET) =    21.40
  FLOW LENGTH(FEET) =   218.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.55
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.43
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   11.27
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     496.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.27
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.045
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                      D        1.25      0.20     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.25      SUBAREA RUNOFF(CFS) =    3.20
  EFFECTIVE AREA(ACRES) =      3.38   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       8.56

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    21.40  DOWNSTREAM(FEET) =    18.00
  FLOW LENGTH(FEET) =   354.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.52
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
```

```
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.56
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   11.51
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =     850.00 FEET.

+----------------------------------------------------------------------------+
| SUBAREA E                                                                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
  ELEVATION DATA: UPSTREAM(FEET) =     27.00  DOWNSTREAM(FEET) =     18.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.196
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.417
  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.)
  URBAN FAIR COVER
  "TURF"                     D        0.36      0.20     1.000    82    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.04
  TOTAL AREA(ACRES) =      0.36   PEAK FLOW RATE(CFS) =      1.04

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     18.00  DOWNSTREAM(FEET) =     17.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE =  0.0062
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.074
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                     D        0.72      0.20     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.42
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   1.88
  Tc(MIN.) =   11.08
  SUBAREA AREA(ACRES) =     0.72       SUBAREA RUNOFF(CFS) =    1.86
  EFFECTIVE AREA(ACRES) =      1.08     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       2.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =   1.61
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =     311.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.08
  RAINFALL INTENSITY(INCH/HR) =   3.07
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       1.08
  TOTAL STREAM AREA(ACRES) =       1.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.79

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     54.00  DOWNSTREAM(FEET) =     37.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.996
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.809
  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.)
  URBAN FAIR COVER
  "TURF"                      C        1.20      0.25     1.000    77   13.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.76
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      2.76

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     37.00  DOWNSTREAM(FEET) =     32.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   204.00   CHANNEL SLOPE =  0.0245
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.630
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                      C        1.80      0.25     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.12
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   1.61
  Tc(MIN.) =   14.60
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    3.86
  EFFECTIVE AREA(ACRES) =      3.00     AREA-AVERAGED Fm(INCH/HR) =   0.25
  AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.0         PEAK FLOW RATE(CFS) =       6.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   2.40
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     55.00 =     534.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     32.00  DOWNSTREAM(FEET) =     19.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   261.00   CHANNEL SLOPE =  0.0479
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.501
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                     D        1.35      0.20     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.20
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   1.36
  Tc(MIN.) =   15.96
  SUBAREA AREA(ACRES) =     1.35       SUBAREA RUNOFF(CFS) =    2.80
  EFFECTIVE AREA(ACRES) =      4.35     AREA-AVERAGED Fm(INCH/HR) =   0.23
  AREA-AVERAGED Fp(INCH/HR) =   0.23  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.3         PEAK FLOW RATE(CFS) =       8.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   3.32
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     56.00 =     795.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     52.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     19.50  DOWNSTREAM(FEET) =     17.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.0227
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.87
  FLOW VELOCITY(FEET/SEC.) =   2.71   FLOW DEPTH(FEET) =   0.22
  TRAVEL TIME(MIN.) =   0.68   Tc(MIN.) =   16.64
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     52.00 =     905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.64
  RAINFALL INTENSITY(INCH/HR) =   2.44
  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       4.35
  TOTAL STREAM AREA(ACRES) =       4.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.87

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.79   11.08    3.074  0.20( 0.20) 1.00       1.1      50.00
      2        8.87   16.64    2.442  0.23( 0.23) 1.00       4.3      53.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       10.39   11.08    3.074  0.23( 0.23) 1.00       4.0      50.00
    2       11.05   16.64    2.442  0.23( 0.23) 1.00       5.4      53.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.05    Tc(MIN.) =    16.64
 EFFECTIVE AREA(ACRES) =       5.43   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        5.4
 LONGEST FLOWPATH FROM NODE     53.00 TO NODE     52.00 =     905.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     57.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     17.00  DOWNSTREAM(FEET) =     16.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   253.00   CHANNEL SLOPE =  0.0040
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.500
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.298
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 URBAN FAIR COVER
 "TURF"                     D        1.44      0.20     1.000    82
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.41
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.22
 AVERAGE FLOW DEPTH(FEET) =   0.80   TRAVEL TIME(MIN.) =   1.90
 Tc(MIN.) =   18.54
 SUBAREA AREA(ACRES) =     1.44       SUBAREA RUNOFF(CFS) =    2.72
 EFFECTIVE AREA(ACRES) =      6.87     AREA-AVERAGED Fm(INCH/HR) =   0.22
 AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        6.9         PEAK FLOW RATE(CFS) =      12.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.81   FLOW VELOCITY(FEET/SEC.) =   2.24
 LONGEST FLOWPATH FROM NODE     53.00 TO NODE     57.00 =    1158.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       12.63   13.00    2.809  0.22( 0.22) 1.00       5.4      50.00
    2       12.84   18.54    2.298  0.22( 0.22) 1.00       6.9      53.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      12.84  Tc(MIN.) =   18.54
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.22
 AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =       6.87

****************************************************************************
 FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     16.00  DOWNSTREAM(FEET) =     15.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   107.00   CHANNEL SLOPE =  0.0047
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.500
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.248
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 URBAN FAIR COVER
 "TURF"                     D        1.22      0.20     1.000    82
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.44
  AVERAGE FLOW DEPTH(FEET) =   0.81   TRAVEL TIME(MIN.) =   0.73
  Tc(MIN.) =   19.27
  SUBAREA AREA(ACRES) =     1.22       SUBAREA RUNOFF(CFS) =    2.25
  EFFECTIVE AREA(ACRES) =      8.09     AREA-AVERAGED Fm(INCH/HR) =   0.22
  AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        8.1         PEAK FLOW RATE(CFS) =      14.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.84   FLOW VELOCITY(FEET/SEC.) =   2.47
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     58.00 =    1265.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       14.98   13.73    2.723  0.22( 0.22) 1.00       6.6      50.00
      2       14.78   19.27    2.248  0.22( 0.22) 1.00       8.1      53.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      14.98  Tc(MIN.) =   13.73
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.22
  AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =       6.64
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        8.1  TC(MIN.) =     13.73
  EFFECTIVE AREA(ACRES) =      6.64  AREA-AVERAGED Fm(INCH/HR)=  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap = 1.000
  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   13.73    2.723  0.22( 0.22) 1.00       6.6      50.00
      2       14.78   19.27    2.248  0.22( 0.22) 1.00       8.1      53.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1355

                          Analysis prepared by:

                        Fuscoe Engineering, Inc.
                         15535 Sand Canyon Ave.
                               Suite 100
                            Irvine, CA 92618

 ************************ DESCRIPTION OF STUDY ************************
* SNUG HARBOR                                                         *
* EXISTING CONDITION                                                  *
* 100 YR                                                              *
 ***********************************************************************

  FILE NAME: SNUG2EX.DAT
  TIME/DATE OF STUDY: 16:51 08/06/2024
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III 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

+----------------------------------------------------------------------------+
| SUBAREA A                                                                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

******************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     55.00  DOWNSTREAM(FEET) =     33.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.339
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.959
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
  COMMERCIAL                  D        0.88      0.20     0.100    91    5.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      4.70
  TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      4.70

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.34
  RAINFALL INTENSITY(INCH/HR) =   5.96
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.88
  TOTAL STREAM AREA(ACRES) =       0.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.70

****************************************************************************
  FLOW PROCESS FROM NODE     11.10 TO NODE     11.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     63.00  DOWNSTREAM(FEET) =     62.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.192
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  D        0.67      0.20     0.100    91    9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.52
  TOTAL AREA(ACRES) =      0.67   PEAK FLOW RATE(CFS) =      2.52

****************************************************************************
  FLOW PROCESS FROM NODE     11.20 TO NODE     11.30 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     62.00
  DOWNSTREAM NODE ELEVATION(FEET) =     55.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   173.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.160
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =  10.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.047
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.78      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.93
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.60
  AVERAGE FLOW DEPTH(FEET) =   0.25   FLOOD WIDTH(FEET) =   11.22
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.63   Tc(MIN.) =   10.49
  SUBAREA AREA(ACRES) =    0.78       SUBAREA RUNOFF(CFS) =    2.83
  EFFECTIVE AREA(ACRES) =    1.45     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
```

```
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       5.26

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.27   FLOOD WIDTH(FEET) =   13.26
  FLOW VELOCITY(FEET/SEC.) =   4.76   DEPTH*VELOCITY(FT*FT/SEC) =   1.30
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.30 =     503.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.40 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.00  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =    52.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.65
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.26
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   10.54
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.40 =     555.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.40 TO NODE     11.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     33.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE =  0.0300
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.26
  FLOW VELOCITY(FEET/SEC.) =   3.64   FLOW DEPTH(FEET) =   0.10
  TRAVEL TIME(MIN.) =   0.69   Tc(MIN.) =   11.23
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.00 =     705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.23
  RAINFALL INTENSITY(INCH/HR) =   3.89
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.45
  TOTAL STREAM AREA(ACRES) =       1.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.26

****************************************************************************
  FLOW PROCESS FROM NODE     11.50 TO NODE     11.60 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   265.00
  ELEVATION DATA: UPSTREAM(FEET) =     62.00  DOWNSTREAM(FEET) =     55.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.859
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.650
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.46      0.20     0.100    91    5.86
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.33
  TOTAL AREA(ACRES) =      0.46   PEAK FLOW RATE(CFS) =      2.33

****************************************************************************
  FLOW PROCESS FROM NODE     11.60 TO NODE     11.70 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    53.00  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =    52.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.25
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.33
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE     11.50 TO NODE     11.70 =     317.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.70 TO NODE     11.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     33.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   143.00   CHANNEL SLOPE =  0.0315
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.33
  FLOW VELOCITY(FEET/SEC.) =   2.67   FLOW DEPTH(FEET) =   0.06
  TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =    6.80
  LONGEST FLOWPATH FROM NODE     11.50 TO NODE     11.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.80
  RAINFALL INTENSITY(INCH/HR) =   5.19
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.46
  TOTAL STREAM AREA(ACRES) =       0.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.33

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.70    5.34    5.959  0.20( 0.02) 0.10       0.9      10.00
      2        5.26   11.23    3.892  0.20( 0.02) 0.10       1.5      11.10
      3        2.33    6.80    5.186  0.20( 0.02) 0.10       0.5      11.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.64    5.34    5.959  0.20( 0.02) 0.10       1.9      10.00
      2       10.67    6.80    5.186  0.20( 0.02) 0.10       2.2      11.50
      3       10.07   11.23    3.892  0.20( 0.02) 0.10       2.8      11.10
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.67    Tc(MIN.) =     6.80
  EFFECTIVE AREA(ACRES) =       2.22   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.8
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.00 =     705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     33.50  DOWNSTREAM(FEET) =     29.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   174.00   CHANNEL SLOPE =  0.0259
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.928
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        0.24      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.58
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   0.63
  Tc(MIN.) =    7.44
  SUBAREA AREA(ACRES) =     0.24       SUBAREA RUNOFF(CFS) =    1.06
  EFFECTIVE AREA(ACRES) =      2.46     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        3.0         PEAK FLOW RATE(CFS) =      10.86

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   4.60
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     12.00 =     879.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.88    5.97    5.589  0.20( 0.02) 0.10       2.2      10.00
      2       10.86    7.44    4.928  0.20( 0.02) 0.10       2.5      11.50
      3       10.22   11.87    3.769  0.20( 0.02) 0.10       3.0      11.10
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      10.88  Tc(MIN.) =    5.97
  AREA-AVERAGED Fm(INCH/HR) =  0.02  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10  EFFECTIVE AREA(ACRES) =       2.17

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.97
  RAINFALL INTENSITY(INCH/HR) =   5.59
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.17
  TOTAL STREAM AREA(ACRES) =       3.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.88

****************************************************************************
  FLOW PROCESS FROM NODE     12.10 TO NODE     12.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   270.00
  ELEVATION DATA: UPSTREAM(FEET) =     58.00  DOWNSTREAM(FEET) =     54.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.626
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.265
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        2.03      0.25      0.100    86    6.63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      9.57
  TOTAL AREA(ACRES) =      2.03   PEAK FLOW RATE(CFS) =      9.57

**************************************************************************
  FLOW PROCESS FROM NODE     12.20 TO NODE     12.30 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    45.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  48.76
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.57
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.69
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     12.30 =     470.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     12.30 TO NODE     12.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     45.00  DOWNSTREAM(FEET) =     29.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.0457
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.829
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.26      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.77
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   1.01
  Tc(MIN.) =    7.71
  SUBAREA AREA(ACRES) =     1.26       SUBAREA RUNOFF(CFS) =    5.45
  EFFECTIVE AREA(ACRES) =      3.29     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.23  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =      14.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   6.03
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     12.00 =     820.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.71
 RAINFALL INTENSITY(INCH/HR) =   4.83
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.23
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       3.29
 TOTAL STREAM AREA(ACRES) =       3.29
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.23

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       10.88    5.97    5.589  0.20( 0.02) 0.10       2.2      10.00
     1       10.86    7.44    4.928  0.20( 0.02) 0.10       2.5      11.50
     1       10.22   11.87    3.769  0.20( 0.02) 0.10       3.0      11.10
     2       14.23    7.71    4.829  0.23( 0.02) 0.10       3.3      12.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       23.65    5.97    5.589  0.22( 0.02) 0.10       4.7      10.00
     2       24.88    7.44    4.928  0.22( 0.02) 0.10       5.6      11.50
     3       25.05    7.71    4.829  0.22( 0.02) 0.10       5.8      12.10
     4       21.32   11.87    3.769  0.22( 0.02) 0.10       6.3      11.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      25.05    Tc(MIN.) =     7.71
 EFFECTIVE AREA(ACRES) =       5.78   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        6.3
 LONGEST FLOWPATH FROM NODE     11.10 TO NODE     12.00 =     879.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     29.00  DOWNSTREAM(FEET) =     26.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00   CHANNEL SLOPE =  0.0224
 CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.705
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.80      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.74
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.25
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   0.36
 Tc(MIN.) =    8.06
 SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    3.37
 EFFECTIVE AREA(ACRES) =      6.58     AREA-AVERAGED Fm(INCH/HR) =   0.02
 AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        7.1         PEAK FLOW RATE(CFS) =      27.75

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   6.32
 LONGEST FLOWPATH FROM NODE     11.10 TO NODE     13.00 =    1013.00 FEET.

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

```
      1       26.74    6.33    5.403  0.21( 0.02) 0.10       5.5      10.00
      2       27.65    7.80    4.797  0.22( 0.02) 0.10       6.4      11.50
      3       27.75    8.06    4.705  0.22( 0.02) 0.10       6.6      12.10
      4       23.58   12.25    3.702  0.21( 0.02) 0.10       7.1      11.10
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      27.75  Tc(MIN.) =    8.06
  AREA-AVERAGED Fm(INCH/HR) =  0.02  AREA-AVERAGED Fp(INCH/HR) =  0.22
  AREA-AVERAGED Ap =  0.10  EFFECTIVE AREA(ACRES) =       6.58

+---------------------------------------------------------------------------+
| SUBAREA B                                                                 |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   122.00
  ELEVATION DATA: UPSTREAM(FEET) =     30.00  DOWNSTREAM(FEET) =     15.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.09      0.20     0.100    91    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.50
  TOTAL AREA(ACRES) =      0.09   PEAK FLOW RATE(CFS) =      0.50

+---------------------------------------------------------------------------+
| SUBAREA C                                                                 |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   266.00
  ELEVATION DATA: UPSTREAM(FEET) =     31.00  DOWNSTREAM(FEET) =     22.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.870
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.157
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.69      0.20     0.400    91    6.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      3.15
  TOTAL AREA(ACRES) =      0.69   PEAK FLOW RATE(CFS) =      3.15

+---------------------------------------------------------------------------+
| SUBAREA D                                                                 |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   278.00
  ELEVATION DATA: UPSTREAM(FEET) =     54.00  DOWNSTREAM(FEET) =     31.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.038
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.930
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN FAIR COVER
  "TURF"                      C        2.13      0.25     1.000    92   11.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      7.06
  TOTAL AREA(ACRES) =      2.13   PEAK FLOW RATE(CFS) =      7.06

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    29.00  DOWNSTREAM(FEET) =    21.40
  FLOW LENGTH(FEET) =   218.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.21
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.06
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   11.22
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     496.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.22
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.894
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                      D        1.25      0.20     1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.25      SUBAREA RUNOFF(CFS) =    4.16
  EFFECTIVE AREA(ACRES) =      3.38   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =      11.14

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    21.40  DOWNSTREAM(FEET) =    18.00
  FLOW LENGTH(FEET) =   354.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.92
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
```

```
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.14
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   11.40
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =     850.00 FEET.

+----------------------------------------------------------------------------+
| SUBAREA E                                                                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
  ELEVATION DATA: UPSTREAM(FEET) =     27.00  DOWNSTREAM(FEET) =     18.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.196
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.364
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN FAIR COVER
  "TURF"                      D        0.36      0.20     1.000    95    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.35
  TOTAL AREA(ACRES) =      0.36   PEAK FLOW RATE(CFS) =      1.35

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     18.00  DOWNSTREAM(FEET) =     17.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE =  0.0062
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.957
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                      D        0.72      0.20     1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.56
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   1.71
  Tc(MIN.) =   10.91
  SUBAREA AREA(ACRES) =     0.72       SUBAREA RUNOFF(CFS) =    2.43
  EFFECTIVE AREA(ACRES) =      1.08     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       3.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =     311.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.91
  RAINFALL INTENSITY(INCH/HR) =   3.96
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       1.08
  TOTAL STREAM AREA(ACRES) =       1.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.65

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     54.00  DOWNSTREAM(FEET) =     37.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.996
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.579
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN FAIR COVER
  "TURF"                      C        1.20      0.25     1.000    92   13.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.60
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      3.60

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     37.00  DOWNSTREAM(FEET) =     32.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   204.00   CHANNEL SLOPE =  0.0245
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.371
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                      C        1.80      0.25     1.000    92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.37
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   1.44
  Tc(MIN.) =   14.43
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    5.06
  EFFECTIVE AREA(ACRES) =      3.00     AREA-AVERAGED Fm(INCH/HR) =   0.25
  AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.0         PEAK FLOW RATE(CFS) =       8.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   2.69
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     55.00 =     534.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     32.00  DOWNSTREAM(FEET) =     19.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   261.00   CHANNEL SLOPE =  0.0479
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.216
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                     D        1.35      0.20     1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.26
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.53
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   1.23
  Tc(MIN.) =   15.66
  SUBAREA AREA(ACRES) =     1.35       SUBAREA RUNOFF(CFS) =    3.66
  EFFECTIVE AREA(ACRES) =      4.35     AREA-AVERAGED Fm(INCH/HR) =   0.23
  AREA-AVERAGED Fp(INCH/HR) =   0.23  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.3         PEAK FLOW RATE(CFS) =      11.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   3.73
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     56.00 =     795.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     52.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     19.50  DOWNSTREAM(FEET) =     17.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.0227
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.67
  FLOW VELOCITY(FEET/SEC.) =   2.97   FLOW DEPTH(FEET) =   0.26
  TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =   16.28
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     52.00 =     905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.28
  RAINFALL INTENSITY(INCH/HR) =   3.15
  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       4.35
  TOTAL STREAM AREA(ACRES) =       4.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.67

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.65   10.91    3.957  0.20( 0.20) 1.00       1.1      50.00
      2       11.67   16.28    3.146  0.23( 0.23) 1.00       4.3      53.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       13.65   10.91    3.957  0.23( 0.23) 1.00       4.0      50.00
    2       14.54   16.28    3.146  0.23( 0.23) 1.00       5.4      53.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      14.54    Tc(MIN.) =    16.28
  EFFECTIVE AREA(ACRES) =       5.43   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.4
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     52.00 =     905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     57.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     17.00  DOWNSTREAM(FEET) =     16.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   253.00   CHANNEL SLOPE =  0.0040
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.966
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                     D        1.44      0.20     1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.40
  AVERAGE FLOW DEPTH(FEET) =   0.93   TRAVEL TIME(MIN.) =   1.75
  Tc(MIN.) =   18.04
  SUBAREA AREA(ACRES) =     1.44       SUBAREA RUNOFF(CFS) =    3.59
  EFFECTIVE AREA(ACRES) =      6.87     AREA-AVERAGED Fm(INCH/HR) =   0.22
  AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        6.9         PEAK FLOW RATE(CFS) =      16.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.95   FLOW VELOCITY(FEET/SEC.) =   2.43
  LONGEST FLOWPATH FROM NODE     53.00 TO NODE     57.00 =    1158.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       16.69   12.68    3.631  0.22( 0.22) 1.00       5.4      50.00
      2       16.97   18.04    2.966  0.22( 0.22) 1.00       6.9      53.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      16.97  Tc(MIN.) =   18.04
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.22
  AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =       6.87

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     16.00  DOWNSTREAM(FEET) =     15.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   107.00   CHANNEL SLOPE =  0.0047
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.905
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN FAIR COVER
  "TURF"                     D        1.22      0.20     1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.45
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.64
 AVERAGE FLOW DEPTH(FEET) =   0.95   TRAVEL TIME(MIN.) =   0.68
 Tc(MIN.) =   18.71
 SUBAREA AREA(ACRES) =     1.22       SUBAREA RUNOFF(CFS) =    2.97
 EFFECTIVE AREA(ACRES) =      8.09     AREA-AVERAGED Fm(INCH/HR) =   0.22
 AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        8.1         PEAK FLOW RATE(CFS) =      19.56

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.98   FLOW VELOCITY(FEET/SEC.) =   2.68
 LONGEST FLOWPATH FROM NODE     53.00 TO NODE     58.00 =    1265.00 FEET.

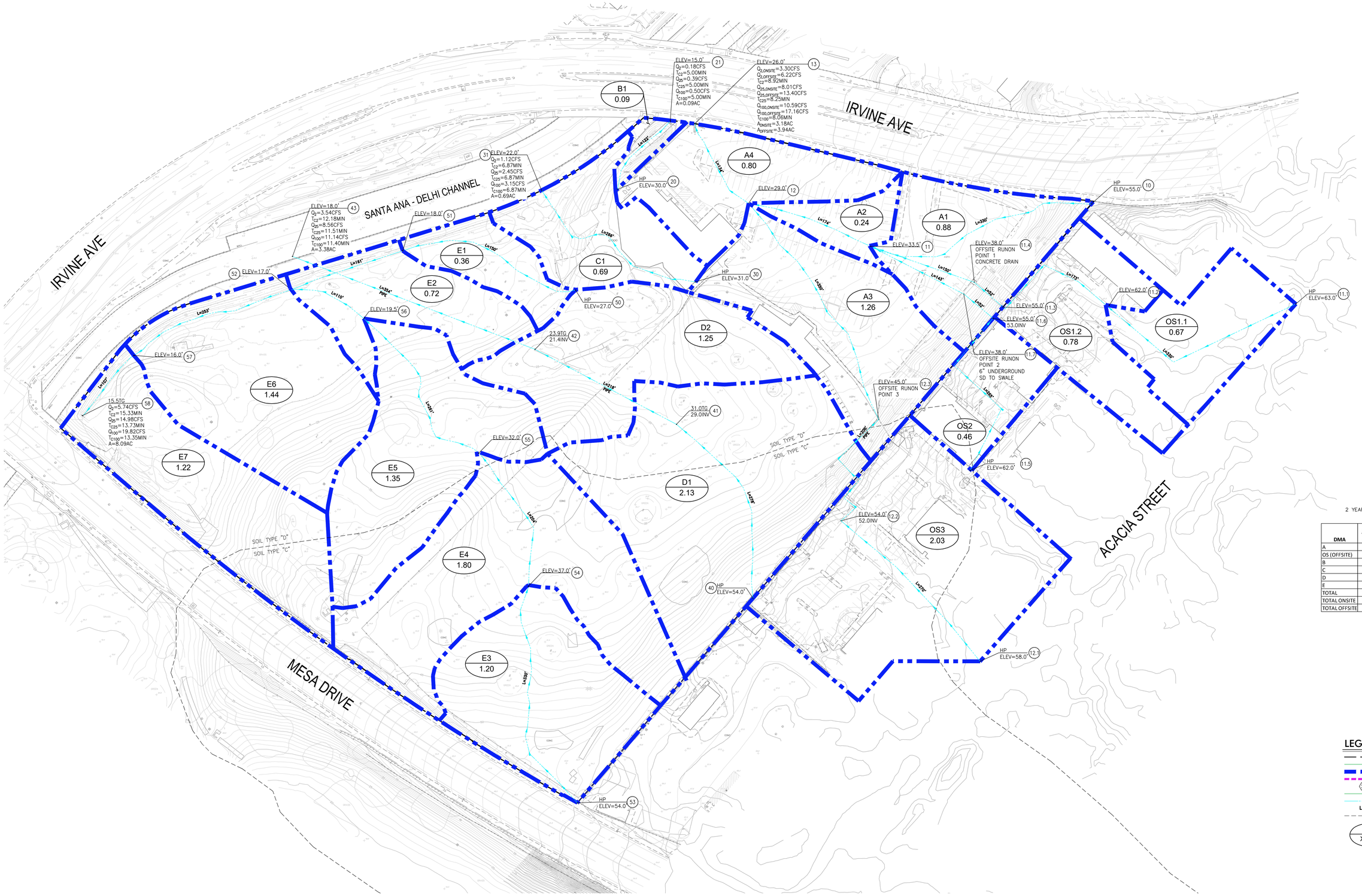
 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       19.82   13.35    3.525  0.22( 0.22) 1.00       6.7      50.00
     2       19.56   18.71    2.905  0.22( 0.22) 1.00       8.1      53.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      19.82  Tc(MIN.) =   13.35
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.22
 AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =       6.65
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        8.1  TC(MIN.) =     13.35
 EFFECTIVE AREA(ACRES) =      6.65  AREA-AVERAGED Fm(INCH/HR)=  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =      19.82

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       19.82   13.35    3.525  0.22( 0.22) 1.00       6.7      50.00
     2       19.56   18.71    2.905  0.22( 0.22) 1.00       8.1      53.00
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Appendix 5

Existing Condition Hydrology Map

EXISTING CONDITION HYDROLOGY



2 YEAR ONSITE RUNOFF VOLUME – 1.78 AC–FT

DMA	AREA (AC)	Q2 (CFS)	Q25 (CFS)	Q100 (CFS)	TC2 (MIN)	TC25 (MIN)	TC100 (MIN)
A	3.18	3.30	8.01	10.59	8.92	8.25	8.06
OS (OFFSITE)	3.94	6.22	13.40	17.16			
B	0.09	0.18	0.39	0.50	5.00	5.00	5.00
C	0.69	1.12	2.45	3.15	6.87	6.87	6.87
D	3.38	3.54	8.56	11.14	12.18	11.51	11.40
E	8.09	5.74	14.95	19.82	15.33	13.73	13.35
TOTAL	19.37	20.10	47.76	62.36	-	-	-
TOTAL ONSITE	15.43	13.88	34.36	45.2			
TOTAL OFFSITE	3.94	6.22	13.4	17.16			

SOIL TYPE "C" & "D"

ABBREVIATIONS

AC	ACRE
AC–FT	ACRE–FOOT
CFS	CUBIC FEET PER SECOND
ELEV	SURFACE ELEVATION
HP	HIGH POINT
INV	PIPE INVERT ELEVATION
L	LENGTH
MIN	MINUTES
Q	FLOW RATE
S	SLOPE
T_C	TIME OF CONCENTRATION
CB	CATCH BASIN

LEGEND

- PROPERTY LINE
- EXISTING STORM DRAIN
- DRAINAGE BOUNDARY
- DRAINAGE SUB–BOUNDARY
- XX — NODE
- ON–SITE AREA DRAIN LINE
- TIME OF CONCENTRATION FLOW PATH
- L=XXX' — FLOW PATH LENGTH
- SOIL TYPE DELINEATION
- X / X.XX — DRAINAGE BOUNDARY DESIGNATION AND AREA

N

50' 0' 25' 50'

SCALE: 1" = 50'

SNUG HARBOR
NEWPORT BEACH, CA 92660

BACK BAY BARRELS, LLC
3857 BIRCH STREET, SUITE 521
NEWPORT BEACH, CA 92660

FUSCOE ENGINEERING
15535 Sand Canyon Ave, Suite 100
Irvine, California 92618
949.474.1960
fuscoe.com

8/8/2024

Appendix 6

Proposed Condition Hydrology Calculations

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**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 23.0  Release Date: 07/01/2016  License ID 1355

                        Analysis prepared by:
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Note: Area E1 consists of the proposed lagoons (5.5 acres), and will be self-contained, draining to sanitary sewer system. Therefore the total on-site area to be discharged is 9.9 acres (15.4 - 5.5)

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 ************************ DESCRIPTION OF STUDY ************************
* Snug Harbor Surf Park                                               *
* Proposed Condition Hydrology                                        *
* 2-year storm event                                                  *
 **********************************************************************

  FILE NAME: PRSH2.DAT
  TIME/DATE OF STUDY: 14:16 11/05/2024
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I 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 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     55.50  DOWNSTREAM(FEET) =     55.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.416
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

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     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL               C        0.14      0.25      0.100    50   11.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100                A-1
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.14   PEAK FLOW RATE(CFS) =      0.18

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.00  DOWNSTREAM(FEET) =    44.70
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.49
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.18
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   12.16
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     454.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<            A-2
============================================================================
  MAINLINE Tc(MIN.) =   12.16
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.359
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               C        0.28      0.25      0.100    50
  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) =    0.34
  EFFECTIVE AREA(ACRES) =      0.42   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       0.50

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    44.70  DOWNSTREAM(FEET) =    37.50
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.00
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.50
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   12.87
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     666.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<          A-3
============================================================================
  MAINLINE Tc(MIN.) =   12.87
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.316
```

```
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.59      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    0.69
  EFFECTIVE AREA(ACRES) =      1.01   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       1.17

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.50  DOWNSTREAM(FEET) =    28.50
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.17
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.17
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   13.25
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =     833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.294
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.66      0.25     0.100    50
  COMMERCIAL                 D        0.02      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    0.78
  EFFECTIVE AREA(ACRES) =      1.69   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       1.93

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    28.50  DOWNSTREAM(FEET) =    25.80
  FLOW LENGTH(FEET) =   267.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.47
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.93
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   14.25
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
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A-4

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------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<        A-5
========================================================================
  MAINLINE Tc(MIN.) =   14.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.241
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.02      0.25     0.100    50
  COMMERCIAL                 D        0.06      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.09
  EFFECTIVE AREA(ACRES) =      1.77   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       1.94

************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.25
  RAINFALL INTENSITY(INCH/HR) =   1.24
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.77
  TOTAL STREAM AREA(ACRES) =       1.77
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.94

************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<    A-6
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   262.00
  ELEVATION DATA: UPSTREAM(FEET) =     40.00  DOWNSTREAM(FEET) =     35.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.356
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.972
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.30      0.20     0.100    57    6.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.53
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      0.53

************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<          A-7
========================================================================
  MAINLINE Tc(MIN.) =    6.36
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.972
  SUBAREA LOSS RATE DATA(AMC  I ):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  D        0.14      0.20      0.100    57
COMMERCIAL                  C        0.14      0.25      0.100    50
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.49
EFFECTIVE AREA(ACRES) =      0.58   AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       1.02
```

A-7

```
****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    6.36
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.972
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  D        0.20      0.20      0.100    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.35
EFFECTIVE AREA(ACRES) =      0.78   AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       1.37
```

A-8

```
****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    6.36
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.972
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  D        0.26      0.20      0.100    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.26      SUBAREA RUNOFF(CFS) =    0.46
EFFECTIVE AREA(ACRES) =      1.04   AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       1.83
```

A-9

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****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    31.50  DOWNSTREAM(FEET) =    25.80
FLOW LENGTH(FEET) =   169.00   MANNING'S N =  0.013
DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.91
ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       1.83
PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    6.76
LONGEST FLOWPATH FROM NODE     16.00 TO NODE     15.00 =     431.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.76
  RAINFALL INTENSITY(INCH/HR) =   1.90
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.04
  TOTAL STREAM AREA(ACRES) =       1.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.83

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.94   14.25    1.241  0.25( 0.02) 0.10       1.8      10.00
      2        1.83    6.76    1.903  0.21( 0.02) 0.10       1.0      16.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.25    6.76    1.903  0.23( 0.02) 0.10       1.9      16.00
      2        3.12   14.25    1.241  0.23( 0.02) 0.10       2.8      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.25    Tc(MIN.) =     6.76
  EFFECTIVE AREA(ACRES) =       1.88   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.8
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    25.80  DOWNSTREAM(FEET) =    11.50
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.80
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.25
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.86
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     18.00 =    1182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.50  DOWNSTREAM(FEET) =    11.10
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
```

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  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.88
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.25
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    7.20
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =    1262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.20
  RAINFALL INTENSITY(INCH/HR) =   1.84
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.88
  TOTAL STREAM AREA(ACRES) =       2.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.25

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     40.00  DOWNSTREAM(FEET) =     33.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.783
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.900
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        1.60      0.20      0.100    57    6.78
  COMMERCIAL                 C        0.20      0.25      0.100    50    6.78
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      3.05
  TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      3.05

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    17.50  DOWNSTREAM(FEET) =    11.30
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.28
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.05
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    6.86
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     386.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
```

A-10

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<          A-11
========================================================================
  MAINLINE Tc(MIN.) =    6.86
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.888
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "GRASS"                    D        0.06      0.20     1.000    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.06      SUBAREA RUNOFF(CFS) =    0.09
  EFFECTIVE AREA(ACRES) =      1.86   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.13
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       3.12

************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     19.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.30  DOWNSTREAM(FEET) =    11.10
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.81
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.12
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    7.04
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     19.00 =     427.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<          A-12
========================================================================
  MAINLINE Tc(MIN.) =    7.04
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.860
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "GRASS"                    D        0.37      0.20     1.000    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    0.55
  EFFECTIVE AREA(ACRES) =      2.23   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       3.62

************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.04
  RAINFALL INTENSITY(INCH/HR) =   1.86
  AREA-AVERAGED Fm(INCH/HR) =  0.06
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.27
 EFFECTIVE STREAM AREA(ACRES) =       2.23
 TOTAL STREAM AREA(ACRES) =       2.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.62

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        3.25    7.20    1.836  0.23( 0.02) 0.10       1.9      16.00
     1        3.12   14.69    1.219  0.23( 0.02) 0.10       2.8      10.00
     2        3.62    7.04    1.860  0.20( 0.06) 0.27       2.2      20.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        6.84    7.04    1.860  0.21( 0.04) 0.20       4.1      20.00
     2        6.82    7.20    1.836  0.21( 0.04) 0.19       4.1      16.00
     3        5.46   14.69    1.219  0.21( 0.04) 0.18       5.0      10.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.84    Tc(MIN.) =     7.04
 EFFECTIVE AREA(ACRES) =       4.07   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        5.0
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =    1262.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    11.10  DOWNSTREAM(FEET) =    11.00
 FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.24
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.84
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    7.14
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     23.00 =    1288.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     39.90  DOWNSTREAM(FEET) =     38.90

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.533
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 C        0.11      0.25     0.100    50    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

Area A

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```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100                  B-1
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    36.40  DOWNSTREAM(FEET) =    34.90
  FLOW LENGTH(FEET) =   303.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.79
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.15
  PIPE TRAVEL TIME(MIN.) =   2.82    Tc(MIN.) =   12.68
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<          B-2
============================================================================
  MAINLINE Tc(MIN.) =   12.68
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.327
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.22      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.26
  EFFECTIVE AREA(ACRES) =      0.33   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.39

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.90  DOWNSTREAM(FEET) =    34.20
  FLOW LENGTH(FEET) =   133.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.34
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.39
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =   13.63
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =     766.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<          B-3
============================================================================
  MAINLINE Tc(MIN.) =   13.63
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.273
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  C        0.14      0.25     0.100    50
  COMMERCIAL                  D        0.30      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      0.77   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       0.87

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.63
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.273
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.08      0.25     0.100    50
  COMMERCIAL                  D        0.16      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.27
  EFFECTIVE AREA(ACRES) =      1.01   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       1.14

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.20  DOWNSTREAM(FEET) =    33.00
  FLOW LENGTH(FEET) =   237.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.02
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.14
  PIPE TRAVEL TIME(MIN.) =   1.31    Tc(MIN.) =   14.94
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     34.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.208
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.23      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.23      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =      1.24   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.2       PEAK FLOW RATE(CFS) =       1.32

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

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B-4

B-5

Area B

```
 FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    33.00  DOWNSTREAM(FEET) =    18.40
 FLOW LENGTH(FEET) =   335.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.32
 PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =   15.73
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     35.00 =    1338.00 FEET.
```

Area B

```
****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     55.00  DOWNSTREAM(FEET) =     32.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.268
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.197
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 D        0.63      0.20      0.100    57    5.27
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.23
 TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.23

****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     51.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.27
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.197
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.87      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    1.70
 EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       2.94

****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     32.00  DOWNSTREAM(FEET) =     27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.0202
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  20.000
```

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C-2

C-3

C-3

```
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.960
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                D        1.65      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.38
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.56
 AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   1.16
 Tc(MIN.) =    6.43
 SUBAREA AREA(ACRES) =     1.65       SUBAREA RUNOFF(CFS) =    2.88
 EFFECTIVE AREA(ACRES) =      3.15     AREA-AVERAGED Fm(INCH/HR) =   0.02
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        3.2         PEAK FLOW RATE(CFS) =       5.50

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   3.73
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =     577.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    21.80
 FLOW LENGTH(FEET) =   121.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.63
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.50
 PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    6.78
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =     698.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    21.80  DOWNSTREAM(FEET) =    20.00
 FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.12
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.50
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    7.02
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     54.00 =     800.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.02
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.863
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                D        0.29      0.20     0.100    57
```

C-4

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.29      SUBAREA RUNOFF(CFS) =    0.48
  EFFECTIVE AREA(ACRES) =      3.44   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       5.70

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.00  DOWNSTREAM(FEET) =    16.70
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.37
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.70
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.07
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     55.00 =     836.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.00  DOWNSTREAM(FEET) =    16.70
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.29
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.70
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    7.13
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     55.00 =     881.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     61.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
  ELEVATION DATA: UPSTREAM(FEET) =     31.50  DOWNSTREAM(FEET) =     15.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.461
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.152
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                D        0.19      0.20      0.850    57    5.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.19   PEAK FLOW RATE(CFS) =      0.34
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.46
  EFFECTIVE AREA(ACRES) =      0.19  AREA-AVERAGED Fm(INCH/HR)=  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.850
```

C-4

Area C

D-1

Area D

```
 PEAK FLOW RATE(CFS)   =       0.34
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Area D

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1355

                          Analysis prepared by:
```

Note: Area E1 consists of the proposed lagoons (5.53 acres), and will be self-contained, draining to sanitary sewer system. Therefore the total on-site area to be discharged is 9.90 acres (15.43 - 5.53)

```
 ************************* DESCRIPTION OF STUDY *************************
* Snug Harbor Surf Park                                                *
* Proposed Condition Hydrology                                         *
* 25-year storm event                                                  *
 ************************************************************************

  FILE NAME: PRSH25.DAT
  TIME/DATE OF STUDY: 13:56 11/05/2024
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  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 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     55.50  DOWNSTREAM(FEET) =     55.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.036
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

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```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL               C        0.14      0.25      0.100    69   11.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100                  A-1
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.14   PEAK FLOW RATE(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.00  DOWNSTREAM(FEET) =    44.70
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.99
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.38
  PIPE TRAVEL TIME(MIN.) =   0.69    Tc(MIN.) =   12.02
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     454.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<          A-2
============================================================================
  MAINLINE Tc(MIN.) =   12.02
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.936
  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) =    0.73
  EFFECTIVE AREA(ACRES) =      0.42   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       1.10

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    44.70  DOWNSTREAM(FEET) =    37.50
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.12
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.10
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   12.60
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     666.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<          A-3
============================================================================
  MAINLINE Tc(MIN.) =   12.60
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.859
```

A-3

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.59      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) =    0.59      SUBAREA RUNOFF(CFS) =    1.50
  EFFECTIVE AREA(ACRES) =      1.01   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       2.58

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.50  DOWNSTREAM(FEET) =    28.50
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.95
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.58
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   12.91
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =     833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

A-4

```
============================================================================
  MAINLINE Tc(MIN.) =   12.91
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.820
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.66      0.25     0.100    69
  COMMERCIAL                 D        0.02      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    1.71
  EFFECTIVE AREA(ACRES) =      1.69   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       4.25

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    28.50  DOWNSTREAM(FEET) =    25.80
  FLOW LENGTH(FEET) =   267.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.42
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.25
  PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =   13.73
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   13.73
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.723
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.02      0.25     0.100    69
  COMMERCIAL                 D        0.06      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.19
  EFFECTIVE AREA(ACRES) =      1.77   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       4.30

************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.73
  RAINFALL INTENSITY(INCH/HR) =   2.72
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.77
  TOTAL STREAM AREA(ACRES) =       1.77
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.30

************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   262.00
  ELEVATION DATA: UPSTREAM(FEET) =     40.00  DOWNSTREAM(FEET) =     35.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.356
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.211
  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                 D        0.30      0.20     0.100    75    6.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.13
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      1.13

************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    6.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.211
  SUBAREA LOSS RATE DATA(AMC  II):
```

A-5

A-6

A-7

A-7

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  D        0.14      0.20      0.100    75
COMMERCIAL                  C        0.14      0.25      0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    1.06
EFFECTIVE AREA(ACRES) =      0.58   AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       2.19

****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

A-8

```
MAINLINE Tc(MIN.) =    6.36
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.211
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  D        0.20      0.20      0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.75
EFFECTIVE AREA(ACRES) =      0.78   AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       2.94

****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

A-9

```
MAINLINE Tc(MIN.) =    6.36
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.211
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  D        0.26      0.20      0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.26      SUBAREA RUNOFF(CFS) =    0.98
EFFECTIVE AREA(ACRES) =      1.04   AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       3.92

****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    31.50  DOWNSTREAM(FEET) =    25.80
FLOW LENGTH(FEET) =   169.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       3.92
PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    6.69
LONGEST FLOWPATH FROM NODE     16.00 TO NODE     15.00 =     431.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.69
  RAINFALL INTENSITY(INCH/HR) =   4.09
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.04
  TOTAL STREAM AREA(ACRES) =       1.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.92

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.30   13.73    2.723  0.25( 0.02) 0.10       1.8      10.00
      2        3.92    6.69    4.090  0.21( 0.02) 0.10       1.0      16.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.08    6.69    4.090  0.23( 0.02) 0.10       1.9      16.00
      2        6.90   13.73    2.723  0.23( 0.02) 0.10       2.8      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.08    Tc(MIN.) =     6.69
  EFFECTIVE AREA(ACRES) =       1.90   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.8
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    25.80  DOWNSTREAM(FEET) =    11.50
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.99
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.08
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    6.77
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     18.00 =    1182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.50  DOWNSTREAM(FEET) =    11.10
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.73
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.08
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    7.05
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =    1262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.05
  RAINFALL INTENSITY(INCH/HR) =   3.97
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.90
  TOTAL STREAM AREA(ACRES) =       2.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.08

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     40.00  DOWNSTREAM(FEET) =     33.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.783
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.059
  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                 D        1.60      0.20      0.100    75    6.78
  COMMERCIAL                 C        0.20      0.25      0.100    69    6.78
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      6.54
  TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      6.54

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    17.50  DOWNSTREAM(FEET) =    11.30
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.86
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.54
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    6.85
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     386.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
```

A-10

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<      A-11
========================================================================
  MAINLINE Tc(MIN.) =    6.85
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.038
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "GRASS"                    D        0.06      0.20     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.06      SUBAREA RUNOFF(CFS) =    0.21
  EFFECTIVE AREA(ACRES) =      1.86   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.13
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       6.72

************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     19.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.30  DOWNSTREAM(FEET) =    11.10
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.49
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.72
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    7.00
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     19.00 =     427.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<        A-12
========================================================================
  MAINLINE Tc(MIN.) =    7.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.988
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "GRASS"                    D        0.37      0.20     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    1.26
  EFFECTIVE AREA(ACRES) =      2.23   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       7.89

************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.00
  RAINFALL INTENSITY(INCH/HR) =   3.99
  AREA-AVERAGED Fm(INCH/HR) =  0.06
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.27
 EFFECTIVE STREAM AREA(ACRES) =       2.23
 TOTAL STREAM AREA(ACRES) =       2.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.89

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        7.08    7.05    3.971  0.23( 0.02) 0.10       1.9      16.00
     1        6.90   14.10    2.683  0.23( 0.02) 0.10       2.8      10.00
     2        7.89    7.00    3.988  0.20( 0.06) 0.27       2.2      20.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       14.95    7.00    3.988  0.21( 0.04) 0.19       4.1      20.00
     2       14.94    7.05    3.971  0.21( 0.04) 0.19       4.1      16.00
     3       12.18   14.10    2.683  0.21( 0.04) 0.18       5.0      10.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      14.95    Tc(MIN.) =     7.00
 EFFECTIVE AREA(ACRES) =       4.12   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =        5.0
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =    1262.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    11.10  DOWNSTREAM(FEET) =    11.00
 FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.11
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.95
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.08
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     23.00 =    1288.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     39.90  DOWNSTREAM(FEET) =     38.90

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.284
 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        0.11      0.25     0.100    69    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

Area A

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```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.32
 TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.32

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    36.40  DOWNSTREAM(FEET) =    34.90
 FLOW LENGTH(FEET) =   303.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.15
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.32
 PIPE TRAVEL TIME(MIN.) =   2.35    Tc(MIN.) =   12.22
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     633.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

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```
============================================================================
 MAINLINE Tc(MIN.) =   12.22
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.909
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.22      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) =    0.22      SUBAREA RUNOFF(CFS) =    0.57
 EFFECTIVE AREA(ACRES) =      0.33   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.86

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    34.90  DOWNSTREAM(FEET) =    34.20
 FLOW LENGTH(FEET) =   133.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.82
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.86
 PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   13.00
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =     766.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

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```
============================================================================
 MAINLINE Tc(MIN.) =   13.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.808
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  C        0.14      0.25     0.100    69
  COMMERCIAL                  D        0.30      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    1.10
  EFFECTIVE AREA(ACRES) =      0.77   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       1.93

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.808
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.08      0.25     0.100    69
  COMMERCIAL                  D        0.16      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.60
  EFFECTIVE AREA(ACRES) =      1.01   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       2.53

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.20  DOWNSTREAM(FEET) =    33.00
  FLOW LENGTH(FEET) =   237.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.69
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.53
  PIPE TRAVEL TIME(MIN.) =   1.07    Tc(MIN.) =   14.07
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     34.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.685
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.23      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.23      SUBAREA RUNOFF(CFS) =    0.55
  EFFECTIVE AREA(ACRES) =      1.24   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.2       PEAK FLOW RATE(CFS) =       2.97

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

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Area B

```
 FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    33.00  DOWNSTREAM(FEET) =    18.40
 FLOW LENGTH(FEET) =   335.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.40
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.97
 PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   14.74
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     35.00 =    1338.00 FEET.
```

Area B

```
**********************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
======================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     55.00  DOWNSTREAM(FEET) =     32.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.268
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.683
 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                 D        0.63      0.20      0.100    75    5.27
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      2.64
 TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.64

**********************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     51.00 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
 MAINLINE Tc(MIN.) =    5.27
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.683
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.87      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    3.65
 EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       6.30

**********************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  51
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     32.00  DOWNSTREAM(FEET) =     27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.0202
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  20.000
```

C-1

C-2

C-3

```
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.256                    C-3
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.65      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.25
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   0.97
  Tc(MIN.) =    6.24
  SUBAREA AREA(ACRES) =     1.65       SUBAREA RUNOFF(CFS) =    6.29
  EFFECTIVE AREA(ACRES) =      3.15     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        3.2         PEAK FLOW RATE(CFS) =      12.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   4.53
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =     577.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    21.80
  FLOW LENGTH(FEET) =   121.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.92
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.01
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =    6.53
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =     698.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    21.80  DOWNSTREAM(FEET) =    20.00
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.48
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.01
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    6.73
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     54.00 =     800.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<          C-4
============================================================================
  MAINLINE Tc(MIN.) =    6.73
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.077
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.29      0.20     0.100    75
```

C-4

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.29      SUBAREA RUNOFF(CFS) =    1.06
  EFFECTIVE AREA(ACRES) =      3.44   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =      12.56

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.00  DOWNSTREAM(FEET) =    16.70
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.24
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.56
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.77
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     55.00 =     836.00 FEET.
```

Area C

```
****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.00  DOWNSTREAM(FEET) =    16.70
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.87
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.56
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    6.82
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     55.00 =     881.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     61.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
  ELEVATION DATA: UPSTREAM(FEET) =     31.50  DOWNSTREAM(FEET) =     15.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.461
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.589
  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.)
  PUBLIC PARK                D        0.19      0.20      0.850    75    5.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.76
  TOTAL AREA(ACRES) =      0.19   PEAK FLOW RATE(CFS) =      0.76
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.46
  EFFECTIVE AREA(ACRES) =      0.19  AREA-AVERAGED Fm(INCH/HR)=  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.850
```

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Area D

```
  PEAK FLOW RATE(CFS)   =       0.76
 ============================================================================
 ============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Area D

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1355

                          Analysis prepared by:
```

Note: Area E1 consists of the proposed lagoons (5.53 acres), and will be self-contained, draining to sanitary sewer system. Therefore the total on-site area to be discharged is 9.90 acres (15.43 - 5.53)

```
 ************************ DESCRIPTION OF STUDY ************************
* Snug Harbor Surf Park                                               *
* Proposed Condition Hydrology                                        *
* 100-storm event                                                     *
 **********************************************************************

  FILE NAME: PRSH100.DAT
  TIME/DATE OF STUDY: 14:35 11/05/2024
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III 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 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     55.50  DOWNSTREAM(FEET) =     55.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.872
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

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```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL               C        0.14      0.25      0.100    86   11.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.48                                        A-1
  TOTAL AREA(ACRES) =      0.14   PEAK FLOW RATE(CFS) =      0.48

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.00  DOWNSTREAM(FEET) =    44.70
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.15
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.48
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   11.99
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     454.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<              A-2
============================================================================
  MAINLINE Tc(MIN.) =   11.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.749
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               C        0.28      0.25      0.100    86
  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) =    0.94
  EFFECTIVE AREA(ACRES) =      0.42   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       1.41

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    44.70  DOWNSTREAM(FEET) =    37.50
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.49
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.41
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   12.53
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     666.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<              A-3
============================================================================
  MAINLINE Tc(MIN.) =   12.53
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.655
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.59      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.93
  EFFECTIVE AREA(ACRES) =      1.01   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       3.30

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.50  DOWNSTREAM(FEET) =    28.50
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.35
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.30
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   12.83
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =     833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.606
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.66      0.25     0.100    86
  COMMERCIAL                 D        0.02      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    2.19
  EFFECTIVE AREA(ACRES) =      1.69   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       5.45

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    28.50  DOWNSTREAM(FEET) =    25.80
  FLOW LENGTH(FEET) =   267.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.67
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.45
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   13.61
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
```

A-3

A-4

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   13.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.486
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.02      0.25     0.100    86
  COMMERCIAL                 D        0.06      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =      1.77   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       5.51

************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.61
  RAINFALL INTENSITY(INCH/HR) =   3.49
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.77
  TOTAL STREAM AREA(ACRES) =       1.77
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.51

************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   262.00
  ELEVATION DATA: UPSTREAM(FEET) =     40.00  DOWNSTREAM(FEET) =     35.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.356
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.392
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.30      0.20     0.100    91    6.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.45
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      1.45

************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    6.36
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.392
  SUBAREA LOSS RATE DATA(AMC III):
```

A-5

A-6

A-7

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  D        0.14      0.20      0.100    91
COMMERCIAL                  C        0.14      0.25      0.100    86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    1.35
EFFECTIVE AREA(ACRES) =      0.58   AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       2.80

****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    6.36
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.392
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  D        0.20      0.20      0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.97
EFFECTIVE AREA(ACRES) =      0.78   AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       3.77

****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    6.36
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.392
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  D        0.26      0.20      0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.26      SUBAREA RUNOFF(CFS) =    1.26
EFFECTIVE AREA(ACRES) =      1.04   AREA-AVERAGED Fm(INCH/HR) =  0.02
AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       5.03

****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    31.50  DOWNSTREAM(FEET) =    25.80
FLOW LENGTH(FEET) =   169.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.79
ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       5.03
PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    6.68
LONGEST FLOWPATH FROM NODE     16.00 TO NODE     15.00 =     431.00 FEET.
```

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A-8

A-9

```
****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.68
  RAINFALL INTENSITY(INCH/HR) =   5.24
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.04
  TOTAL STREAM AREA(ACRES) =       1.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.03

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.51   13.61    3.486  0.25( 0.02) 0.10       1.8      10.00
      2        5.03    6.68    5.242  0.21( 0.02) 0.10       1.0      16.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.10    6.68    5.242  0.23( 0.02) 0.10       1.9      16.00
      2        8.85   13.61    3.486  0.23( 0.02) 0.10       2.8      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.10    Tc(MIN.) =     6.68
  EFFECTIVE AREA(ACRES) =       1.91   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.8
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    25.80  DOWNSTREAM(FEET) =    11.50
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.10
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.10
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.75
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     18.00 =    1182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.50  DOWNSTREAM(FEET) =    11.10
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.97
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.10
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    7.02
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =    1262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.02
  RAINFALL INTENSITY(INCH/HR) =   5.10
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.91
  TOTAL STREAM AREA(ACRES) =       2.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.10

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     40.00  DOWNSTREAM(FEET) =     33.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.783
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.195
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        1.60      0.20      0.100    91    6.78
  COMMERCIAL                 C        0.20      0.25      0.100    86    6.78
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      8.38
  TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      8.38

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    17.50  DOWNSTREAM(FEET) =    11.30
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.69
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.38
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    6.84
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     386.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
```

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```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<          A-11
========================================================================
  MAINLINE Tc(MIN.) =    6.84
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.169
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "GRASS"                    D        0.06      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.06      SUBAREA RUNOFF(CFS) =    0.27
  EFFECTIVE AREA(ACRES) =      1.86   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.13
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       8.61

************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     19.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.30  DOWNSTREAM(FEET) =    11.10
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.87
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.61
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    6.98
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     19.00 =     427.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<          A-12
========================================================================
  MAINLINE Tc(MIN.) =    6.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.110
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "GRASS"                    D        0.37      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    1.63
  EFFECTIVE AREA(ACRES) =      2.23   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =      10.14

************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.98
  RAINFALL INTENSITY(INCH/HR) =   5.11
  AREA-AVERAGED Fm(INCH/HR) =  0.06
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.27
 EFFECTIVE STREAM AREA(ACRES) =       2.23
 TOTAL STREAM AREA(ACRES) =       2.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.14

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        9.10    7.02    5.095  0.23( 0.02) 0.10       1.9      16.00
     1        8.85   13.95    3.436  0.23( 0.02) 0.10       2.8      10.00
     2       10.14    6.98    5.110  0.20( 0.06) 0.27       2.2      20.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       19.23    6.98    5.110  0.21( 0.04) 0.19       4.1      20.00
     2       19.22    7.02    5.095  0.21( 0.04) 0.19       4.1      16.00
     3       15.64   13.95    3.436  0.21( 0.04) 0.18       5.0      10.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      19.23    Tc(MIN.) =     6.98
 EFFECTIVE AREA(ACRES) =       4.13   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =        5.0
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =    1262.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    11.10  DOWNSTREAM(FEET) =    11.00
 FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.23
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.06
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     23.00 =    1288.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     39.90  DOWNSTREAM(FEET) =     38.90

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.192
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 C        0.11      0.25     0.100    86    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

Area A

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  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.41

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    36.40  DOWNSTREAM(FEET) =    34.90
  FLOW LENGTH(FEET) =   303.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.32
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.41
  PIPE TRAVEL TIME(MIN.) =   2.17    Tc(MIN.) =   12.03
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.740
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.22      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.74
  EFFECTIVE AREA(ACRES) =      0.33   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       1.10

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.90  DOWNSTREAM(FEET) =    34.20
  FLOW LENGTH(FEET) =   133.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.94
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.10
  PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =   12.79
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =     766.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.612
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

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B-3

```
  COMMERCIAL                C        0.14      0.25     0.100    86
  COMMERCIAL                D        0.30      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    1.42
  EFFECTIVE AREA(ACRES) =      0.77   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       2.49

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.612
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.08      0.25     0.100    86
  COMMERCIAL                D        0.16      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.78
  EFFECTIVE AREA(ACRES) =      1.01   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       3.26

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.20  DOWNSTREAM(FEET) =    33.00
  FLOW LENGTH(FEET) =   237.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.89
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.26
  PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =   13.80
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     34.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.458
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        0.23      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.23      SUBAREA RUNOFF(CFS) =    0.71
  EFFECTIVE AREA(ACRES) =      1.24   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.2       PEAK FLOW RATE(CFS) =       3.83

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

B-3

B-4

B-5

Area B

```
 FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    33.00  DOWNSTREAM(FEET) =    18.40
 FLOW LENGTH(FEET) =   335.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.18
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.83
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   14.41
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     35.00 =    1338.00 FEET.
****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     55.00  DOWNSTREAM(FEET) =     32.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.268
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.005
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 D        0.63      0.20      0.100    91    5.27
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      3.39
 TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      3.39

****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     51.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.27
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.005
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.87      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    4.69
 EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       8.08

****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     32.00  DOWNSTREAM(FEET) =     27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.0202
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  20.000
```

Area B

C-1

C-2

C-3

C-3

```
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.486
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                D        1.65      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.14
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.58
 AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.90
 Tc(MIN.) =    6.17
 SUBAREA AREA(ACRES) =     1.65       SUBAREA RUNOFF(CFS) =    8.12
 EFFECTIVE AREA(ACRES) =      3.15     AREA-AVERAGED Fm(INCH/HR) =   0.02
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        3.2         PEAK FLOW RATE(CFS) =      15.50

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   4.83
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =     577.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    21.80
 FLOW LENGTH(FEET) =   121.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.42
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.50
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    6.44
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =     698.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    21.80  DOWNSTREAM(FEET) =    20.00
 FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.17
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.50
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    6.62
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     54.00 =     800.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.62
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.266
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                D        0.29      0.20     0.100    91
```

C-4

C-4

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.29      SUBAREA RUNOFF(CFS) =    1.37
  EFFECTIVE AREA(ACRES) =      3.44   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =      16.24

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.00  DOWNSTREAM(FEET) =    16.70
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.04
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.24
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.66
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     55.00 =     836.00 FEET.
```

Area C

```
****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     61.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
  ELEVATION DATA: UPSTREAM(FEET) =     31.50  DOWNSTREAM(FEET) =     15.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.461
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.882
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                D        0.19      0.20     0.850    91    5.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.98
  TOTAL AREA(ACRES) =      0.19   PEAK FLOW RATE(CFS) =      0.98
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.46
  EFFECTIVE AREA(ACRES) =      0.19  AREA-AVERAGED Fm(INCH/HR)=  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.850
  PEAK FLOW RATE(CFS)   =       0.98
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

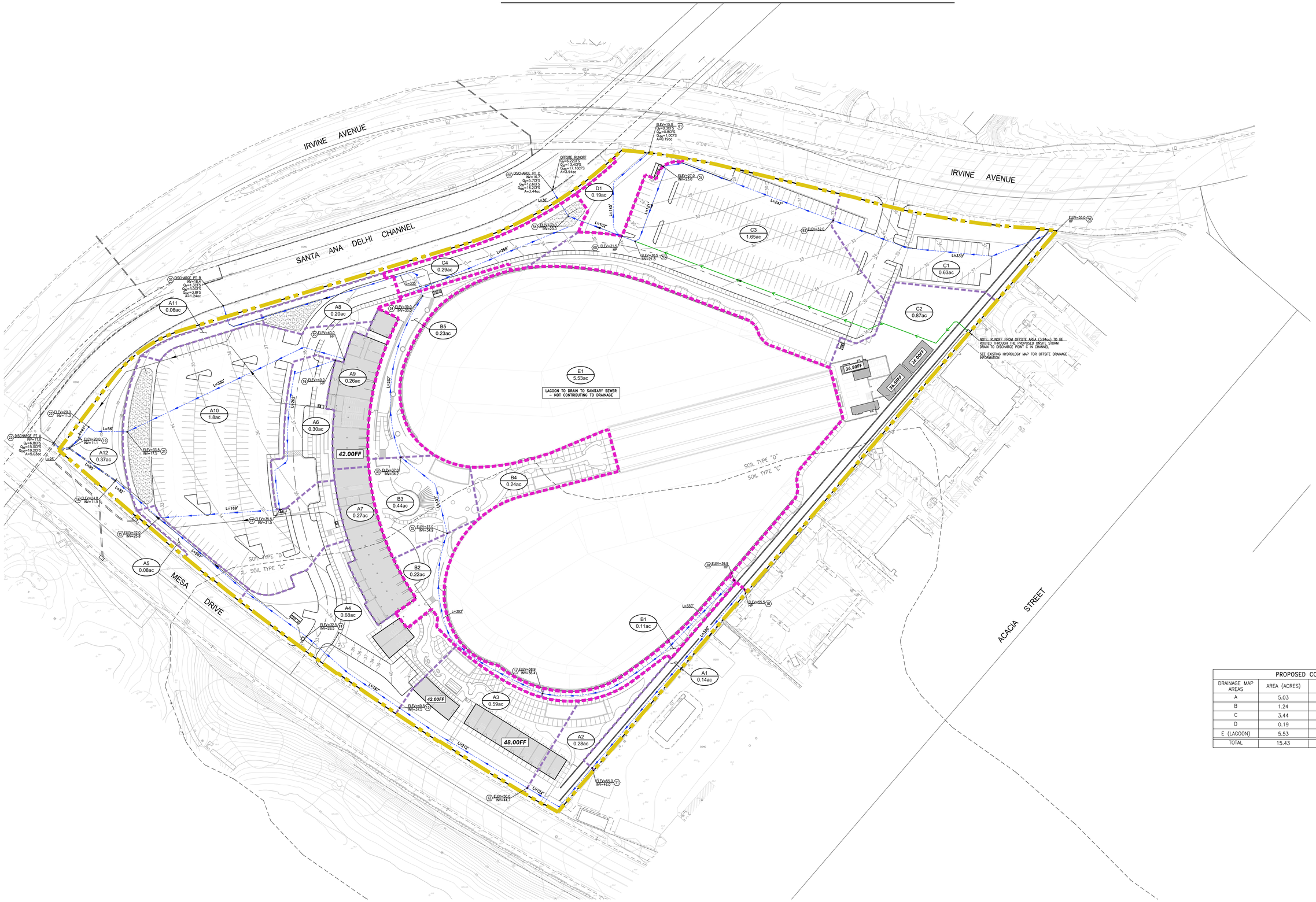
D-1

Area D

Appendix 7

Proposed Condition Hydrology Map

PROPOSED CONDITION HYDROLOGY



ABBREVATIONS

AC	ACRE
AC-FT	ACRE-FOOT
CFS	CUBIC FEET PER SECOND
ELEV	SURFACE ELEVATION
HP	HIGH POINT
INV	PIPE INVERT ELEVATION
L	LENGTH
MIN	MINUTES
Q	FLOW RATE
S	SLOPE
T_c	TIME OF CONCENTRATION
CB	CATCH BASIN

LEGEND

- PROPERTY LINE
- EXISTING STORM DRAIN
- DRAINAGE BOUNDARY
- DRAINAGE SUB-BOUNDARY
- DRAINAGE SUB-AREAS
- (XX) NODE
- ON-SITE AREA DRAIN LINE
- TIME OF CONCENTRATION FLOW PATH
- OFFSITE FLOW PATH
- L=XXX' FLOW PATH LENGTH
- SOIL TYPE DELINEATION
- X / X.XX DRAINAGE BOUNDARY DESIGNATION AND AREA

PROPOSED CONDITION SUMMARY TABLE

DRAINAGE MAP AREAS	AREA (ACRES)	Q2 (CFS)	Q25 (CFS)	Q100 (CFS)
A	5.03	6.8	15.0	19.2
B	1.24	1.3	3.0	3.8
C	3.44	5.7	12.6	16.2
D	0.19	0.3	0.8	1.0
E (LAGOON)	5.53	–	–	–
TOTAL	15.43	14.1	31.4	40.2

N

50' 0' 25' 50'

SCALE: 1" = 50'

SNUG HARBOR
NEWPORT BEACH, CA 92660

BACK BAY BARRELS, LLC
3857 BIRCH STREET, SUITE 521
NEWPORT BEACH, CA 92660

FUSCOE ENGINEERING
15535 Sand Canyon Ave, Suite 100
Irvine, California 92618
949.474.1960
fuscoe.com

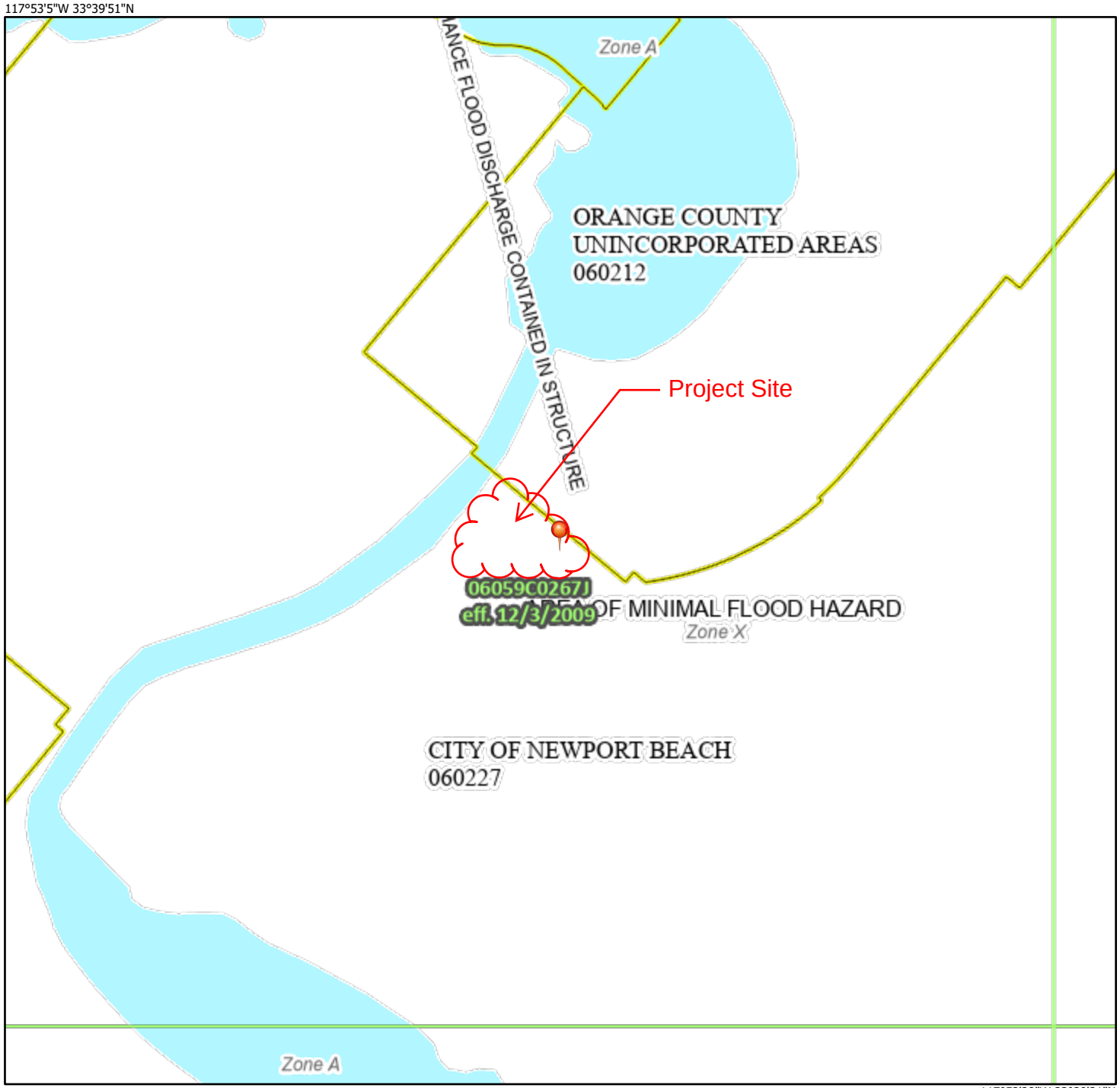
11/05/2024

Appendix 8

FEMA Map

National Flood Hazard Layer FIRMette

FEMA



Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

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

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

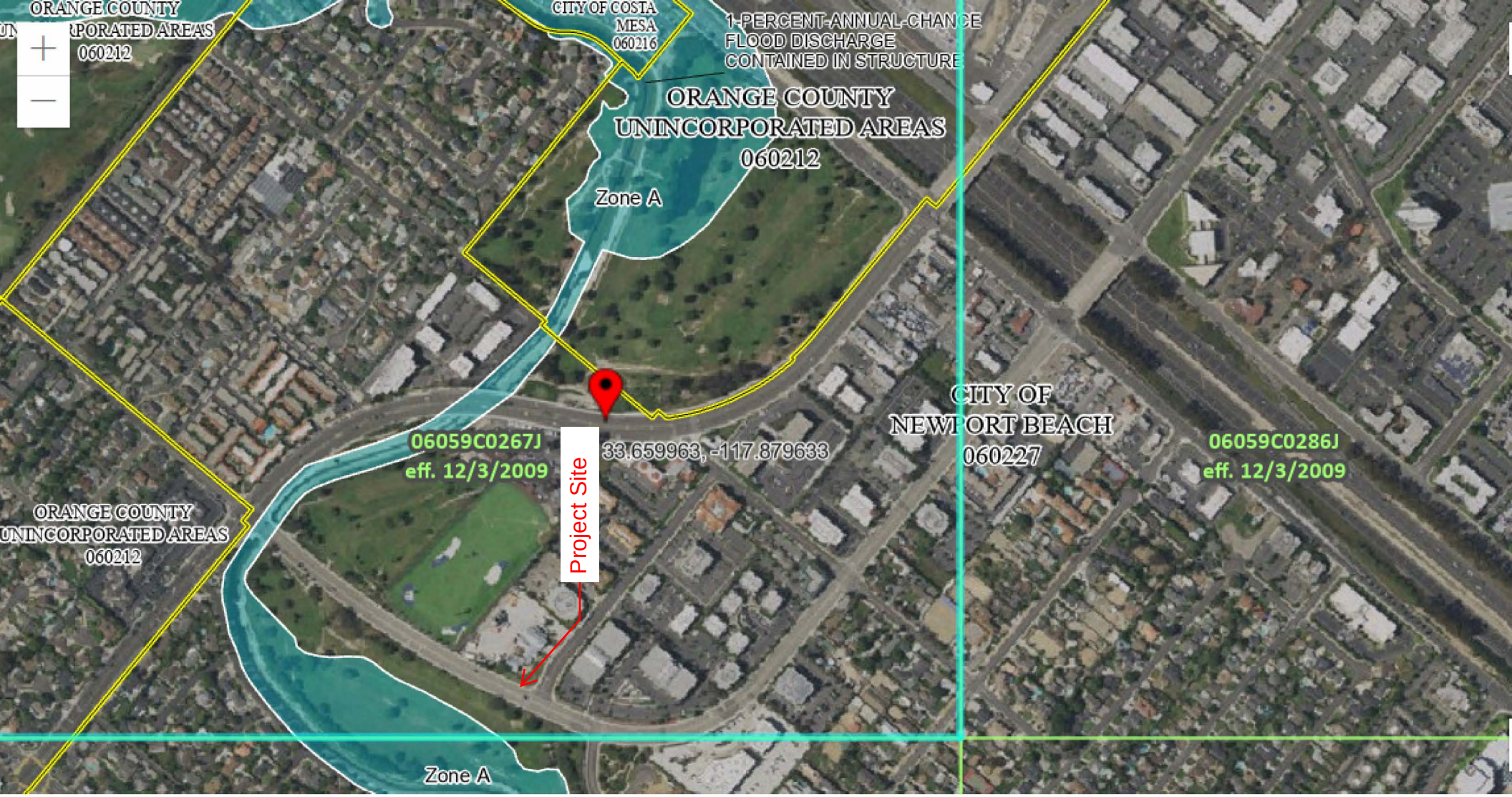
N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/7/2024 at 12:55 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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


ORANGE COUNTY
UNINCORPORATED AREAS
060212
CITY OF COSTA MESA
060216
1-PERCENT-ANNUAL-CHANCE
FLOOD DISCHARGE
CONTAINED IN STRUCTURE
ORANGE COUNTY
UNINCORPORATED AREAS
060212
Zone A
CITY OF
NEWPORT BEACH
060227
06059C0267J
eff. 12/3/2009
33.659963, -117.879633
06059C0286J
eff. 12/3/2009
Project Site
ORANGE COUNTY
UNINCORPORATED AREAS
060212
Zone A

Appendix 9

Hydraulic Calculations

Rating Table for Circular Pipe

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.00500	ft/ft
Normal Depth	0.33	ft
Diameter	4.0	in
Discharge	0.17	ft³/s

Diameter (in)	Normal Depth (ft)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
4.0	0.33	0.17	2.0	0.09	1.05	0.00
6.0	0.50	0.52	2.6	0.20	1.57	0.00
8.0	0.67	1.11	3.2	0.35	2.09	0.00
10.0	0.83	2.01	3.7	0.55	2.62	0.00
12.0	1.00	3.27	4.2	0.79	3.14	0.00
14.0	1.17	4.94	4.6	1.07	3.67	0.00
16.0	1.33	7.05	5.1	1.40	4.19	0.00
18.0	1.50	9.66	5.5	1.77	4.71	0.00