OC DANA POINT HARBOR REVITALIZATION PROJECT

HYDROLOGY AND HYDRAULIC REPORT
LINE L00P01

City of Dana Point
County of Orange, California

Prepared For:

Orange County Dana Point Harbor
24650 Dana Point Harbor Drive
Dana Point, CA 92629

Prepared By:

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Date Prepared: May 3, 2013
Job Number: 307-008-01

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1.0 INTRODUCTION

1.1 INTRODUCTION AND PURPOSE

This drainage study provides analysis to establish runoff discharge rates for Line L00P01, a significant storm drain collection system in the center of the City of Dana Point, and to determine if the Line L00P01 storm drain has available hydraulic capacity to continue to receive and convey runoff from tributary areas originating within the Orange County Dana Point Harbor project boundary (Harbor). The Harbor is currently planning major renovations within its commercial core area south of Dana Point Harbor Drive (formerly Del Obispo Street), west of Puerto Place, and east of Casitas Place. Land use characteristics of the renovation will be similar to those in the existing condition. Line L00P01 originates approximately one mile upstream of the Harbor and captures 234 acres of tributary within the City of Dana Point before entering the Harbor, capturing an additional 4.5 acres of Harbor tributary and outletting through a sea wall into the Dana Point Harbor marina. Refer to Figure 1 for the alignment and tributary boundary of Line L00P01. The portion of Line L00P01 storm drain which resides within the harbor was constructed circa 1968 when the original harbor construction was undertaken and has historically received and conveyed runoff from tributaries within the Harbor project limits. With the planned renovations, the Harbor will continue to send runoff to the existing L00P01 storm drain.

1.2 BACKGROUND

The Line L00P01 storm drain was originally constructed circa 1968 as part of the original Dana Point Harbor grading and infrastructure construction and extended 900-feet between its sea wall outlet into the Dana Point Harbor marina and Dana Point Harbor Drive (formerly Del Obispo Street). The storm drain is a 60″ RCP through the Harbor except for a short 25-foot transition to an RC Box at the sea wall outlet. Line L00P01 storm drain originally terminated just north of Dana Point Harbor Drive as a basin impoundment created by the fill construction for Dana Point Harbor Drive (see Exhibit 1 in Appendix A). At the time of construction, areas upstream of the basin impoundment between Dana Point Harbor Drive and Pacific Coast Highway were open space and areas north of Pacific Coast Highway were moderately populated. Research for this report did not produce a hydrology report for the original harbor grading and infrastructure construction and discharge values or a hydraulic grade line does not appear on the as-built drawings.

On-site improvements were made in the Harbor soon after the original grading and infrastructure improvements (including the 60″ RCP) were completed. On-site improvements in the vicinity of Line L00P01 included building structures housing retail space and Harbor services as well as paved parking lots. Research for this report did not produce as-built drawings for the on-site Harbor improvements. However, because surface evidence indicates inlet locations in the parking lot near the alignment of the 60″ RCP, camera probe work was performed to determine if the inlets connect to Line L00P01. The results of the camera probe work indicate five inlets and three connection pipes join the 60″ RCP storm drain and drain an on-site

tributary of 4.5 acres. The inlets, connector pipes, and their respective tributary areas are shown on Figure 2. It should be noted that the City of Dana Point Master Plan of Drainage (refer to Appendix A-Exhibit 2-Sheet 8) does not indicate the presence of on-site Harbor tributary connections to Line L00P01, and the City of Dana Point Storm Drain Atlas (refer to Appendix A-Exhibit 3-Sheet D9) indicates the presence of two inlets and one connector pipe connection to Line L00P01.

Between the mid 1970's and late 1980's areas to the north of the Harbor were built out and Line L00P01 was extended north from Dana Point Harbor Drive to Selva Road capturing 100 percent of the present day hydrologic boundary. Refer to Appendix A-Exhibits 4 and 5 for Line L00P01 mainline extension as-built drawings. This off-site tributary (upstream of the Harbor) covers 233.6 acres and mainline L00P01 pipe sizes range between 33-inches and 66-inches. Hydrologic information for off-site L00P01 was unavailable although hydraulic data tables presented on Exhibit 4 indicate the segment of L00P01 between Dana Point Harbor Drive and Pacific Coast Highway was originally designed to convey a 10-year storm event.

STONEHILL DR
BLUE LANTERN
SELVA RD
SELVA RD
GOLDEN LANTERN
LA CRESTA
PACIFIC COAST HWY
PACIFIC COAST HWY
DEL PRADO
GOLDEN LANTERN
DANA
POINT
HARBOR
DRIVE
DANA POINT HARBOR

LEGEND

WATERSHED BOUNDARY (EXISTING)

L00P01 EXISTING STORM DRAIN

DANA POINT HARBOR COMMERCIAL CORE BOUNDARY

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FIGURE 1

Line L00P01 Watershed Map

Line L00P01 Drainage Study

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DANA POINT HARBOR DRIVE

EMBARCADERO PLACE

GOLDEN LANTERN

CASITAS PLACE

ON-SITE EXISTING WATERSHED TRIBUTARY BOUNDARY (4.5 Acres)

EXISTING 60" RCP LINE L00P01

EXISTING MANHOLE

CONNECTION 1

EXISTING CB OS-1

EXISTING CB OS-2

EXISTING CB OS-3

EXISTING 60" RCP LINE L00P01

CONNECTION 2

EXISTING CB OS-4

CONNECTION 3 (MANHOLE)

EXISTING CB OS-5

EXISTING RC BOX OUTLET STRUCTURE (THROUGH SEA WALL)

0' 50' 100'

SCALE: 1" = 100'

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FIGURE 2

OC Harbor On-Site SD Connections

Line L00P01 Drainage Study

2.0 HYDROLOGIC ASSESSMENT

2.1 ANALYSIS FRAMEWORK

A hydrologic analysis has been prepared for Line L00P01 existing and proposed conditions utilizing the methodology described in the Orange County Hydrology Manual, October, 1986 (Hydrology Manual) and methods accepted by the Orange County Public Works/Flood Division. Three separate models have been prepared for the two conditions (existing and proposed). Model 1 studies existing condition runoff and assumes no inclusion of tributary from Dana Point Harbor on-site areas (consistent with the City of Dana Point Master Plan of Drainage document, Appendix A-Exhibit 2). Model 2 also studies existing condition runoff but provides for 4.5 acres of Harbor on-site tributary area contributing to the system. This model is the baseline condition model. Model 3 studies proposed condition runoff and assumes no changes to development conditions north of Dana Point Harbor Drive while providing for planned Dana Point Harbor on-site renovation conditions. Proposed condition modeling was based on the Orange County Harbor Revitalization site plan shown on Figure 3. The analysis used in this study is based on the storm frequency of a ten-year high confidence event as specified in the Orange County Local Drainage Manual.

2.2 METHODOLOGY

The hydrologic study limits consist of an area entirely within the incorporated City limits of Dana Point and encompasses a range of tributary acreage between 233.6 acres and 238.1 acres depending on the model. Watershed drainage areas and drainage patterns were defined based upon a review of the City of Dana Point Master Plan of Drainage document and Storm Drain Atlas document, electronic contour mapping obtained from Intermap Technologies, Inc., an on-line vendor, and a field reconnaissance survey. A comprehensive inventory of existing drainage facilities was prepared through a review of record drawings from the City of Dana Point and the County of Orange. A proposed storm drain facility planned for the "Town Center Pacific Coast Highway and Del Prado Streetscape Improvement Project" was also integrated into the models. This storm drain will replace an existing facility which currently traverses private property east of Street of the Golden Lantern and north and south of Pacific Coast Highway. Surface flow conveyance data was derived by takeoff from the electronic contour mapping. Pipe flow conveyance data was taken directly from storm drain as-built drawings for Line L00P01 (see Appendix A-Exhibits 4 and 5). Data on land use was taken from a review of the City of Dana Point Land Use Map, November, 1993 and Zoning Map June, 2008 (refer to Appendix A-Exhibits 6 and 7). Where the two documents were in conflict or were non-specific, a review of aerial photography was utilized to determine the land use. Figure 4, Existing Land Use Map, summarizes the existing land use factors used in the hydrologic models. Land use factors used in the proposed condition model were identical to the existing condition, including the use of a "commercial" factor for all on-site areas in the Harbor south of Dana Point Harbor Drive. Soil Type D conforming to the soil classifications published in the Hydrology Manual were used throughout the watershed. Soil Type D is the most conservative of the four soil groups listed in the Hydrology Manual and has high runoff potential characteristics (slow infiltration rates).

The rational hydrologic method, conforming to the 1986 Orange County Hydrology Manual, was used in this study investigation. This method and the data and criteria it incorporates, is consistent with accepted methods of analyzing storm water runoff in Orange County. The rational method is used when drainage areas are less than 640 acres (one square mile). The rational method relates rainfall intensity, the ratio of runoff to rainfall expressed as a runoff coefficient, and the drainage area size to the peak runoff. Rational method hydrologic computations were made using computer analysis techniques of the RATSCx program by Advanced Engineering Software, Version 19.0, June, 2012.

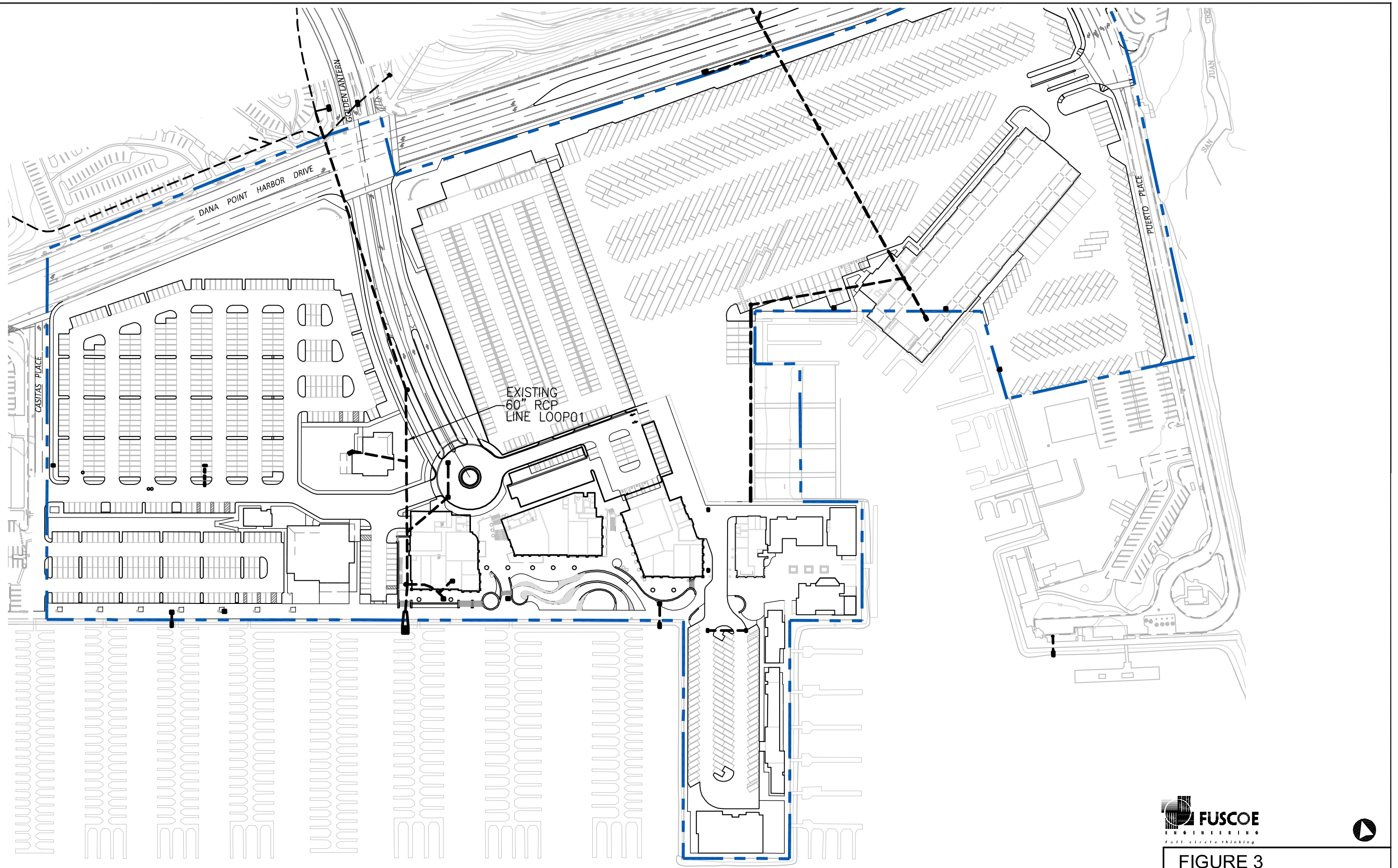
2.3 HYDROLOGIC RESULTS

Watershed hydrology calculations for a 10-year high confidence storm event have been prepared for two existing condition models and one proposed condition model utilizing the methodologies and variables described in Sections 2.1 and 2.2. All three models have identical watershed characteristic upstream of hydrologic Node 191 located at the intersection of Dana Point Harbor Drive and Street of the Golden Lantern and variable watershed characteristics downstream of Node 191. Refer to the study hydrology maps for significant hydrologic model locations in the watershed. Existing condition (w/o Harbor) hydrology calculations and hydrology maps can be found in Appendices B.1 and C.1, respectively. Existing condition (w/Harbor) hydrology calculations and hydrology maps can be found in Appendices B.2 and C.2, respectively. Proposed condition (w/Harbor) hydrology calculations and hydrology maps can be found in Appendices B.3 and C.3, respectively. Table 2.1 summarizes the hydrologic results at Nodes 191 and 214 (Dana Point Harbor Marina)for all three models.

Table 2.1: Watershed Hydrologic Summary

Model No.	Model Description	Tributary Area at Node 191[(1)] (acres)	Discharge at Node 191 (cfs)	Tributary Area at Node 214[(2)] (acres)	Discharge at Node 214 (cfs)
1	Existing 10-year minus harbor tributary	233.6	401.3	233.6	401.3
2	Existing 10-year with harbor tributary	233.6	401.3	238.1	410.5
3	Proposed 10-year with harbor tributary	233.6	401.3	237.1	408.4

(1) Intersection of Dana Point Harbor Drive and Street of the Golden Lantern.
(2) Outlet into Marina.



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

FIGURE 3

OC Harbor Revitalization
Site Plan

Line L00P01 Drainage Study

STONEHILL DR
BLUE LANTERN
SELVA RD
SELVA RD
GOLDEN LANTERN
LA CRESTA
PACIFIC COAST HWY
PACIFIC COAST HWY
DEL PRADO
GOLDEN LANTERN
DANA POINT HARBOR DRIVE
DANA POINT HARBOR
203

LEGEND

- WATERSHED BOUNDARY (EXISTING)
- WATERSHED BOUNDARY (PROPOSED)(1)
- EXISTING STORM DRAIN
- PARK/OPEN SPACE
- RESIDENTIAL SINGLE FAMILY 7 DU/AC
- RESIDENTIAL MULTIPLE FAMILY 7 DU/AC
- RESIDENTIAL MULTIPLE FAMILY 10 DU/AC
- RESIDENTIAL MULTIPLE FAMILY 14 DU/AC
- RESIDENTIAL CONDOMINIUMS
- COMMERCIAL / STREETS

(1) ON-SITE PROPOSED LAND USE IS COMMERCIAL/STREETS

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FIGURE 4

Line L00P01 Existing Land Use Map

Line L00P01 Drainage Study

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3.0 HYDRAULIC ASSESSMENT

3.1 ANALYSIS FRAMEWORK AND METHODOLOGY

Hydraulic modeling analysis has been performed for a portion of Line L00P01 storm drain mainline to determine the hydraulic grade line (HGL) of the system and to determine the sensitivity of Dana Point Harbor on-site tributary runoff inclusion on the system HGL. Line L00P01 traverses 6,850-feet between its origin at the Golden Lantern/Selva Road intersection and its outlet into Dana Point Harbor marina, however, the hydraulic modeling does not extend north of Pacific Coast Highway because the hydraulic flow regime in the pipe system between Dana Point Harbor Drive and Del Prado is supercritical and backwater effects from the downstream system are absent. Three hydraulic models were prepared for the three conditions described in Chapter 2, including existing condition 10-year event without Harbor tributary inclusion (Model 1), existing condition 10-year event with Harbor tributary inclusion (Model 2), and proposed condition 10-year event with Harbor tributary inclusion (Model 3). 10-year event discharges utilized in the hydraulic modeling were taken from the hydrologic results presented in Chapter 2. Hydraulic modeling analysis was performed utilizing the Water Surface Pressure Gradient (WSPG) computer modeling software Version 14.06 from Civil Design Corporation, originally the Los Angeles County Flood Control District program FO515P. Storm drain system stationing, invert elevations, and conduit sizes were taken directly from as-built drawings of the existing L00P01 system (see Appendix A-Exhibits 1 and 4). Because station and vertical datum control were different between the two sets of as-built plans, stations and inverts were converted on the Dana Point Harbor drainage plan (Exhibit 1) to agree with the L00P01 drainage plan (Exhibit 4). Conversion data can be seen on Figures 5a, 5b, and 5c. Hydraulic models 1, 2, and 3 can be found in Appendices D1, D2, and D3 respectively.

3.2 HYDRAULIC RESULTS

Hydraulic grade line results from the three WSPG models described in Section 3.2 are summarized in Tables 3.1, 3.2, and 3.3 respectively.

Table 3.1 HGL Summary-Existing Condition, No Harbor Tributary (Model 1)

Storm Drain Station [1]	Description	Conduit/ Size [1]	Invert Elev [1]	Depth of Flow (ft)	HGL Elev	Finished Surface Elev
1+99.39	Marina Outlet	5'x10' RCB	-12.22	17.26	5.04	7.2
2+80.66	MH in Parking Lot	60" RCP	-0.26	4.89	4.63	9.0
6+10.66	MH in Parking Lot	60" RCP	3.28	9.58	12.86	14.0
10+54.00	MH/JS @ Golden Lantern/DPHD Intersection	60" RCP	5.29	20.95	26.24	26.6
11+00.66	MH/JS to CB on Goldern Lantern	60" RCP	5.69	21.39	27.08	26.5
11+94.98 (Downstream)	Hydraulic Jump	60" RCP	15.68	13.45	29.14	29.2
11+94.98 (Upstream)	Hydraulic Jump	60" RCP	15.68	2.43	18.11	29.2
12+92.50	JS to CB on Golden Lantern	60" RCP	22.89	2.40	25.29	33.5
15+72.50	JS Lateral to Marriot	60" RCP	47.04	2.35	49.39	56.5
16+22.50	MH/JS Lateral to Tr. 11153	60" RCP	52.00	2.32	54.32	61.0
18+62.50	MH/JS Lateral to Tr. 11153	60" RCP	74.54	2.65	77.19	83.2
23+67.50	MH/JS Lateral to Tr.	60" RCP	92.19	3.85	96.04	122.3
25+46.29	JS Lateral to CB at GL/Del Prado Int.	66" RCP	94.54	3.84	98.38	132.0
26+88.61	JS/MH Lateral to CB on Del Prado	66" RCP	96.41	4.16	100.57	133.1

[1] Refer to Exhibits 1 and 4 in Appendix A.

Table 3.2 HGL Summary-Existing Condition, Including Harbor Tributary (Model 2)

Storm Drain Station [1]	Description	Conduit /Size [1]	Invert Elev [1]	Depth of Flow (ft)	HGL Elev	Finished Surface Elev
1+99.39	Marina Outlet	5'x10' RCB	-12.22	17.26	5.04	7.2
2+56.50	JS Lateral to Lower Parking Lot Pickup	60" RCP	-5.74	3.37	-2.37	8.5
2+80.66	MH in Parking Lot	60" RCP	-0.26	4.89	4.63	9.0
3+56.16	JS Lateral to On-Site Golden Lantern CB's	60" RCP	0.55	6.18	6.73	9.7
5+06.16	JS Lateral to On-Site Westerly Parking Lot	60" RCP	2.16	8.55	10.71	12.7
6+10.66	MH in Parking Lot	60" RCP	3.28	10.45	13.73	14.0
10+54.00	MH/JS @ Golden Lantern/DPHD Intersection	60" RCP	5.29	21.83	27.12	26.6
11+00.66	MH/JS to CB on Golden Lantern	60" RCP	5.69	22.27	27.96	26.5
12+09.85 (Downstream)	Hydraulic Jump	60" RCP	16.79	13.49	30.28	30.1
12+09.85 (Upstream)	Hydraulic Jump	60" RCP	16.79	2.42	19.21	30.1
12+92.50	JS to CB on Golden Lantern	60" RCP	22.89	2.40	25.29	33.5
15+72.50	JS Lateral to Marriot	60" RCP	47.04	2.35	49.39	56.5
16+22.50	MH/JS Lateral to Tr. 11153	60" RCP	52.00	2.32	54.32	61.0
18+62.50	MH/JS Lateral to Tr. 11153	60" RCP	74.54	2.65	77.19	83.2
23+67.50	MH/JS Lateral to Tr.	60" RCP	92.19	3.85	96.04	122.3
25+46.29	JS Lateral to CB at GL/Del Prado Int.	66" RCP	94.54	3.84	98.38	132.0
26+88.61	JS/MH Lateral to CB on Del Prado	66" RCP	96.41	4.16	100.57	133.1

[1] Refer to Exhibits 1 and 4 in Appendix A.

Table 3.3 HGL Summary-Proposal Condition, Including Harbor Tributary (Model 3)

Storm Drain Station [1]	Description	Conduit /Size [1]	Invert Elev [1]	Depth of Flow (ft)	HGL Elev	Finished Surface Elev
1+99.39	Marina Outlet	5'x10' RCB	-12.22	17.26	5.04	7.2
2+65.77	JS/MH Lateral to Westerly Parking Lot	60" RCP	-3.64	3.64	0.00	10.5
2+80.66	MH in Parking Lot	60" RCP	-0.26	4.89	4.63	10.5
4+23.74	JS/MH Lateral to Terrace Area	60" RCP	1.27	7.32	8.59	9.5
6+10.66	MH in Parking Lot	60" RCP	3.28	10.29	13.57	15.0
10+54.00	MH/JS @ Golden Lantern/DPHD Intersection	60" RCP	5.29	21.66	26.96	26.6
11+00.66	MH/JS to CB on Golden Lantern	60" RCP	5.69	22.10	27.79	26.5
12+07.08 (Downstream)	Hydraulic Jump	60" RCP	16.58	13.49	30.07	30.0
12+07.08 (Upstream)	Hydraulic Jump	60" RCP	16.58	2.43	19.01	30.0
12+92.50	JS to CB on Golden Lantern	60" RCP	22.89	2.40	25.29	33.5
15+72.50	JS Lateral to Marriot	60" RCP	47.04	2.35	49.39	56.5
16+22.50	MH/JS Lateral to Tr. 11153	60" RCP	52.00	2.32	54.32	61.0
18+62.50	MH/JS Lateral to Tr. 11153	60" RCP	74.54	2.65	77.19	83.2
23+67.50	MH/JS Lateral to Tr.	60" RCP	92.19	3.85	96.04	122.3
25+46.29	JS Lateral to CB at GL/Del Prado Int.	66" RCP	94.54	3.84	98.38	132.0
26+88.61	JS/MH Lateral to CB on Del Prado	66" RCP	96.41	4.16	100.57	133.1

[1] Refer to Exhibits 1 and 4 in Appendix A.

The analysis results identify several key items;

- Except for a short segment of open channel flow between stations 2+35 and 2+85, flow passing through the Harbor is under pressure in all three model scenarios.

- Although pressure flow is prevalent in Line L00P01 as it passes through the Harbor, the hydraulic grade line stays below ground and provides freeboard under all three model conditions.

- The mainline junction structure at station 10+54 located at the intersection of Golden Lantern and Dana Point Harbor Drive receives substantial lateral flow from tributaries to the west. The flow regime is pressurized and the hydraulic grade line is near or above finished surface at this location under all three model conditions.

- A significant grade break in the pipe invert occurs at station 11+00 transitioning from a steep invert gradient upstream of the location to a flat invert gradient downstream of the location. This grade break causes a hydraulic jump in the hydraulic grade line generally around station 12+00 in all three models. Downstream of the hydraulic jump, flow in the pipe system becomes pressurized and the hydraulic grade line is above ground at station 11+00.66 likely creating on outflow condition during a ten-year peak flow storm even at the catch basin on the west side of Golden Lantern just north of the intersection. The contribution of runoff to the system from Dana Point Harbor on-site tributaries does not change this condition in any of the models.

- An open channel flow regime with supercritical flow is present upstream of the hydraulic jump (upstream of station 12+00) in all three models.

3.3 CONCLUSIONS

The Orange County Dana Point Harbor Revitalization Project is planning renovations to the harbor's commercial core area south of Dana Point Harbor Drive, east of Casitas Place, and west of Puerto Place in the City of Dana Point. The Harbor was originally constructed in the late 1960's and early 1970's and included a 60" RCP storm drain conduit to drain off-site areas upstream of the Harbor and to drain portions of the commercial core area in the Harbor. The conduit (Line L00P01) outlets into the Dana Point Harbor marina and was originally constructed 835-feet north to a terminus just north of Dana Point Harbor Drive (formerly Del Obispo Street). Between the mid-1970's and late 1980's, Line L00P01 was extended northerly in phases to its terminus at the intersection of Selva Road and Street of The Golden Lantern. Drainage planning for the Harbor Revitalization Project allows for Line L00P01 to continue receiving runoff from up to 4.5 acres of tributary area from the on-site Harbor watershed which is consistent with historical drainage usage patterns. Due to the absence of reliable hydrologic and hydraulic information for Line L00P01, analysis has been prepared and presented in this report to confirm that the continued flow of Harbor tributary to Line L00P01 will not have an adverse effect to the hydraulic performance of the pipe system. Results presented throughout the report lead to the following conclusions:

- Runoff from 4.5 acres of on-site Harbor tributary watershed has historically flowed into and been conveyed to the marina outlet by the Line L00P01 storm drain system.

- The City of Dana Point Master Plan of Drainage Document (Appendix A-Exhibit 2) has omitted the 4.5 acre Harbor watershed from inclusion into Line L00P01's overall tributary watershed.

- Model 1 results presented in this report do not represent the current hydrologic and hydraulic condition of the storm drain system because the model does not include runoff from the 4.5 acres of Harbor tributary.

- With the inclusion of 10-year storm event runoff from up to 4.5 acres of Harbor tributary, the hydraulic grade line of Line L00P01 remains below finished ground through the Harbor area and provides freeboard in existing (Model 2) and proposed (Model 3) modeling conditions.

- Existing condition (Model 2) hydraulic modeling results indicate runoff from a 10-year peak flow storm event will be purged from a catch basin inlet on the Street of The Golden Lantern just north of the intersection with Dana Point Harbor Drive (around storm drain station 11+00). Proposed condition (Model 3) hydraulic modeling results indicate this condition will not be changed and the inclusion of on-site Harbor runoff into the system will not otherwise adversely affect the L00P01 storm drain system.

Results and conclusions stated above and throughout this analysis and report confirm that storm flow runoff from up to 4.5 acres of Harbor tributary watershed can be conveyed through the Harbor by Line L00P01 without any adverse effect to the hydraulic grade line.

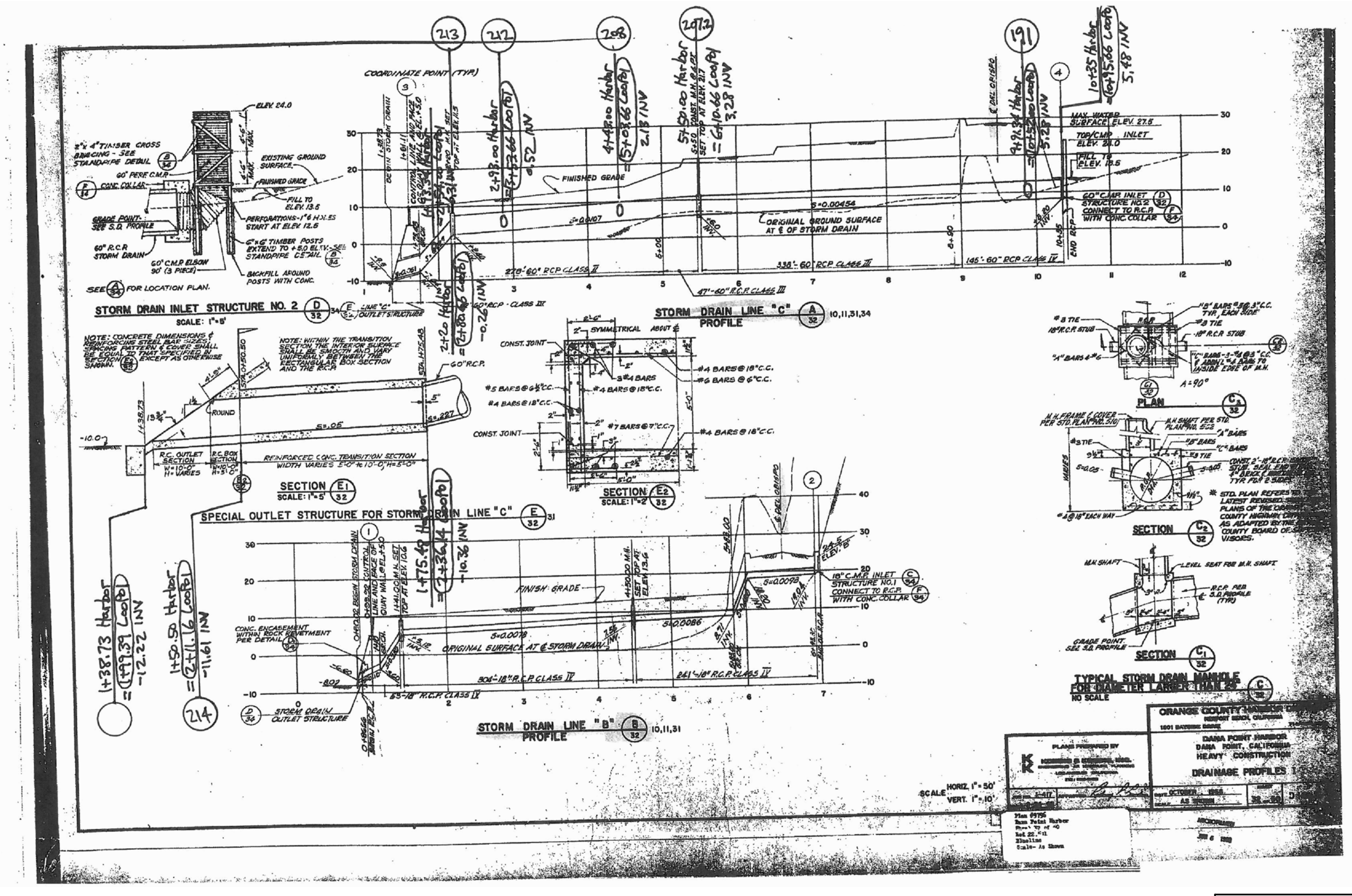

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FIGURE 5a

Line L00P01 Through Harbor

Line L00P01 Drainage Study

CONSTRUCTION NOTES

1. CONST. 60" RCP PER PLAN AND PROFILE.
2. CONST. JUNCTION STRUCTURE TYPE II PER O.C.E.M.A. STD. № 311
5. CONST. INLET TYPE 1 PER O.C.E.M.A. STD. № 301 WITHOUT LOCAL DEPRESSION.
4. CONST. 4 LF. OF 21" RCP - STUB OUT AND PLUG WITH BRICK AND MORTAR FOR FUTURE CONNECTION.
5. CONST JUNCTION STRUCTURE TYPE II PER O.C.E.M.A. STD. № 315 AND STUB OUT 4 LF OF 18" RCP AND PLUG WITH BRICK AND MORTAR FOR FUTURE CONNECTION.
6. CONST. 4 LF OF 24" RCP - STUB OUT AND PLUG WITH BRICK AND MORTAR FOR FUTURE CONNECTION.
12. CONST. REINFORCED CONCRETE COLLAR PER O.C.E.M.A. STD. № 317
15. CONST. JUNCTION STRUCTURE TYPE X PER O.C.E.M.A. STD. № 311 WITH PLATFORM USING ECCENTRIC FLAT TOP PER O.C.E.M.A. STD. № FOR OPENING TO BE SKEWED AT 90° TO EACH OTHER (ELEVATION AND NUMBER OF PLATFORMS SHOWN ON PROFILE)

DOUBLE VERTICAL SCALE

PROFILE SCALE
HORIZONTAL - 1" = 40'
VERTICAL - 1" = 8'

NOTE: CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF END OF EXISTING 60" RCP. PRIOR TO CONSTRUCTION

STORM DRAIN PLAN
FACILITY LOOP01
L00P01-7/13-3
SHEET 2 OF 6 SHEETS

SD-085-02

	Δ	R	L	T
C	28°18'59"	620'	306.31'	156.95'
B	36°40'05"	150'	101.39'	52.65'
A	19°36'39"	270'	64.14'	32.22'

℄ RCP. CURVE DATA

STA. TO STA.	Q_{10}	n	S_f	G	D_n	V_n	D_c	V_c
20105.00 - 21+60.00	817.7	0.013	0.0169	0.0172	3.83	19.7	4.75	16.5
18+65.50 - 20105.00	817.7	0.013	0.0169	0.0172	2.33	38.8 *	4.75	16.5
16+22.50 - 18+57.50	547.4	0.013	0.0168	0.0936	2.25	38.2 *	4.78	17.0
15+70.00 - 16+17.50	557.7	0.013	0.0165	0.0924	2.30	38.5 *	4.78	17.6
15+09.70 - 15+20.00	547.1	0.013	0.0178	0.0934	2.25	38.8 *	4.80	17.9
13+88.47 - 14+03.70	547.1	0.013	0.0178	0.0876	2.25	38.5 *	4.80	17.9
12+90.00 - 13+88.47	547.1	0.013	0.0178	0.0740	FULL	18.1	4.80	17.9
12+70.00 - 12+90.00	582.1	0.013	0.0185	0.0760	FULL	18.1	4.88	18.1
11+64.14 - 12+70.00	585	0.013	0.0186	0.0760	FULL	18.1	4.88	18.3
10+95.00 - 11+64.14	585	0.013	0.0186	0.1116	FULL	18.1	4.89	18.3

HYDRAULIC DATA

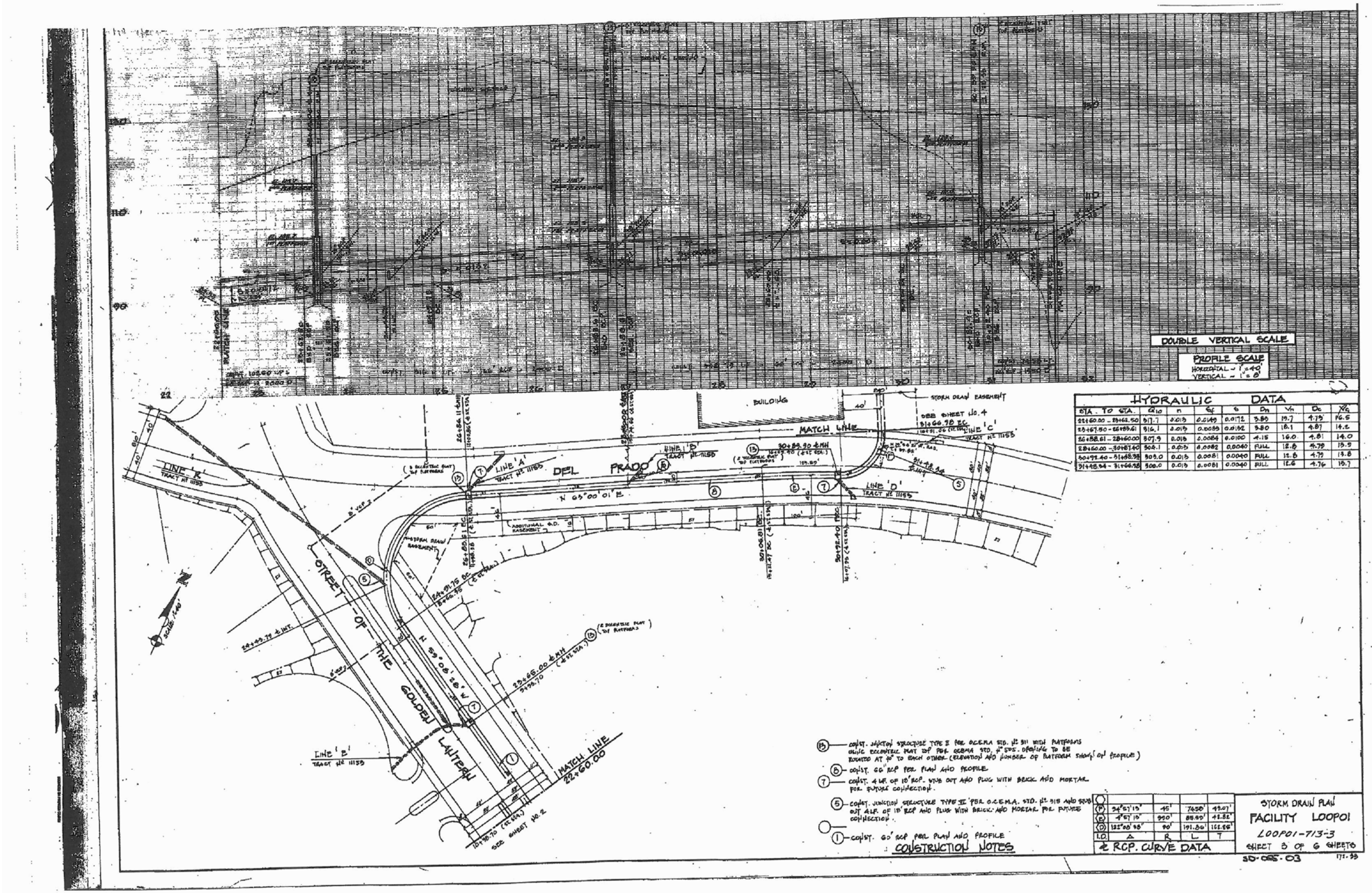
* USE SPECIAL PIPE WITH 1½" EXTRA CONC. COVER OVER TOP OF STEEL IN PIPE.

FUSCOE ENGINEERING
full circle thinking

FIGURE 5b

Line L00P01 North of Dana Point Harbor Drive

Line L00P01 Drainage Study



FUSCOE ENGINEERING
full circle thinking

FIGURE 5c

Line L00P01 at Del Prado

Line L00P01 Drainage Study

4.0 REFERENCES

1. Orange County Hydrology Manual, October, 1986
2. Orange County Local Drainage Manual, January, 1986

APPENDIX A. EXHIBITS

EXHIBIT 1 – DANA POINT HARBOR DRAINAGE PLAN (CIRCA 1968)

EXHIBIT 2 – CITY OF DANA POINT MASTER PLAN OF DRAINAGE DOCUMENT

EXHIBIT 3 – CITY OF DANA POINT STORM DRAIN ATLAS

EXHIBIT 4 - FACILITY L00P01 AS-BUILT PLAN, DANA POINT HARBOR DRIVE TO PCH

EXHIBIT 5 – GOLDEN LANTERN STORM DRAIN (FACILITY L00P01), PCH TO SELVE ROAD

EXHIBIT 6 – CITY OF DANA POINT LAND USE MAP (NOVEMBER 23, 1993)

EXHIBIT 7 – CITY OF DANA POINT ZONING MAP (JUNE 3, 2008)

COORDINATE TABLE

POINT	NORTH	EAST	POINT	NORTH	EAST
1	[illegible]	[illegible]		2,995.0	[illegible]
2	[illegible]	[illegible]	4	[illegible]	[illegible]
3	[illegible]	[illegible]	1	[illegible]	[illegible]
	2818.91	938.33	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	7,150.00	21	[illegible]	7,380.00
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	7,150.00	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				2,388.89	
1	[illegible]	[illegible]	28	,762.60	5,806.70
			29	[illegible]	5,908.22
			30	,070.00	5,908.22

DRAINAGE PLAN AND GRADING FOR THIS AREA SHOWN ON SHEETS 47 TO 50

PACIFIC COAST HIGHWAY

DOHENY BEACH STATE PARK

B/35 INLET STRUCTURE
54" R.C.P. STORM DRAIN-LINE "A" SEE PLAN G/34

OUTLET STRUCTURE A/35

C/34 INLET STRUCTURE NO.1

A/34 INLET STRUCTURE NO.2

18" R.C.P. STORM DRAIN-LINE "B" SEE PROFILE B/32

D/34 STORM DRAIN OUTLET STRUCTURE

60" R.C.P. STORM DRAIN-LINE "C" SEE PROFILE A/32

BOAT RAMP

C/34 INLET STRUCTURE NO.1

DEL OBISPO

51" R.C.P. STORM DRAIN-LINE "F" SEE PROFILE A/33

C/34 INLET STRUCTURE NO.1

18" R.C.P. STORM DRAIN-LINE "D" SEE PROFILE C/33

15" R.C.P. STORM DRAIN-LINE "E" SEE PROFILE B/33

STORM DRAIN OUTLET STRUCTURE D/34

STORM DRAIN OUTLET STRUCTURE D/34

TYPE "F" OUTLET STRUCTURE E/34

TYPE "F" OUTLET STRUCTURE E/34

LINE "C" OUTLET STRUCTURE E/32

TYPE "F" OUTLET STRUCTURE E/34

24" R.C.P. STORM DRAIN-LINE "G" SEE PROFILE F/32

EXISTING PIER

BEACH

WEST BASIN

EAST BASIN

CAUSEWAY

TYPE "G" OUTLET STRUCTURE E/17-A

TYPE "F" OUTLET STRUCTURE TYPICAL E/34

EAST BREAKWATER

WEST BREAKWATER

MAIN CHANNEL

N 4,000
N 3,000
N 2,000
N 1,000
E 6,000
E 7,000
E 8,000
E 9,000
E 10,000
E 11,000

LANTERN
BLUE
SANTA CLARA
RUBY
AMBER

PLAN A/31
1" = 200'

LEGEND

- STORM DRAIN
- M.H.
- ③ COORDINATE POINT

STORM DRAIN GENERAL NOTES

1. STATIONS SHOWN ON THE STORM DRAIN PLANS ARE ALONG THE CENTERLINE OF CONDUIT OR ON A LINE NORMAL TO THE CENTERLINE OF THE CONDUIT.
2. MANHOLES SHALL BE CONSTRUCTED ACCORDING TO ORANGE COUNTY HIGHWAY DEPARTMENT STANDARD PLATE NOS. 308, 305, 307, AND 310 WHERE THE STORM DRAIN CONDUIT IS 54" OR SMALLER. FOR LARGER SIZE CONDUIT, MANHOLES SHALL BE CONSTRUCTED ACCORDING TO DETAIL.
3. WHERE REINFORCED CONCRETE PIPE HAS A DEFLECTION OF GREATER THAN 5° USE CONCRETE COLLAR PER DETAIL.

REV.	DESCRIPTION	DATE
A	ADDED FILL WEST END	9-19-69

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE 714/83[illegible]

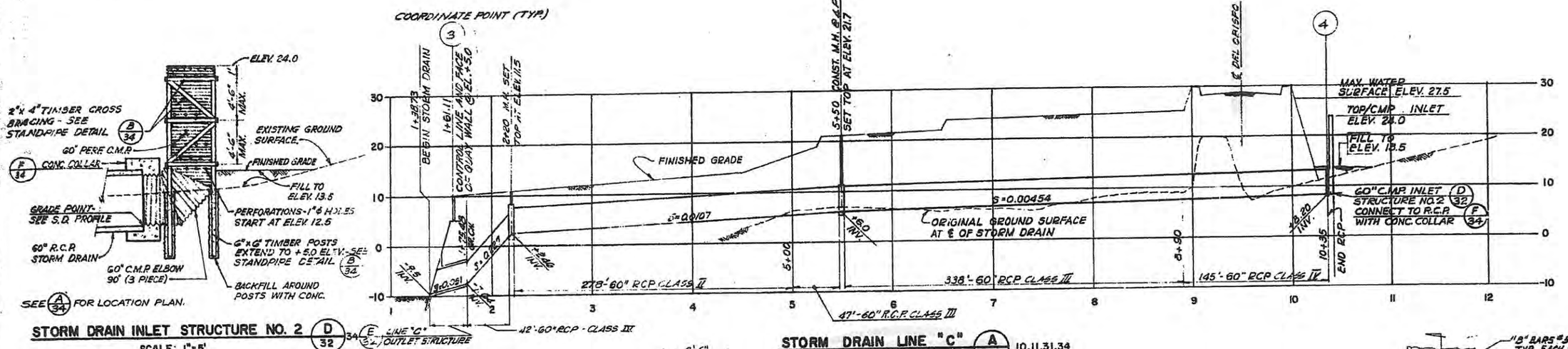
PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
ENGINEERING ARCHITECTURE PLANNING
LOS ANGELES CALIFORNIA
213/629-2122

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

DRAINAGE PLAN

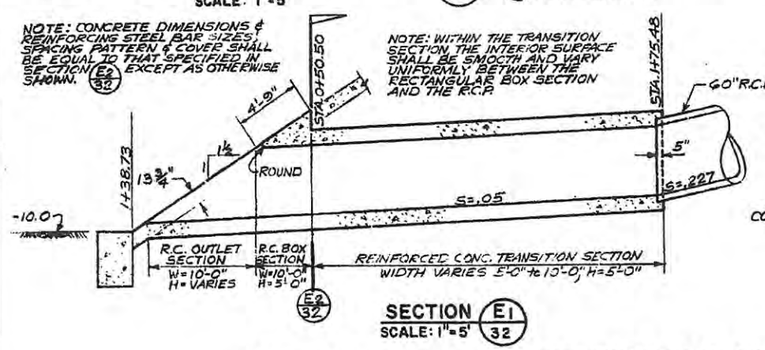
JOB NO. 1-417
DATE 9-24-68
APPROVED: Rodney P. Koebig
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 31 OF 51
D 10.5-1

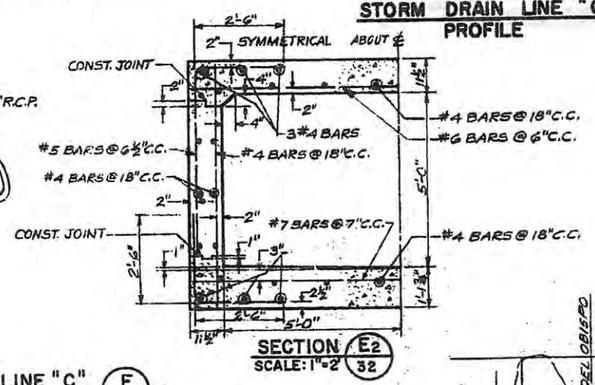
EXHIBIT 1



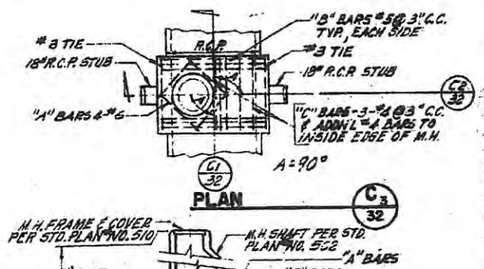
STORM DRAIN INLET STRUCTURE NO. 2 (D/32) (E/34)

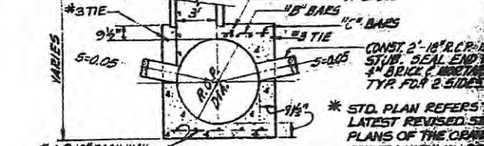
SCALE: 1"=5'

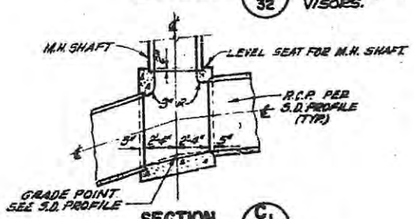




STORM DRAIN LINE "C" PROFILE (A/32) 10,11,31,34



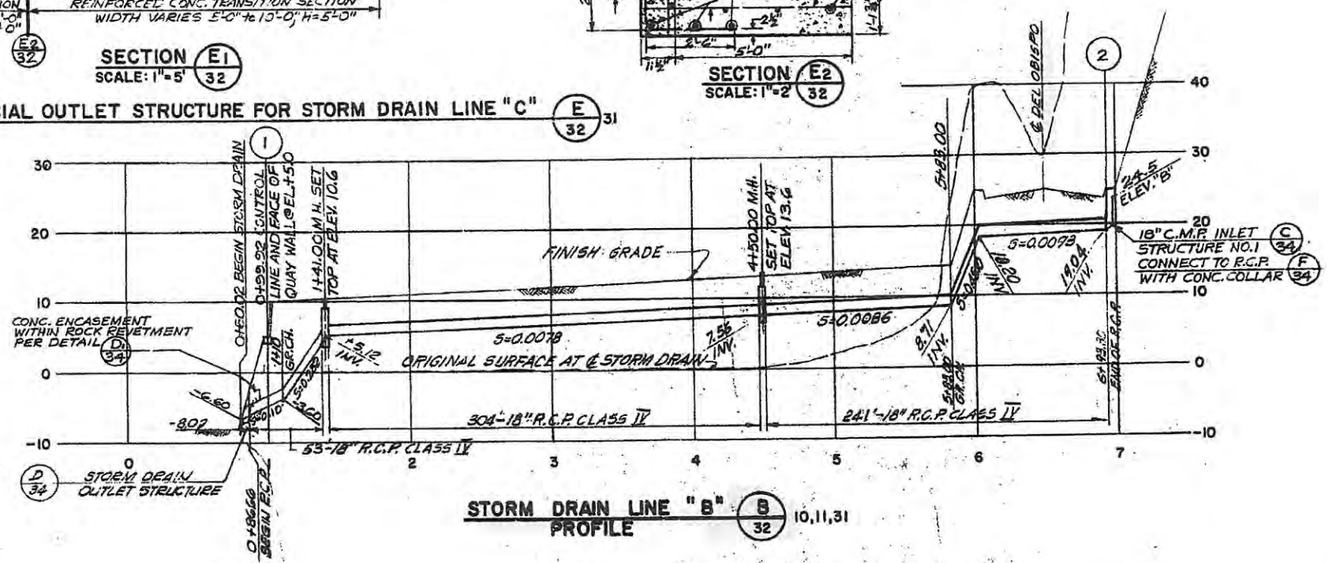




TYPICAL STORM DRAIN MANHOLE FOR DIAMETER LARGER THAN 24" (C/32)

NO SCALE

SPECIAL OUTLET STRUCTURE FOR STORM DRAIN LINE "C" (E/32) 31



STORM DRAIN LINE "B" PROFILE (B/32) 10,11,31

SCALE: HORIZ. 1"=50'
VERT. 1"=10'

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
LOS ANGELES CALIFORNIA

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSHORE DRIVE

DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION

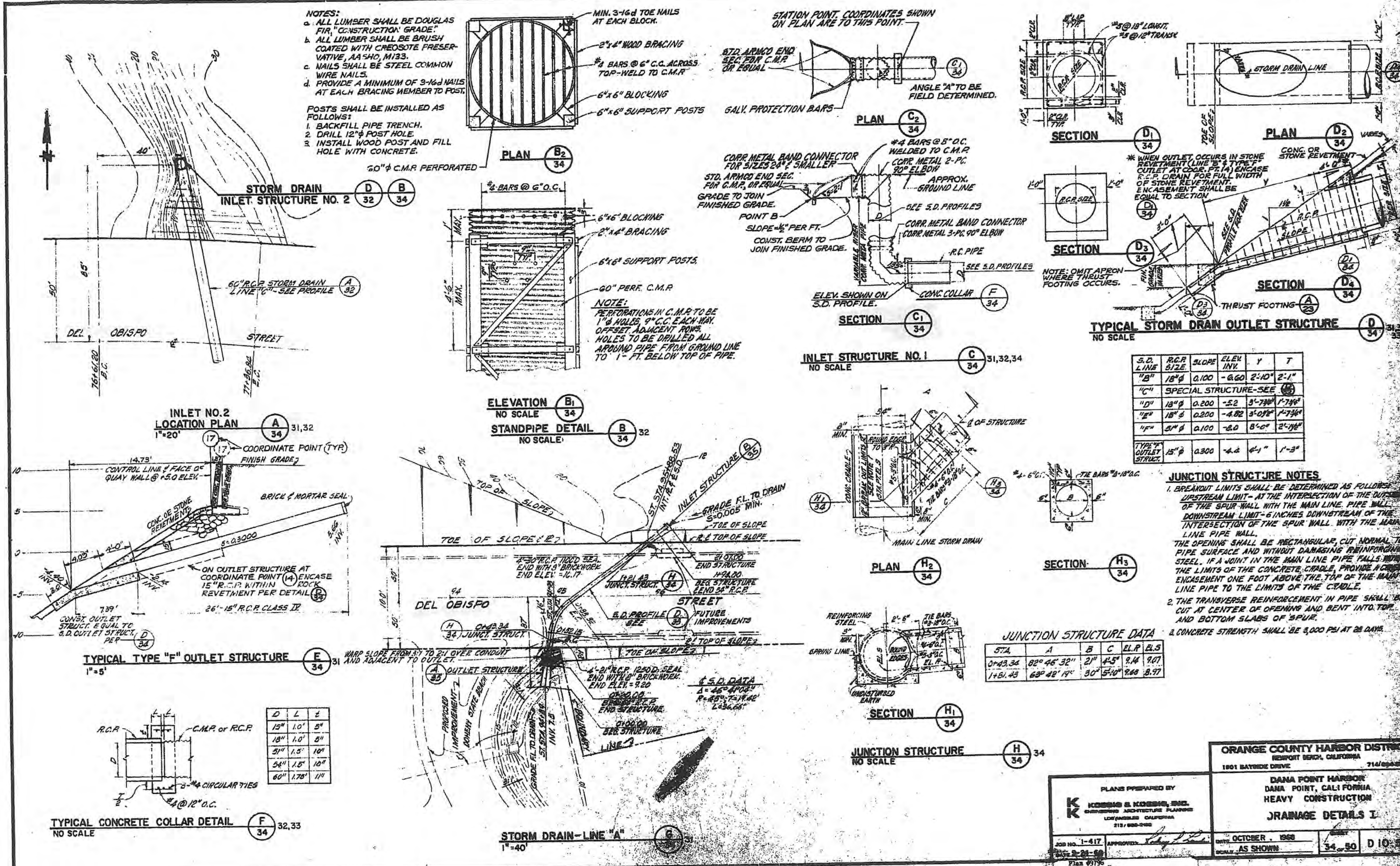
DRAINAGE PROFILES I

JOB NO. 1-417
DATE OCTOBER, 1958
SCALE AS SHOWN
SHEET 32 OF 50
DWG. NO. D-16

Plan #9796
Dana Point Harbor
Sheet 32 of 50
Red 22.5:1
Blueline
Scale- As Shown

MICROFILMED
JUN 6 1989

EXHIBIT 1



S.D. LINE	R.C.P. SIZE	SLOPE	ELEV. INV.	Y	T
"B"	18"ϕ	0.100	-6.60	2'-10"	2'-1"
"C"	SPECIAL STRUCTURE-SEE (B)				
"D"	18"ϕ	0.200	-5.2	3'-7¾"	1'-7¾"
"E"	18"ϕ	0.200	-4.82	3'-0⅝"	1'-7¾"
"F"	51"ϕ	0.100	-8.0	8'-0"	2'-1½"
TYPE "F" OUTLET STRUCT.	15"ϕ	0.300	-4.4	4'-1"	1'-3"

JUNCTION STRUCTURE NOTES

1. BREAKOUT LIMITS SHALL BE DETERMINED AS FOLLOWS: UPSTREAM LIMIT - AT THE INTERSECTION OF THE OUTSIDE OF THE SPUR WALL WITH THE MAIN LINE PIPE WALL. DOWNSTREAM LIMIT - 6 INCHES DOWNSTREAM OF THE INTERSECTION OF THE SPUR WALL WITH THE MAIN LINE PIPE WALL. THE OPENING SHALL BE RECTANGULAR, CUT NORMAL TO PIPE SURFACE AND WITHOUT DAMAGING REINFORCING STEEL. IF A JOINT IN THE MAIN LINE PIPE FALLS WITHIN THE LIMITS OF THE CONCRETE CRADLE, PROVIDE A CONCRETE ENCASEMENT ONE FOOT ABOVE THE TOP OF THE MAIN LINE PIPE TO THE LIMITS OF THE CRADLE.
2. THE TRANSVERSE REINFORCEMENT IN PIPE SHALL BE CUT AT CENTER OF OPENING AND BENT INTO TOP AND BOTTOM SLABS OF SPUR.
3. CONCRETE STRENGTH SHALL BE 3,000 PSI AT 28 DAYS.

JUNCTION STRUCTURE DATA

STA.	A	B	C	EL.R	EL.S
0+43.34	82° 46' 32"	21"	4'-5"	9.14	9.07
1+81.43	63° 42' 19"	30"	5'-10"	9.66	8.97

D	L	t
15"	1.0'	5"
18"	1.0'	5"
51"	1.5'	10"
54"	1.5'	10"
60"	1.75'	11"

PLANS PREPARED BY
KOEBIG & KOEBIG, INC.
LOS ANGELES CALIFORNIA

ORANGE COUNTY HARBOR DISTRICT
NEWPORT BEACH, CALIFORNIA
1901 BAYSIDE DRIVE

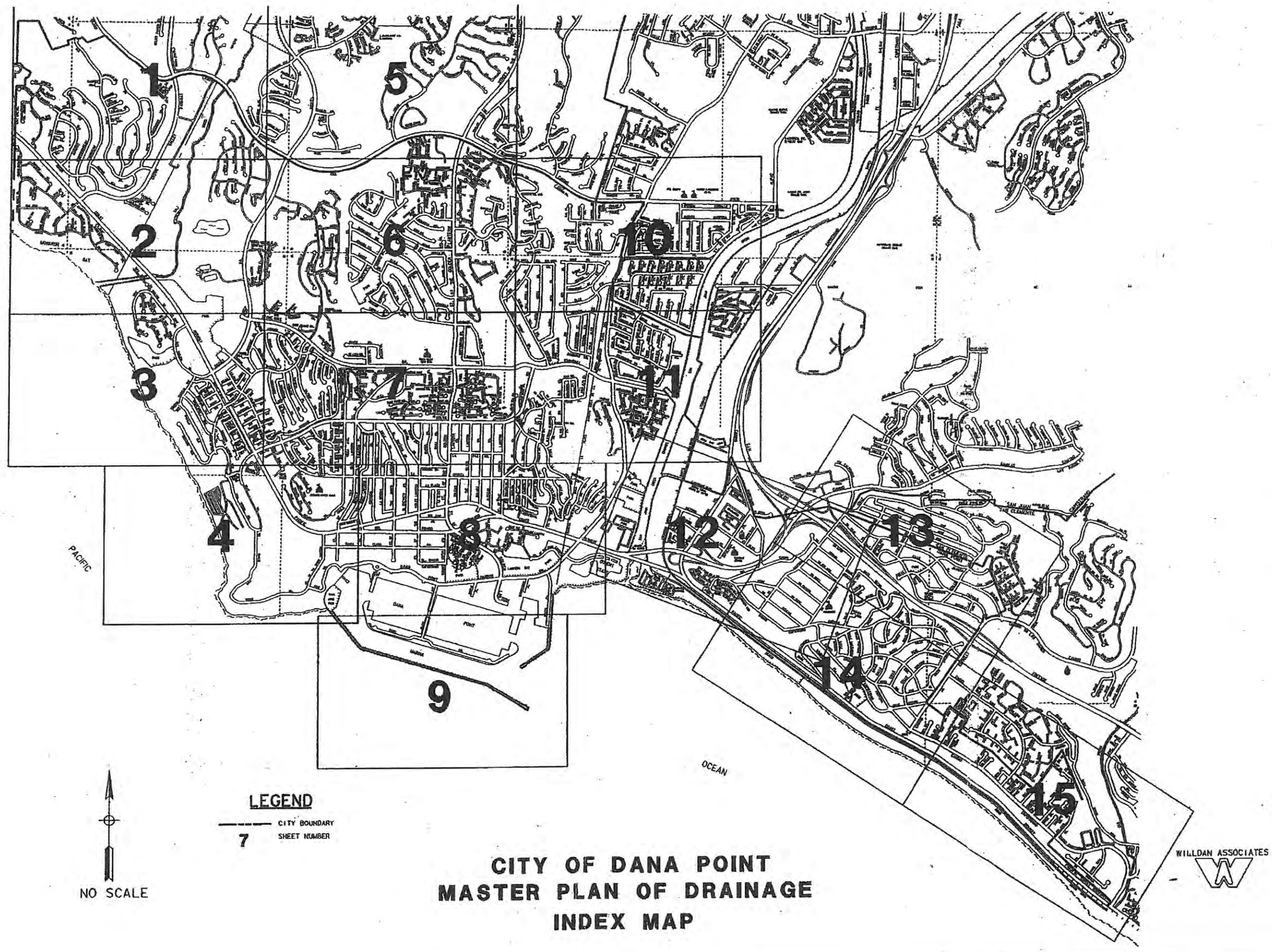
DANA POINT HARBOR
DANA POINT, CALIFORNIA
HEAVY CONSTRUCTION
DRAINAGE DETAILS I

JOB NO. 1-417
APPROVED:
DATE OCTOBER, 1968
SCALE AS SHOWN
SHEET 34 OF 50
D 10.5-1

Plan #9796
Dana Point Harbor
Sheet 34 of 50
Red 22-21
Blueline
Scale- As Shown

MICROFILMED
JUN 6 1969

EXHIBIT 1



LEGEND

CITY BOUNDARY

7 SHEET NUMBER

NO SCALE

CITY OF DANA POINT
MASTER PLAN OF DRAINAGE
INDEX MAP

WILLDAN ASSOCIATES

EXHIBIT 2

(SEE SHEET 6)

(SEE SHEET 3)

(SEE SHEET 11)

(SEE SHEETS 4 & 8)

CITY OF DANA POINT
MASTER PLAN OF DRAINAGE

LEGEND

- CITY BOUNDARY
- MAJOR DRAINAGE AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- SUBDRAINAGE AREA BOUNDARY
- EXISTING STORM DRAIN
- EXISTING CONCRETE CHANNEL AND BOX
- PROPOSED STORM DRAIN
- FLOW DIRECTION
- 4 MAJOR DRAINAGE AREA DESIGNATION
- NODE NUMBER
- TOTAL TRIBUTARY AREA
- EXISTING CONCRETE CHANNEL (FEET)
- EXISTING RCP (INCHES)
- PROPOSED RCP (INCHES)
- 10 YEAR STORM RUNOFF (cfs)
- 100 YEAR STORM RUNOFF (cfs)
- EXISTING VERTICAL WALL CHANNEL
- EXISTING PIPE ARCH BASE x DEPTH (INCHES)
- EXISTING REINFORCED CONCRETE BOX CULVERT

WILLDAN ASSOCIATES

100 50 0 100 200Ft

SHEET 7

EXHIBIT 2

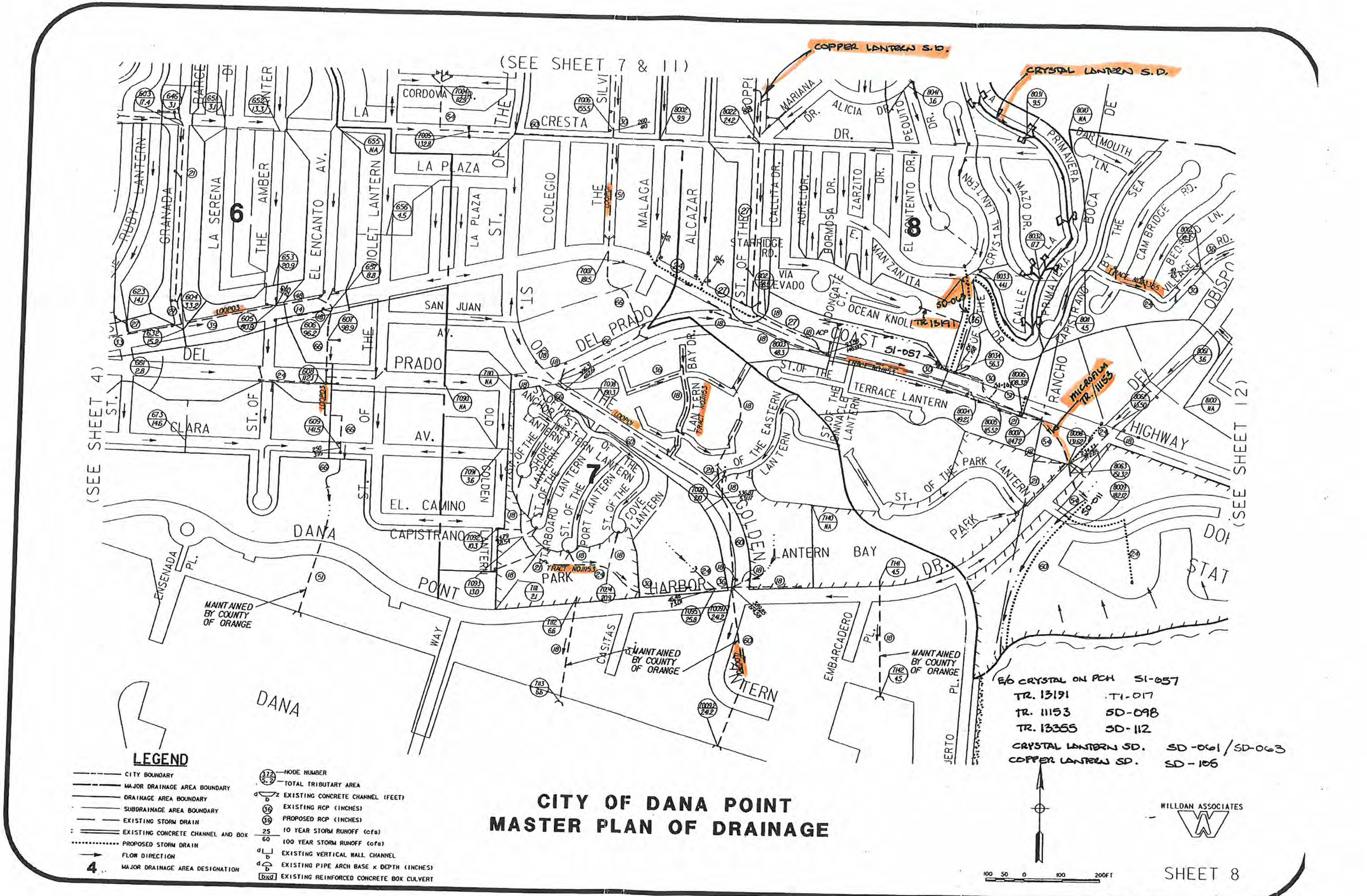

(SEE SHEET 7 & 11)
(SEE SHEET 4)
(SEE SHEET 12)
COPPER LANTERN S.D.
CRYSTAL LANTERN S.D.
MAINTAINED BY COUNTY OF ORANGE
E/o CRYSTAL ON PCH S1-057
TR. 13191 T1-017
TR. 11153 SD-098
TR. 13355 SD-112
CRYSTAL LANTERN SD. SD-061/SD-063
COPPER LANTERN SD. SD-105
LEGEND
CITY BOUNDARY
MAJOR DRAINAGE AREA BOUNDARY
DRAINAGE AREA BOUNDARY
SUBDRAINAGE AREA BOUNDARY
EXISTING STORM DRAIN
EXISTING CONCRETE CHANNEL AND BOX
PROPOSED STORM DRAIN
FLOW DIRECTION
MAJOR DRAINAGE AREA DESIGNATION
NODE NUMBER
TOTAL TRIBUTARY AREA
EXISTING CONCRETE CHANNEL (FEET)
EXISTING RCP (INCHES)
PROPOSED RCP (INCHES)
10 YEAR STORM RUNOFF (cfs)
100 YEAR STORM RUNOFF (cfs)
EXISTING VERTICAL WALL CHANNEL
EXISTING PIPE ARCH BASE x DEPTH (INCHES)
EXISTING REINFORCED CONCRETE BOX CULVERT
CITY OF DANA POINT
MASTER PLAN OF DRAINAGE
WILLDAN ASSOCIATES
SHEET 8

EXHIBIT 2

DRAFT (IN REVIEW)

LEGEND

←	DANA POINT MAINTAINED STORM DRAIN LINE	←	SAN CLEMENTE MAINTAINED STORM DRAIN LINE	═	PUBLIC STREET CITY MAINTAINED	⊙	MAN HOLES	▬	CATCH BASINS (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)
←	COUNTY MAINTAINED STORM DRAIN LINE	←	AT&SF RAILROAD MAINTAINED STORM DRAIN LINE	═	PRIVATE STREETS	(36)	PIPE DIAMETER	■	GRATE INLETS (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)
←	PRIVATE STORM DRAIN LINE	←	FUTURE STORM DRAIN LINE	SD-XX-XX	STORM DRAIN FILE #	⌒	DRAIN OUTLETS	●	SD CLEANOUT (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)
←	CALTRANS MAINTAINED STORM DRAIN LINE	←	ABANDONED STORM DRAIN LINE	K01-XXX-XX	FACILITY #	⊓	HEADWALL INLETS		
←	LAGUNA NIGUEL MAINTAINED STORM DRAIN LINE	←	OPEN CHANNEL						
←	SAN JUAN CAPISTRANO MAINTAINED STORM DRAIN LINE	▬	CITY LIMITS						

REVISED:

B5	C5	D5
B6	C6	D6
B7	C7	D7

N

200 100 0 200
scale feet
SCALE: 1"= 200'

CITY OF DANA POINT

STORM DRAIN ATLAS

SHEET
C6
OF 53

EXHIBIT 3

DWG Name: I:\009-General Engineering\AutoCAD Files\Base Map\Storm Drain Map\Storm Drain Master Plan - 11x17.dwg Plotted by: intern on Sep 17, 2012 - 8:50:03

D5

DANA HILLS HIGH SCHOOL

STONEHILL DR

NOTTINGHAM WY.

SHERWOOD WY

CHELTAM WY

SEA BRIGHT DR

STONEHILL DR

BLUE LANTERN

ALTA VISTA DR.

HARBOR VIEW DR

SEA GULL CT

DIVERS CT

SEAWIND CT.

MERIDIAN DR

SUNRISE CT

MOON RING CT

N.STAR WY.

SEA SHELL WY

DANA VISTA DR

EVENING STAR DR

WALKABOUT LN

SAND PIPER LN

MOONFIRE DR

DANA POINT DR.

SEACALL WY

N. STAR WY

MOONFIRE DR

SEACALL WY

DISCOVERY DR

POLARIS DR

MORNING STAR LN

SELVA RD

CASTANO

VIOLET LANTERN

OLINDA

DIANA

COLEGIO DR

SILVER LANTERN

MALAGA

ALCAZAR

COPPER LANTERN

GOLDEN LANTERN

SEAGATE DR.

HARRY OTSUBO GARDEN

SANDCASTLE CT

SPIN

DRIFT CT

MERIDIAN DR

SAND FLOWER CT

RISING TIDE CT

SEA CREST DR

SUNDOWN CT

SEA POINT DR.

BEACHWALK WY

WAVE CREST LN

SEABIRD WY

DANA POINT DR

SEA MIST WY

STARFISH WY

SUNFISH WY

SUNSTAR LN

CATHERINE WY.

SEA CREST DR

DANA POINT DR

HOLTZ HILL RD

HOLTZ HILL RD

STONEHILL/SELVA OPEN SPACE

SELVA RD

DIAMOND RIDGE CT.

PERCH DR

CALLE LA PRIMAVERA

D7

C6

E6

SI-196-09 PKWY CULVERT

TI-246-02 PKWY CULVERT

SI-130-03

SI-130-09

SD-047-02

SI-028-04

SI-028-03 PKWY CULVERT

SI-018-04 PKWY CULVERT

GR-026-02 PKWY CULVERT

GR-197-01 PKWY CULVERT

TI-054-18 TR 12853

TI-054-07

TI-054-04 DOWN DRAIN

TR 12853 TI-054-17

TR 14102 TI-067-04

TI-067-04

GR-197-03 V.DITCH

SD-015-06 L00P01-713-2A

SD-015-08

SD-015-05

SI-229-03

TI-246-21

DRAFT (IN REVIEW)

LEGEND

- DANA POINT MAINTAINED STORM DRAIN LINE
- COUNTY MAINTAINED STORM DRAIN LINE
- PRIVATE STORM DRAIN LINE
- CALTRANS MAINTAINED STORM DRAIN LINE
- LAGUNA NIGUEL MAINTAINED STORM DRAIN LINE
- SAN JUAN CAPISTRANO MAINTAINED STORM DRAIN LINE
- SAN CLEMENTE MAINTAINED STORM DRAIN LINE
- AT&SF RAILROAD MAINTAINED STORM DRAIN LINE
- FUTURE STORM DRAIN LINE
- ABANDONED STORM DRAIN LINE
- OPEN CHANNEL
- CITY LIMITS
- PUBLIC STREET CITY MAINTAINED
- PRIVATE STREETS
- SD-XX-XX / K01-XXX-XX STORM DRAIN FILE # / FACILITY #
- MAN HOLES
- (36) PIPE DIAMETER
- DRAIN OUTLETS
- HEADWALL INLETS
- CATCH BASINS (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)
- GRATE INLETS (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)
- SD CLEANOUT (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)

REVISED:

C5	D5	E5
C6	D6	E6
C7	D7	E7

N

200 100 0 200 scale feet

SCALE: 1"= 200'

CITY OF DANA POINT

STORM DRAIN ATLAS

SHEET D6 OF 53

DWG Name: I:\DPG-General Engineering\AutoCAD Files\Base Map\Storm Drain Map\Storm Drain Master Plan - 11x17.dwg Plotted by: intern on Sep 17, 2012 - 9:56:20

EXHIBIT 3

D6

C7

E7

D8

CASTANO DR

ROBLES DR

EL ENCANTO AV.

VIOLET LANTERN

QUINDA DR

DIANA DR

GOLDEN LANTERN

LA PAZ AV

SILVER LANTERN

MALAGA DR.

ALCAZAR DR.

COPPER LANTERN

CALLE LA PRIMAVERA

MARIANA DR

ZARZITO DR

VIA PACIFICA

ALICIA DR

CORDOVA DR.

LA CRESTA DR

LA CRESTA DR.

LA PLAZA

LA PLAZA PARK

COLEGIO DR

SAN MARENO

CALLITA DR

AURELIO DR.

FORMOSA DR.

EL CONTENTO DR

MANZANITA DR.

STARRIDGE RD

LANTERN VILLANGE COMMUNITY PARK

SHIPWRECK PARK

ALLEY

L00P01-172-2A

SI-162-05

SI-162-06

SI-175-47 (ABANDONED)

SI-175-49

SI-178-04

SD-015-03

SD-015-04

SD-015-07

SD-105-03

TIE NOT FOUND

DRAFT (IN REVIEW)

LEGEND

- DANA POINT MAINTAINED STORM DRAIN LINE
- COUNTY MAINTAINED STORM DRAIN LINE
- PRIVATE STORM DRAIN LINE
- CALTRANS MAINTAINED STORM DRAIN LINE
- LAGUNA NIGUEL MAINTAINED STORM DRAIN LINE
- SAN JUAN CAPISTRANO MAINTAINED STORM DRAIN LINE
- SAN CLEMENTE MAINTAINED STORM DRAIN LINE
- AT&SF RAILROAD MAINTAINED STORM DRAIN LINE
- FUTURE STORM DRAIN LINE
- ABANDONED STORM DRAIN LINE
- OPEN CHANNEL
- CITY LIMITS
- PUBLIC STREET CITY MAINTAINED
- PRIVATE STREETS
- SD-XX-XX / K01-XXX-XX STORM DRAIN FILE # / FACILITY #
- MAN HOLES
- (36) PIPE DIAMETER
- DRAIN OUTLETS
- HEADWALL INLETS
- CATCH BASINS (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)
- GRATE INLETS (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)
- SD CLEANOUT (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)

REVISED: 09/10/12

C6	D6	E6
C7	D7	E7
C8	D8	E8

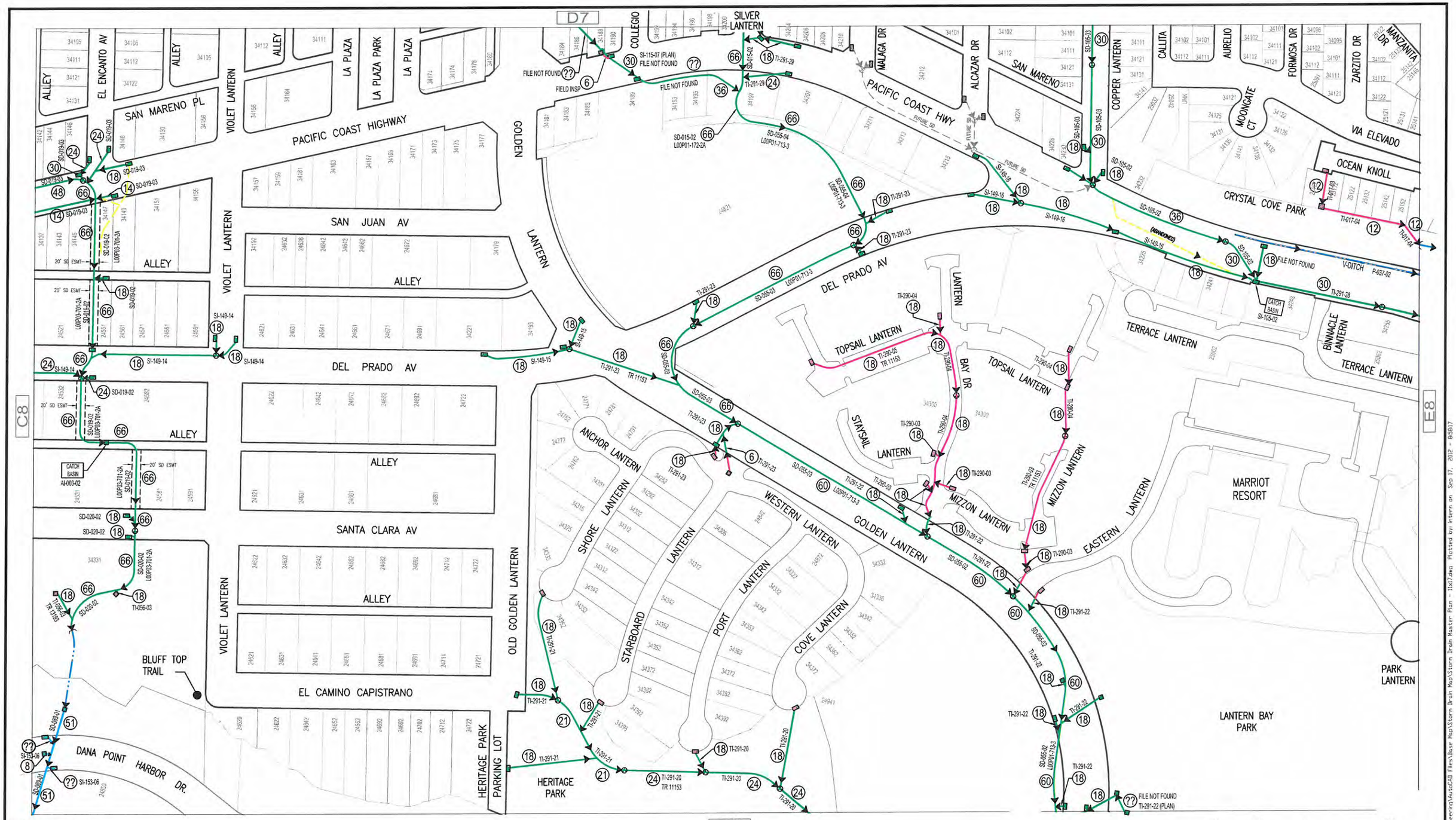
scale: 1"= 200'

CITY OF DANA POINT

STORM DRAIN ATLAS

SHEET D7 OF 53

EXHIBIT 3



DRAFT (IN REVIEW)

LEGEND

- DANA POINT MAINTAINED STORM DRAIN LINE
- COUNTY MAINTAINED STORM DRAIN LINE
- PRIVATE STORM DRAIN LINE
- CALTRANS MAINTAINED STORM DRAIN LINE
- LAGUNA NIGUEL MAINTAINED STORM DRAIN LINE
- SAN JUAN CAPISTRANO MAINTAINED STORM DRAIN LINE
- SAN CLEMENTE MAINTAINED STORM DRAIN LINE
- AT&SF RAILROAD MAINTAINED STORM DRAIN LINE
- FUTURE STORM DRAIN LINE
- ABANDONED STORM DRAIN LINE
- OPEN CHANNEL
- CITY LIMITS
- PUBLIC STREET CITY MAINTAINED
- PRIVATE STREETS
- SD-XX-XX / K01-XXX-XX — STORM DRAIN FILE # / FACILITY #
- MAN HOLES
- (36) PIPE DIAMETER
- DRAIN OUTLETS
- HEADWALL INLETS
- CATCH BASINS (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)
- GRATE INLETS (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)
- SD CLEANOUT (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)

REVISED: 09/10/12

C7	D7	E7
C8	D8	E8
C9	D9	E9

CITY OF DANA POINT

STORM DRAIN ATLAS

SHEET D8 OF 53

DWG Name: J:\009-General Engineering\AutoCAD Files\Base Map\Storm Drain Map\Storm Drain Master Plan - 11x17.dwg Plotted by: intern on Sep 17, 2012 - 8:58:17

EXHIBIT 3

D8

HERITAGE PARK

DANA POINT HARBOR DR

CASITAS PL

GOLDEN LANTERN

EMBARCADERO

ISLAND WAY

DANA POINT HARBOR

DANA DR

C9

E9

D10

SI-153-06 (8) SI-153-05 (??) SD-088-01 (15)

SD-088-01 (18) SI-153-05 (??) SI-153-05 (8)

TI-291-20 (24) TR 11153 (30) TI-291-20 (24) TI-291-20 (36) SD-055-02 (60) TI-291-22 (18)

SD-088-01 (60)

SD-088-01 (18) SI-153-04 (??) SI-153-04 (18)

SD-088-01 (60) SD-088-01 (15) SI-153-09 (15) SI-153-09 (60)

DRAFT (IN REVIEW)

LEGEND

- DANA POINT MAINTAINED STORM DRAIN LINE
- COUNTY MAINTAINED STORM DRAIN LINE
- PRIVATE STORM DRAIN LINE
- CALTRANS MAINTAINED STORM DRAIN LINE
- LAGUNA NIGUEL MAINTAINED STORM DRAIN LINE
- SAN JUAN CAPISTRANO MAINTAINED STORM DRAIN LINE
- SAN CLEMENTE MAINTAINED STORM DRAIN LINE
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- FUTURE STORM DRAIN LINE
- ABANDONED STORM DRAIN LINE
- OPEN CHANNEL
- CITY LIMITS
- PUBLIC STREET CITY MAINTAINED
- PRIVATE STREETS
- SD-XX-XX STORM DRAIN FILE #
- K01-XXX-XX FACILITY #
- MAN HOLES
- (36) PIPE DIAMETER
- DRAIN OUTLETS
- HEADWALL INLETS
- CATCH BASINS (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)
- GRATE INLETS (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)
- SD CLEANOUT (COLOR REPRESENTS AGENCY RESPONSIBLE FOR MAINTENANCE)

REVISED:

C8	D8	E8
C9	D9	E9
	D10	

N

200 100 0 200 feet

scale SCALE: 1"= 200'

CITY OF DANA POINT

STORM DRAIN ATLAS

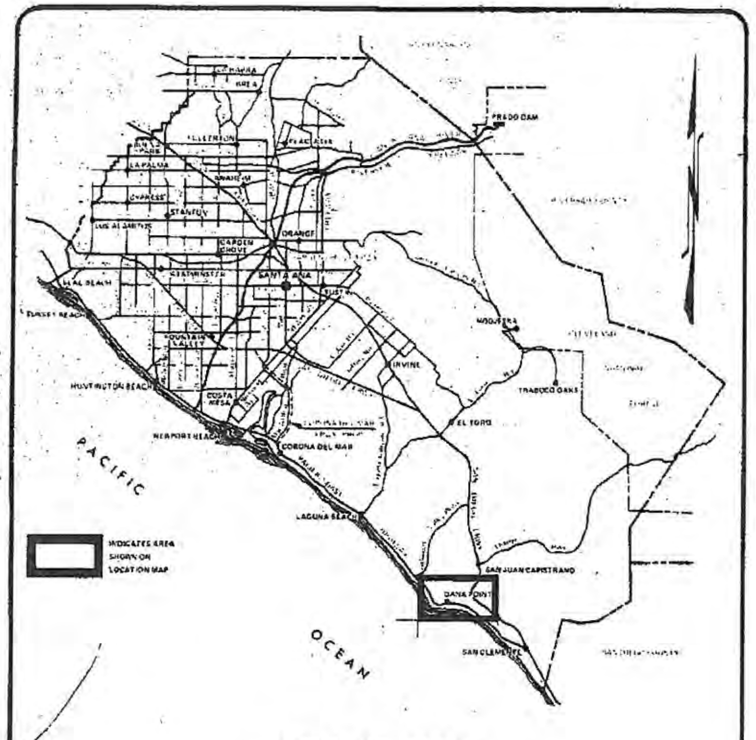
SHEET D9 OF 53

DWG Name: J:\009-General Engineering\AutoCAD Files\Base Map\Storm Drain Map\Storm Drain Master Plan - 11x17.dwg Plotted by: intern on Sep 17, 2012 - 8:59:05

EXHIBIT 3

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA, CALIFORNIA
M. STORM, DIRECTOR



VICINITY MAP

SCALE IN MILES

PLANS FOR CONSTRUCTION OF
FACILITY NO. LOOPOI
FROM ~~DEL OBISPO ST.~~ TO P.C.H.
DANA POINT HARBOR DRIVE

GENERAL NOTES

1. ALL WORK TO BE DEDICATED TO THE COUNTY OF ORANGE SHALL BE IN CONFORMANCE WITH THE DISTRICT'S STD. SPECS. WHICH MAY BE PURCHASED FROM THE DISTRICT AND SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
2. THE CONTRACTOR SHALL NOTIFY THE DISTRICT'S INSPECTOR AT LEAST 24 HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING 834-3410, OR BY WRITING THE ORANGE COUNTY FLOOD CONTROL DISTRICT, 400 WEST CIVIC CENTER DRIVE, SANTA ANA, CALIF.
3. ALL CONC. IN REINF. CONC. STRUCTURES SHALL BE 3000 POUNDS PER SQ. INCH. IN 28 DAYS, PORTLAND CEMENT CONC., CLASS A.
4. ALL PIPE LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
5. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXITING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY OR DAMAGE THERETO.
6. ALL FILL SHALL BE COMPACTED TO 90' RELATIVE COMPACTION AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216-F1963 "FIVE LAYER METHOD" ALL BACKFILL MATERIAL SHALL BE FREE FROM VEGTABLE MATTER.
7. PIPE CONSTRUCTIONSHALL BE COORDINATED WITH THE GRADING WORK SO THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED TO A GRADE A MIN. OF (4') FEET ABOVE THE TOP OF THE PIPE. THE STORM DRAIN TRENCH SHALL BE EXCAVATED AND THE PIPE INSTALLED.
8. ALL REINF. CONC. PIPE SHALL BE BEDDED IN ACCORDANCE WITH OCEMA, STD. PLAN 319.
9. REINFORCEMENT IN REIF. CONC. PIPE SHALL HAVE A MIN. CONC. COVER OF 1½" FROM INSIDE FACE OF PIPE WHERE NOTED ON PLANS.
10. ALL MATERIALS TESTING FOR THE STORM DRAIN FACILITIES AND RELATED CONSTRUCTION SHALL BE PROVIDED BY THE CONTRACTOR OR DEVELOPER IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE FLOOD CONTROL DISTRICT'S INSPECTOR
11. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT SHALL BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING SHALL BE IN ACCORDANCE WITH THE REQUEST OF THE DISTRICT'S INSPECTOR.
12. ALL PIPE JOINTS SHALL BE BANDED AND GROUTED.
13. A PERMIT FOR WORK WITHIN EXISTING OR PROPOSED STREET RIGHT OF WAY IS REQUIRED FROM THE ORANGE COUNTY ROAD DEP'T. FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER ROAD DEP'T. INSPECTION, AND MEET OR EXCEED ROAD DEP'T. MINIMUM STANDARDS.

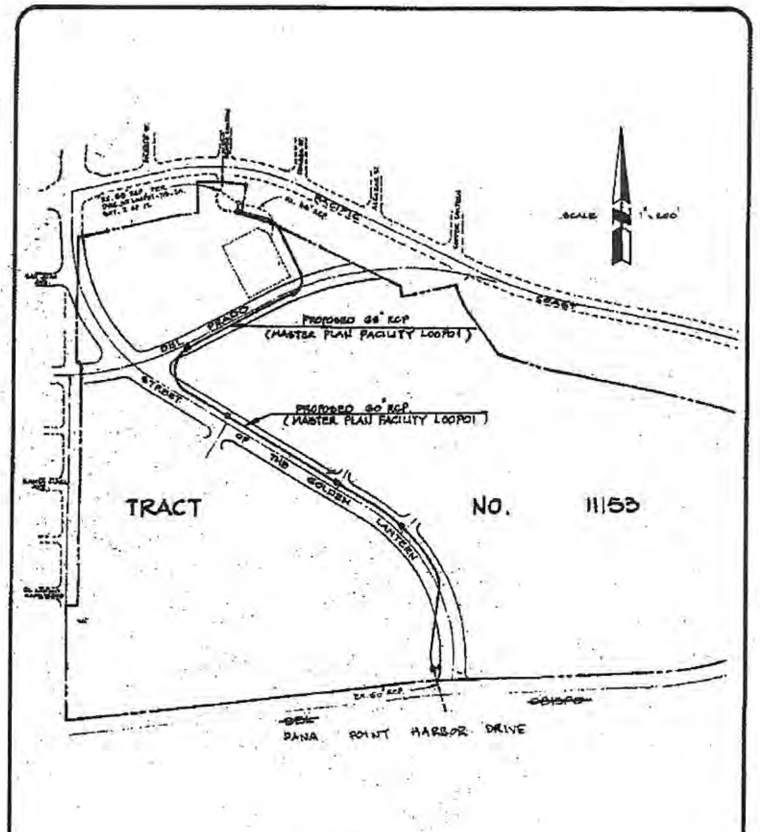
GENERAL NOTES: (CONTINUED)

14. THE CONTRACTOR SHALL NOTIFY THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY, CONSTRUCTION DIVISION (834-3486) 48 HOURS PRIOR TO BEGINNING ANY WORK WITHIN DISTRICT'S RIGHT OF WAY.
15. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.
16. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS OR OTHER HARMFUL MATERIALS.
17. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH O.C.E.M.A. STANDARD SPECIFICATIONS. (PUBLIC WORKS CONSTRUCTION, 1979 EDITION.)
18. CONTRACTOR SHALL PROVIDE FOR MATERIAL TESTING AT DIRECTION OF COUNTY ENGINEER.

APPROVED FOR MAIN LINE STORM DRAIN ONLY
JACK SCHWARZ [signature] DATE 9-24-81

QUANTITY ESTIMATE

I.D	ITEM	QUANTITIES
	18" RCP ~ 1500 D	12 LF.
	18" RCP ~ 1750 D	19 LF.
	18" RCP ~ 2250 D	4 LF.
	18" RCP ~ 2350 D	16 LF.
	REMOVE EX. 36" RCP	15 LF.
	21" RCP ~ 1250 D	4 LF.
	24" RCP ~ 1250 D	4 LF.
	60" RCP ~ 1000 D	110 LF.
	60" RCP ~ 1000 D (1½" EXTRA CONC. OVER STEEL)	645 LF.
	60" RCP ~ 1200 D	135 LF.
	60" RCP ~ 1700 D	120 LF.
	60" RCP ~ 1500 D	145 LF.
	60" RCP ~ 2000 D	103 LF
	66" RCP ~ 1950 D	178 LF.
	66" RCP ~ 2400 D	1014 LF.
	JUNCTION STRUCTURE TYPE II - OCEMA STD. N° 311	2 EA.
	JUNCTION STRUCTURE TYPE VI - OCEMA STD. N° 315	5 EA.
	INLET TYPE I - OCEMA STD. N° 301	1 EA.
	PLUG WITH BRICK AND MORTAR (SIZE PER PLAN)	10 EA.
	REMOVE 170 LF. EX. 66" RCP & OUTLET FACILITY	1 EA.
	REMOVE EX. 60" CMP. RISER AND CONC. COLLAR	1 EA.
	72" MANHOLE WITH PUMP STATION PER DETAIL SHT N° 5	1 EA.
	REINFORCED CONC. COLLAR. OCEMA. STD. N° 317	2 EA.
	JCT. STR. TYPE II. STD. N° 311 WITH PLATFORMS PER STD. N° 505	4 EA.
	JUNCT STR. PER DETAIL ON SHEET N° 4	1 EA.



LOCATION MAP

MAINTAINED BY THE COUNTY OF ORANGE

PREPARED BY:
VTN CONSOLIDATED INC.
2301 CAMPUS DRIVE.
IRVINE, CALIFORNIA 92713.
PHONE: (714) 851-5200

BY: Lawrence Rahfeld [signature] RCE 28763
DATE: 6-23-81

EMA REGULATION

THIS PLAN IS SIGNED BY EMA/REGULATION FOR CONCEPT AND ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. EMA/REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

APPROVED: J.W. Schwarz [signature] RCE 8856
DATE: 10-20-81

FACILITY NO. LOOPOI IS A COUNTY OF ORANGE MASTER PLAN OF DRAINAGE FACILITY BEING CONSTRUCTED IN ACCORDANCE WITH THE SAN JUAN CAPISTRANO AREA MASTER PLAN OF DRAINAGE UNDER THE ADMINISTRATION AND SUPERVISION OF THE ENVIRONMENTAL MANAGEMENT AGENCY.

AGREEMENT NO. D-81-081

INDEX OF SHEETS

UTILITY	PHONE NO.
SOUTHERN CAL. GAS CO. UNDERGROUND SERVICE ALERT	800-422-4133
DANA POINT SANITARY DISTRICT	714-496-9382
CAPISTRANO BEACH COUNTY WATER DISTRICT	714-496-5261
SAN DIEGO GAS & ELECTRIC CO.	714-498-1100
STORER CABLE TELEVISION	714-831-3842
PACIFIC TELEPHONE CO.	714-951-0545

BENCH MARK: (3F-24-68) STD: O.C.S.
ALUMINUM CAP MONUMENT BAS MI. N/W. ALONG THE PACIFIC COAST HIGHWAY (U.S. 101 ALT.) FROM THE A.T. & S.F. RAILWAY OVERPASS OF THE HWY. IN CAPISTRANO BEACH TO ITS INTERSECTION WITH DEL OBISPO STREET. ABOUT 245 FT. N/E. OF THE C/L OF THE HWY. 38 FT S/E. OF THE C/L OF THE STREET, 913 FT. N/E. OF POWER POLE N° 22507, 44 FT. S/W. OF STREET LIGHT POLE N° 222499 ABOUT 50 FT. S/W OF THE S/W. SIDE OF HOUSE N° 34271 AND ACROSS THE STREET. SET IN THE [illegible] THAN THE GUTTER ELEV. 15.701 (1970 ADJ.)

BASIS OF BEARING:
N 77°39'44" E. FOR THE CENTERLINE OF PACIFIC COAST HIGHWAY AS SHOWN ON R.S. 91/27 & 28. RECORDS OF ORANGE COUNTY. CALIFORNIA.

NO.	DESCRIPTION	SHT.	APPROVED	DATE
△	PROVIDE AS-BUILT OF PUMP STA., 3-5, & PUMP CONTROL ENCLOSURE, INTERIOR PLAN OF STA.	4&5		
△	REVISED PIPE ALIGNMENT BETWEEN STA 10+95.66 AND STA 11+88.57, & LINE J	2	J.W. Schwarz [signature]	6-11-82

REVISIONS

DWG. NO. LOOPOI-713-3

SHEET 1 OF 6

SD-055-01

EXHIBT 4

CONSTRUCTION NOTES

1. CONST. 60" RCP PER PLAN AND PROFILE.
2. CONST. JUNCTION STRUCTURE TYPE II PER O.C.E.M.A. STD. № 311
3. CONST. INLET TYPE I PER O.C.E.M.A. STD. № 301 WITH LOCAL DEPRESSION.
4. CONST. 4 LF. OF 21" RCP. STUB OUT AND PLUG WITH BRICK AND MORTAR FOR FUTURE CONNECTION.
5. CONST JUNCTION STRUCTURE TYPE VI PER O.C.E.M.A. STD. № 315 AND STUB OUT 4 LF OF 18" RCP AND PLUG WITH BRICK AND MORTAR FOR FUTURE CONNECTION.
6. CONST. 4 LF OF 24" RCP - STUB OUT AND PLUG WITH BRICK AND MORTAR FOR FUTURE CONNECTION.
12. CONST. REINFORCED CONCRETE COLLAR PER O.C.E.M.A. STD. № 517
15. CONST. JUNCTION STRUCTURE TYPE I PER O.C.E.M.A. STD. № 311 WITH PLATFORMS USING ECCENTRIC FLAT TOP PER O.C.E.M.A. STD. № 305. OPENING TO BE ROTATED AT 90° TO EACH OTHER (ELEVATION AND NUMBER OF PLATFORMS SHOWN ON PROFILE)

NOTE: CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF END OF EXISTING 60" RCP. PRIOR TO CONSTRUCTION

DOUBLE VERTICAL SCALE

PROFILE SCALE
HORIZONTAL - 1" = 40'
VERTICAL - 1" = 8'

20105.00 - 22+60.00	317.7	0.013	0.0149	0.0172	3.83	19.7	4.73	16.5
18+62.50 - 20105.00	317.7	0.013	0.0149	0.0172	2.33	35.5 #	4.73	16.5
16+21.50 - 18+57.50	327.4	0.013	0.0158	0.0930	2.35	38.2 *	4.76	17.0
15+70.00 - 16+17.50	337.7	0.013	0.0168	0.0924	2.30	38.3 #	4.78	17.5
14+89.70 - 15+70.00	347.1	0.013	0.0178	0.0924	2.35	38.8 #	4.80	17.9
13+58.47 - 14+89.70	347.1	0.013	0.0178	0.0876	2.35	38.3 #	4.80	17.9
12+90.00 - 13+58.47	347.1	0.013	0.0178	0.0740	FULL	18.1	4.80	17.9
12+70.00 - 12+90.00	362.1	0.013	0.0183	0.0740	FULL	18.1	4.82	18.1
11+64.14 - 12+70.00	355	0.013	0.0180	0.0740	FULL	18.1	4.83	18.3
10+95.00 - 11+64.14	355	0.013	0.0180	0.0116	FULL	18.1	4.83	18.3
STA. TO STA.	Q_{10}	n	Sf	S	D_n	V_n	Dc	Vc

* USE SPECIAL PIPE WITH 1½" EXTRA CONC. COVER OVER TOP OF STEEL 1/4 PIPE.

HYDRAULIC DATA

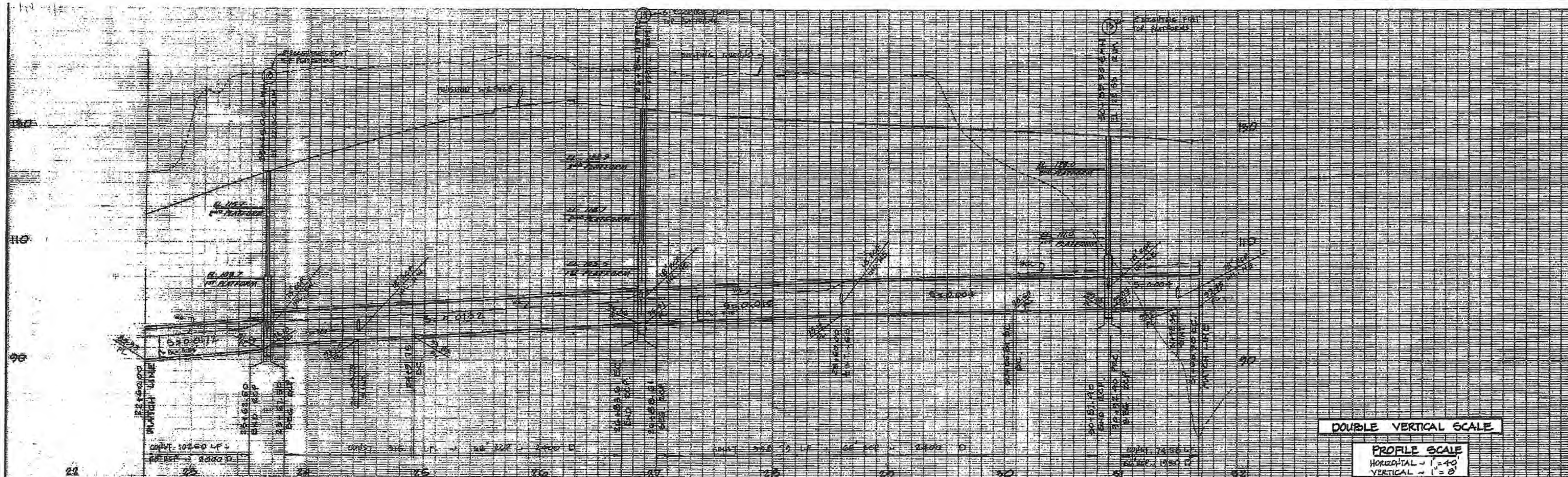
(C)	28°18'28"	620'	306.31'	196.35'
(B)	35°40'03"	150'	101.23'	52.63'
(A)	13°36'39"	270'	64.14'	32.22'
I.D.	Δ	R	L	T

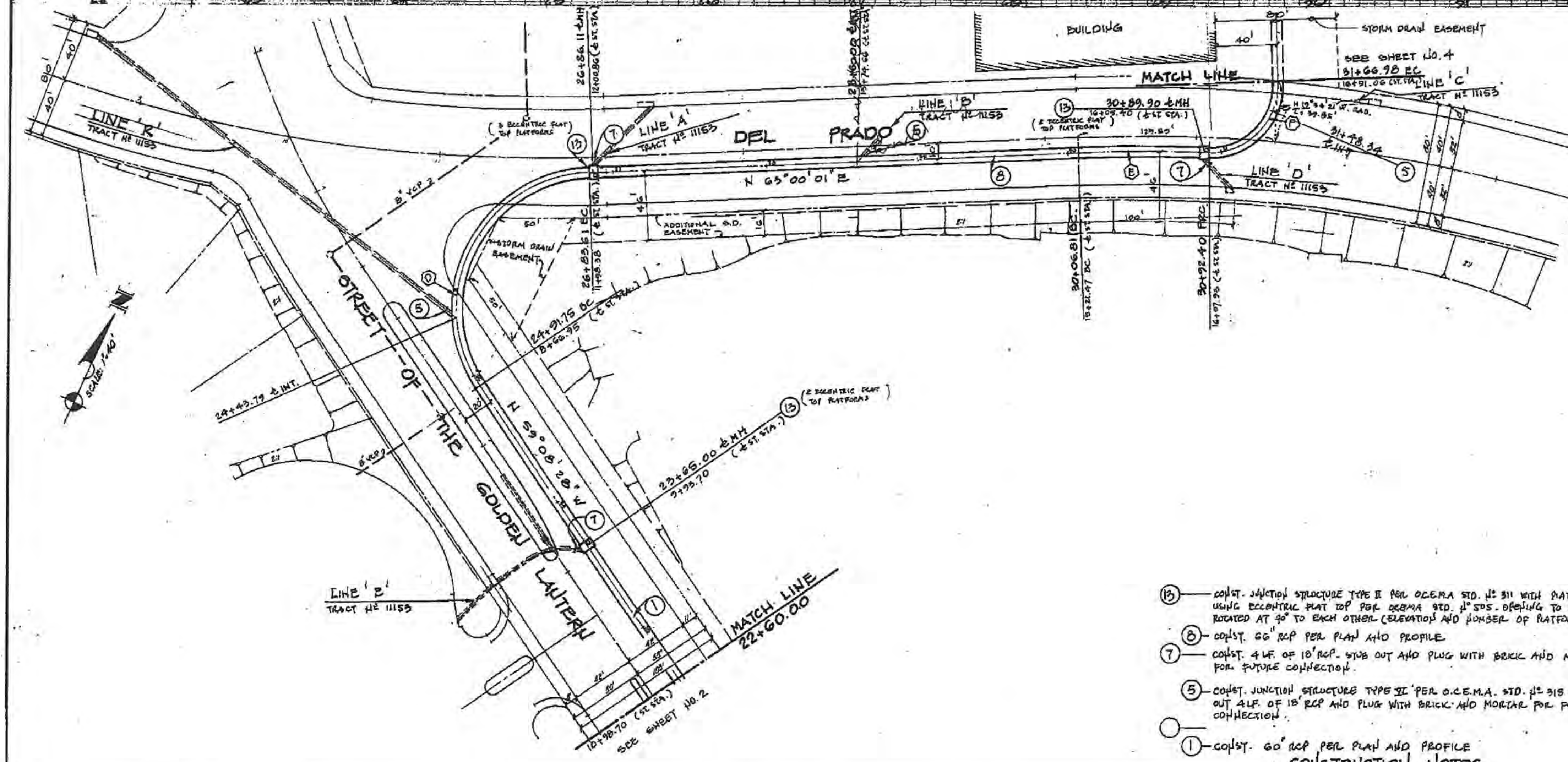
℄ RCP. CURVE DATA

STORM DRAIN PLAN
FACILITY LOOP01
LOOP01-7/3-3
SHEET 2 OF 6 SHEETS
172-33

SD-065-01

EXHIBIT 4





HYDRAULIC DATA								
STA. TO STA.	Q_{10}	n	S_f	S	D_n	V_n	D_c	V_c
22+60.00 - 23+62.50	317.7	0.013	0.0149	0.0172	3.83	19.7	4.73	16.5
23+67.50 - 26+83.61	316.1	0.013	0.0089	0.0132	3.80	18.1	4.87	14.2
26+88.61 - 28+60.00	307.9	0.013	0.0084	0.0100	4.15	16.0	4.81	14.0
28+60.00 - 30+87.40	304.1	0.013	0.0082	0.0040	FULL	12.8	4.79	13.9
30+92.40 - 31+48.34	303.0	0.013	0.0081	0.0040	FULL	12.8	4.79	13.8
31+48.34 - 31+66.98	300.0	0.013	0.0081	0.0040	FULL	12.6	4.76	13.7

(13) — CONST. JUNCTION STRUCTURE TYPE II PER O.C.E.M.A STD. No 311 WITH PLATFORMS USING ECCENTRIC FLAT TOP PER OCEMA STD. No 505. OPENING TO BE ROTATED AT 90° TO EACH OTHER (ELEVATION AND NUMBER OF PLATFORM SHOWN ON PROFILE)

(8) — CONST. 66" RCP PER PLAN AND PROFILE

(7) — CONST. 4 LF. OF 18" RCP. STUB OUT AND PLUG WITH BRICK AND MORTAR FOR FUTURE CONNECTION.

(5) — CONST. JUNCTION STRUCTURE TYPE VI PER O.C.E.M.A. STD. No 315 AND STUB OUT 4 LF. OF 18" RCP AND PLUG WITH BRICK AND MORTAR FOR FUTURE CONNECTION.

( ) —

(1) — CONST. 60" RCP PER PLAN AND PROFILE

CONSTRUCTION NOTES

I.D.	Δ	R	L	T
( )				
(F)	94°57'13"	45'	74.58'	49.07'
(E)	4°57'13"	990'	85.59'	42.82'
(D)	122°08'38"	90'	191.86'	162.85'

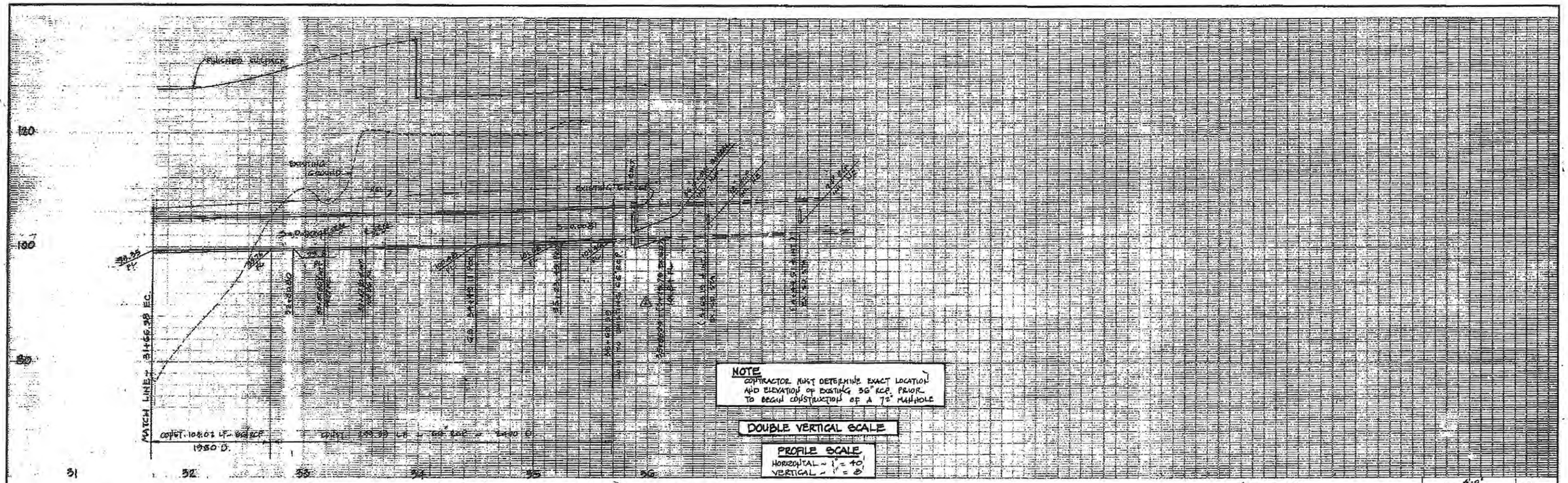
℄ RCP. CURVE DATA

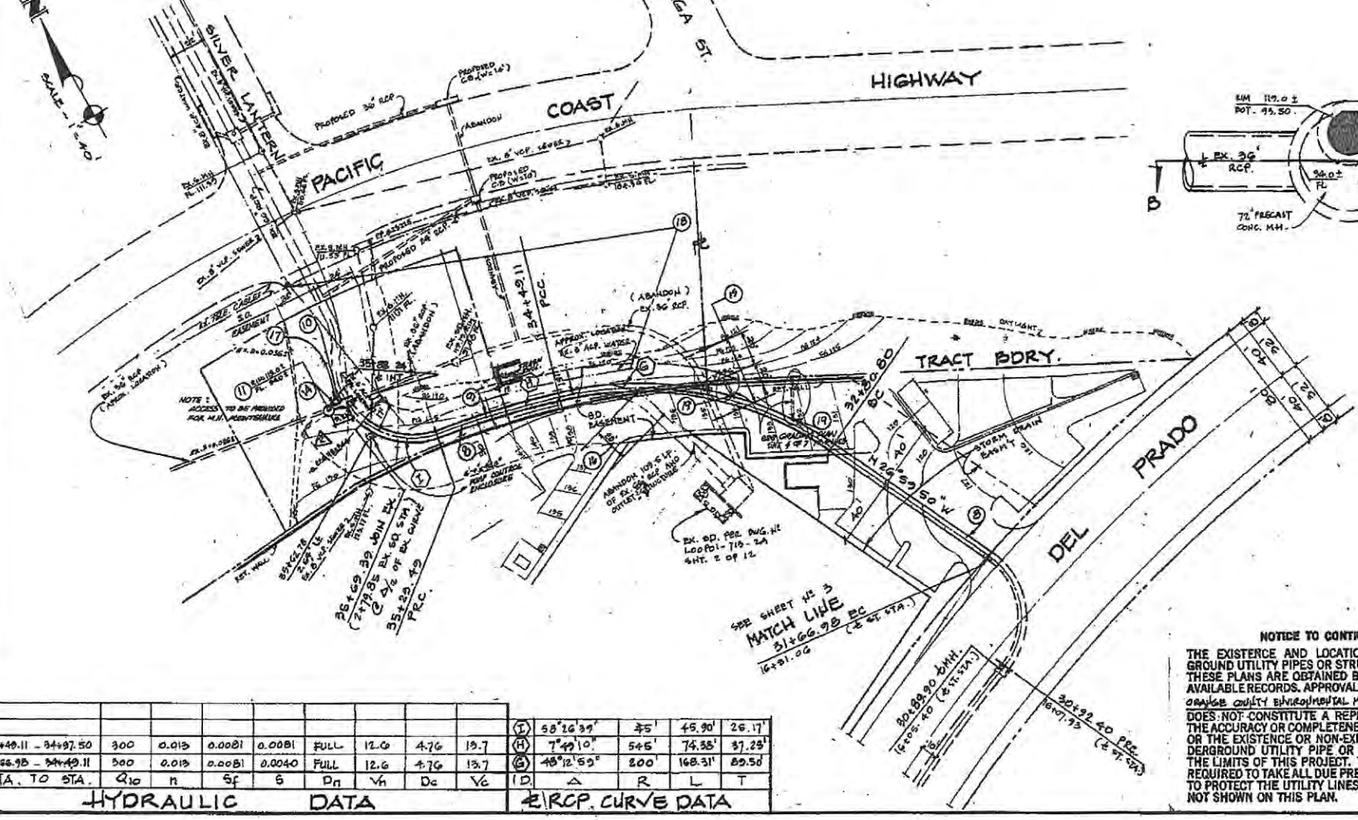
STORM DRAIN PLAN
FACILITY LOOP01
LOOP01-713-3
SHEET 3 OF 6 SHEETS

SD-055-03

172-33

EXHIBIT 4





NOTE
CONTRACTOR MUST DETERMINE EXACT LOCATION AND ELEVATION OF EXISTING 36" RCP. PRIOR TO BEGIN CONSTRUCTION OF A 72" MANHOLE

DOUBLE VERTICAL SCALE

PROFILE SCALE
HORIZONTAL ~ 1" = 40'
VERTICAL ~ 1" = 8'

JUNCTION STRUCTURE DETAILS ⑭

@ STA: 3+25.75 PRC OF EX. LINE (66" RCP)

(19) CONST. JUNCTION STRUCTURE TYPE II PER OCEMA STD. No 315 AND STUB OUT 4 L.F. OF 8" PVC AND PLUG WITH BRICK AND MORTAR FOR FUTURE CONNECTION.

(18) CONTRACTOR SHALL REMOVE, SALVAGE & REPLACE EXIST. 6" A.C.P. WATER LINE FROM EX. W.V. TO CONST. LIMITS FOR RE-ROUTING OF 66" RCP.

(17) INSTALL 1" WATER SERVICE FOR M.H. MAINTENANCE.

(16) ~~REMOVE EXIST. 66" R.C.P. TO POINT INDICATED. SEE SPECIAL EARTH WORK REQUIREMENTS PER SHT. S-5 OF RET. WALL CONST. PLANS.~~

(15) ~~REMOVE 40 L.F. OF EXIST. 36" R.C.P. TO POINTS INDICATED. SEE SPECIAL EARTHWORK REQUIREMENTS PER SHT. S-5 OF RET. WALL CONST. PLANS.~~

(14) CONST. JUNCTION STR. PER DETAIL HEREON.

(11) CONST. 72" MH. WITH PUMP STATION PER DETAIL ON SHEET No 5

(10) REMOVE 15 LF. OF EX. 36" RCP.

(9) REMOVE 185 LF± OF EX. 66" RCP AND JOIN.

(8) CONST. 66" RCP. PER PLAN AND PROFILE. SEE SPECIAL EARTHWORK REQUIREMENTS PER SHT. S-5 OF RET. WALL CONST. PLANS

CONSTRUCTION NOTES

NOTICE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. APPROVAL OF THIS PLAN BY THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OR COMPLETENESS OF THE LOCATION OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THE CONTRACTOR IS REQUIRED TO TAKE ALL DUE PRECAUTIONARY MEANS TO PROTECT THE UTILITY LINES NOT OF RECORD OR NOT SHOWN ON THIS PLAN.

STA. TO STA.	Q_{10}	n	S_f	S	D_n	V_n	D_c	V_c
34+49.11 – 34+97.50	300	0.013	0.0081	0.0081	FULL	12.6	4.76	13.7
31+66.98 – 34+49.11	300	0.013	0.0081	0.0040	FULL	12.6	4.76	13.7

HYDRAULIC DATA

I.D.	Δ	R	L	T
(I)	58°26'39"	45'	45.90'	26.17'
(H)	7°49'10"	545'	74.38'	37.25'
(G)	48°12'59"	200'	168.31'	89.50'

℄ RCP. CURVE DATA

STORM DRAIN PLAN
FACILITY L00P01
L00P01-713-3
SHEET 4 OF 6 SHEETS

SD-055-04

172-33

EXHIBIT 4

NOTES:

1 PUMP CONTROL PANEL ENCLOSURE TO BE LOCATED ON ADJACENT RETAINING WALL , SEE SHEET 4 OF 6.

2 LOCATE WARRICK SE SIB FITTING OR APPROVED EQUAL CLOSE TO M.H. COVER & FRAME ON A FLANGE SUPPORTED FROM THE SIDE WALL.

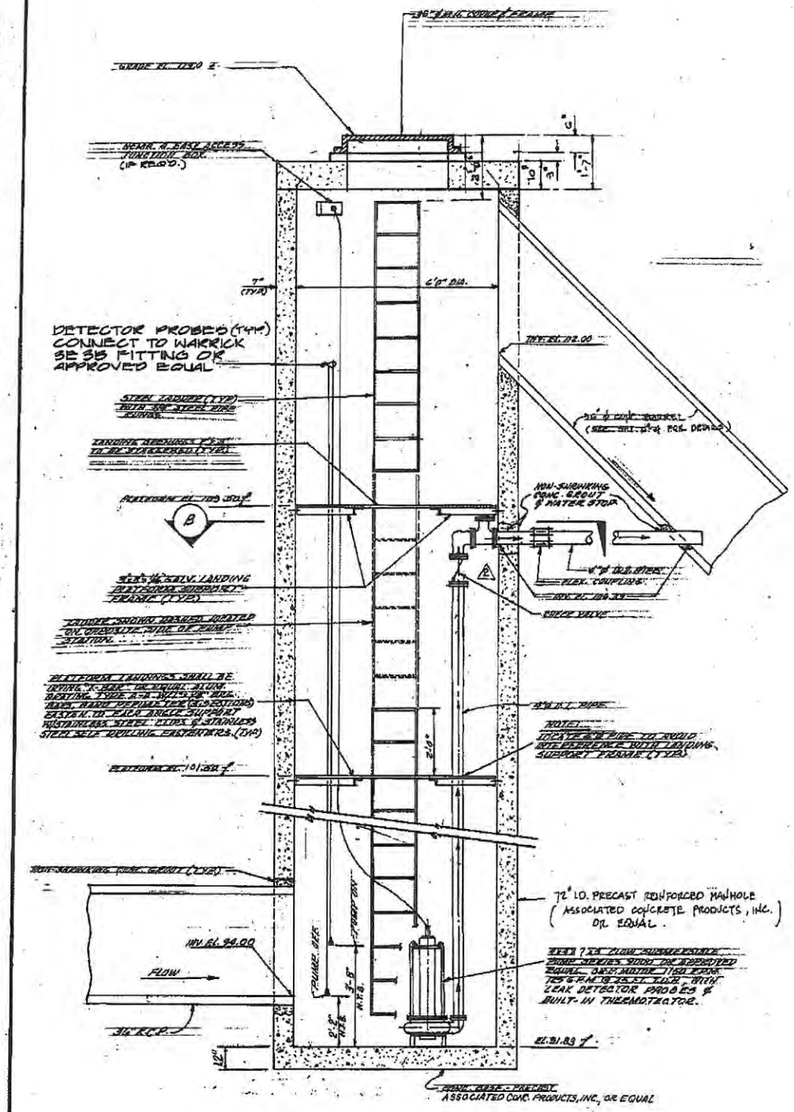
3 INSTALL DETECTOR PROBES (WARRICK SW BRASS OR APPROVED EQUAL) INSIDE A PVC PIPE TO MINIMIZE TURBULENCE

4 PUMP MOTOR SHALL BE SUITABLE TO OPERATE AT 120/240 V, 1Ø.

OUTSTANDING LEG VERTICAL LEG

SHIM DETAIL
NO SCALE

PLATFORM FRAME WELDING DETAILS
NO SCALE



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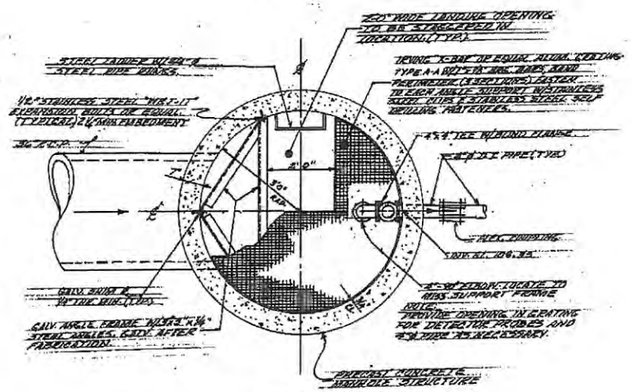

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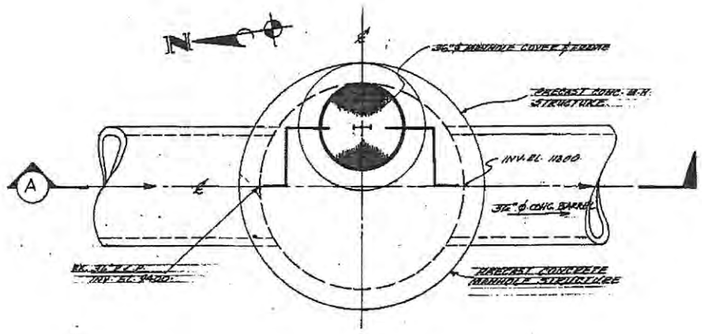


PLAN

LOOPOI-713-3

STORM DRAIN AUXILIARY PUMP STATION, FOR FACILITY LOOPOI
SHEET 5 of 6 SHEETS

SD-025-05

EXHIBIT 4

1. STORM WATER PUMP STATION:

1.1 General: The Contractor shall furnish and install in the structure as described by specifications, and as shown in the plans, one factory-built automatic pumping unit as manufactured by the Flow Corporation, or equal. The principle items of the pumping unit shall include one submersible centrifugal sewage pump; motor control panel with fully magnetic type circuit breaker, magnetic motor starter, and automatic liquid level control system.

1.2 Pump:

a. The pump must have the necessary characteristics and be properly selected to pump unscreened storm water at design conditions as shown on the contract drawings. The pump/motor unit must be non-overloading across the complete head/capacity range of the pump.

b. The pump shall have a 4-inch discharge with 125 pound standard cast iron flange fitting.

c. All pump openings and passages shall be of adequate size to pass spheres 3 inches in diameter and any trash or stringy material which can pass through the storm drain.

d. The impeller shall be of cast iron, enclosed, and non-clog type shall be dynamically balanced.

e. Pump shall include impeller and suction cover wear rings. Impeller wear ring shall be of cast polymer material.

f. All exposed fasteners and lock washers shall be of 316 stainless steel.

g. The pump shaft shall be sealed against leakage by an oil-filled double mechanical seal. Both the stationary sealing member and mated rotating member shall be of tungsten-titanium carbide alloy.

1.3 Pump Motor:

a. The submersible pump motor shall be as called for on the contract drawings. The pump and motor furnished shall be an integral unit. Motor shall be suitable for Class 1, Division 1, Group D hazardous locations.

b. Motor frame and end shield shall be of corrosion-resistant cast iron with stainless steal hardware and shaft.

c. The oil filled seal chamber shall contain a moisture sensing probe through which signs of impending seal failure may be signalled to the motor control panel. This seal chamber shall also contain a labyrinth flame path slinger which serves as a protective slinger for the upper seal.

d. Motor shall have an internal pressure capability of 200 psi.

1.4 Quick Lift Assembly

a. General: Furnish one "quick lift" slide rail mechanism to guide submersible pump from 5 feet above the concrete base to its operational location in the sump base.

b. Elbow: The base elbow shall be cast in accordance with A.S.T.M. Specification No. A46-76, Class 30. All pipe flanges shall be faced and to the thickness required for compliance with 125 lb. American Standard. Bolt slots are acceptable in lieu of drilled holes. Bolt slots in the base are to be provided for mounting the elbow to the concrete floor or sole plate. The base elbow is specifically designed to permit the slide mechanism to link up the pump with the base elbow.

c. Rail: The guide rail is to be constructed from standard structural angle and anti-rust coated to prevent corrosion and maintain a smooth surface for the guide shoes. The guide rail is to be attached to the discharge pipe with pipe straps every 12" o/c,

d. Guide Shoes: Two teflon coated shoes are to guide the pump assembly down the guide rail until the shoes contact the discharge elbow.

The pump then fulcrums about this point and positions the pump discharge flange to properly engage it with the discharge elbow.

e. Jam Washer: A neoprene jam washer shall fit in the slide plate to minimize leakage between the pump casing and base elbow.

f. Slide: The pump discharge is to be bolted to the slide on one side and the guide shoes are to be attached to the other side. The slide is to be guided in its descent and ascent by the rail and guide shoes.

1.5 Lift Cable:

A ½ inch diameter stainless steel braided wire lift cable shall be permanently attached to the pump. Provision shall be made for attaching upper end of this cable to the wet well access frame.

1.6 Hardware:

All bolts, machine screws, nuts, washers, and lockwashers for complete assembly of access cover, guide rails, and discharge elbow shall be furnished by manufacturer in 316 stainless steel.

1.7 Control:

a. Enclosure: A NEMA type 4, UL listed, dead-front enclosure, key-lockable, shall house all control equipment. The panel shall be fully gasketed and dust tight and shall include test push buttons (one for each level control), and moisture sensing alarm system consisting of necessary relays and warning light. In the event of a seal failure alarm, the pump shall be shut down and remain inoperative until the seal is corrected. Circuit breaker , motor starter , reset buttons, and pump control H.O.A. switches shall be surface mounted for accessible operation without opening the high voltage panel. The low voltage pump control section shall be enclosed is a hinged section of the

panel and isolated from the high voltage section. All low voltage control wiring shall be accessible by a hinged drop shelf covering the control section. All external wiring shall terminate behind this panel. A grounding type convenience outlet shall be porvided for operation of 127 volt AC devices and shall be protected by a 15 amp thermal magnetic circuit breaker.

b. Circuit Breakers: Magnetic circuit breakers shall be provided for branch disconnect service and over-current protection against short circuits or grounds of motor branch circuit conductors, motor , controls and auxilliary equipment. Magnetic across-the-line starters with under voltage release and overload coils for each phase shall be provided for each pump motor to give positive protection against single phasing. All equipment control switches shall be labeled and a color coded wiring diagram shall be provided.

c. Level Controls: The automatic operation of the pump shall be controlled by wet well mounted electrodes as manufactured by Warrick Co., or equal. Electrodes shall be series 3W brass, with 32 1 A suspension wire, 32 1 B adaptors, 3 E 3B fitting. Series 2 low voltage control relays shall be included in the control panel.

d. Motor High Temperature Shutdown: The control shall be equipped with high temperature shutdown for motor and shall utilize the temperature switches embedded in the motor windings. In a high motor temperature condition, the switch shall open, de-energize the motor starter and stop the pump motor. The high motor temperature shutdown device shall be automatic reset.

e. Seal Failure Shutdown: The control panel shall be equipped with a moisture detector control for pump which senses moisture in the oil cavity should the lower seal fail. Sensor probes located in the oil cavity will detect the influx of moisture and disrupt the motor starter circuit of the particular pump involved. Should this condition occur, the pump motor shall remain inoperative until the problem is corrected and the control circuit has been manually reset.

1.8 Running Light :

Include in the motor control panel a pilot light for pump motor which shall illuminate red light when the motor is running.

1.9 Wiring:

a. The lift station shall be completely wired at the factory, except for the power feeder lines, in accordance with applicable wiring standards set forth by the National Electric Code (NEC). All wiring in the lift station shall be color coded and numbered as indicated on the wiring diagram.

b. All components shall be electrically grounded to a common ground lug mounted on the control panel sub plate. Upon installation of the lift station, and before connection of any power feeder lines, Contractor shall extend grounding wire from lug to external ground in accordance with local electrical code.

2.0 Operational Test:

The pump, motor and controls shall be given an operational test in accordance with the standards of the Hydraulic Institute. Recordings of the test shall substantiate the operation of equipment at the design head, capacity, speed and horsepower as herein specified.

2.1 Operation and Maintenance Manuals:

Contractor shall provide 4 sets hardbound manuals to include the following for each component:

a. Catalog
b. Parts list
c. Price list
d. Wiring diagram
e. Plan and details
f. Performance curves
g. Copies of operational test

L00P01-713-3

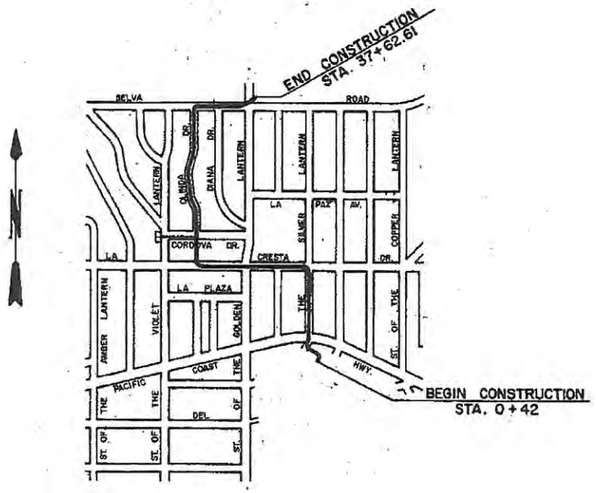
STORM DRAIN AUXILIARY PUMP STATION FOR FACILITY L00P01
SHEET 6 OF 6 SHEETS

SD-095-06

EXHIBIT 4

INDEX OF DRAWINGS

SHEET NO.	DRAWING TITLE
1.	TITLE SHEET
2	PLAN & PROFILE , STA. 0+42 TO STA. 9+20
3	PLAN & PROFILE , STA. 9+20 TO STA. 18+40
4	PLAN & PROFILE , STA. 18+40 TO STA. 25+40
5	PLAN & PROFILE , STA. 25+40 TO STA. 32+60
6	PLAN & PROFILE , STA. 32+60 TO STA. 37+62.61
7	INTERSECTION DETAILS - LA CRESTA DRIVE AT SILVER LANTERN CORDOVA DRIVE AT OLINDA DRIVE
8	INTERSECTION DETAILS - SELVA ROAD AT OLINDA DRIVE CORDOVA DRIVE AT VIOLET LANTERN
9	MAINLINE CONNECTOR PROFILES & DETAILS
10	MAINLINE CONNECTOR PROFILES & DETAILS SEWER CONSTRUCTION DETAILS
11	OUTLET STRUCTURE PLAN & DETAILS
12	LOG OF BORINGS & BEDDING DETAIL



LOCATION MAP

SCALE: 1" = 600'

0 250 500 750 1000 1500 2000

SCALE IN FEET

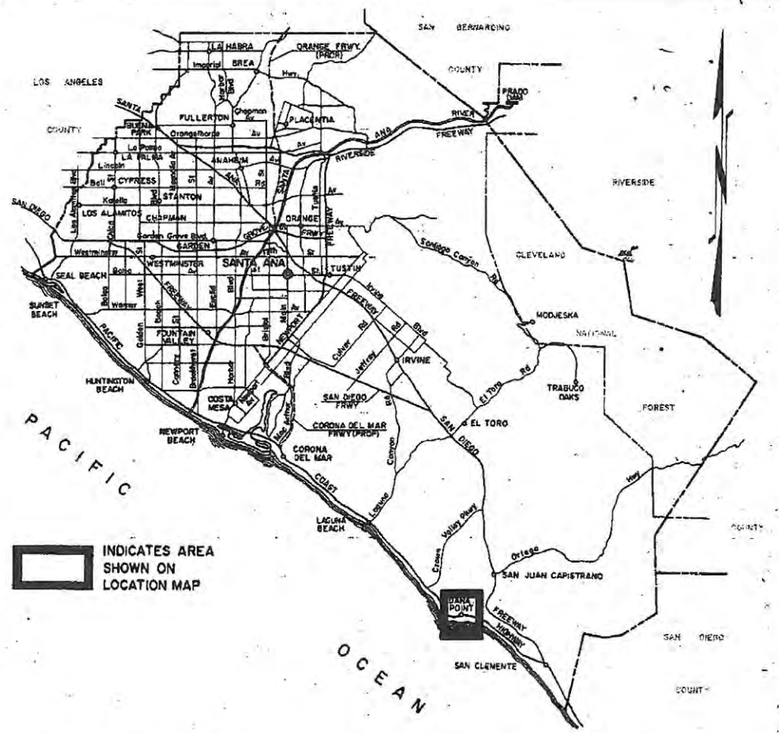
UTILITY OWNERS

NAME	PHONE NO.
DANA POINT SANITARY DISTRICT	(714) 496-9322
SAN DIEGO GAS & ELECTRIC COMPANY	(714) 492-5111
SOUTHERN CALIFORNIA GAS COMPANY	(714) 538-0211
PACIFIC TELEPHONE COMPANY	(714) 557-1224
CAPISTRANO BEACH COUNTY WATER DISTRICT	(714) 496-5261
STORER CABLE TV INC.	(714) 493-1600

PREPARED BY THE STAFF OF

TOUPS CORPORATION
1010 NORTH MAIN STREET
SANTA ANA, CALIFORNIA 92711
TELEPHONE (714) 835-4447

SUBMITTED BY : Donald Talley
DONALD TALLEY R.C.E. 13,151



ORANGE COUNTY, CALIFORNIA
VICINITY MAP

4 3 2 1 0 2 4 8 12

SCALE IN MILES

PLANS FOR
THE CONSTRUCTION OF
THAT PORTION OF

GOLDEN LANTERN STORM DRAIN

FROM
PACIFIC COAST HIGHWAY
TO
STREET OF THE GOLDEN LANTERN AT SELVA ROAD
FACILITY NO. LOOP01
AUGUST, 1975

APPROVED: C.R. Nelson
ASSISTANT DIRECTOR

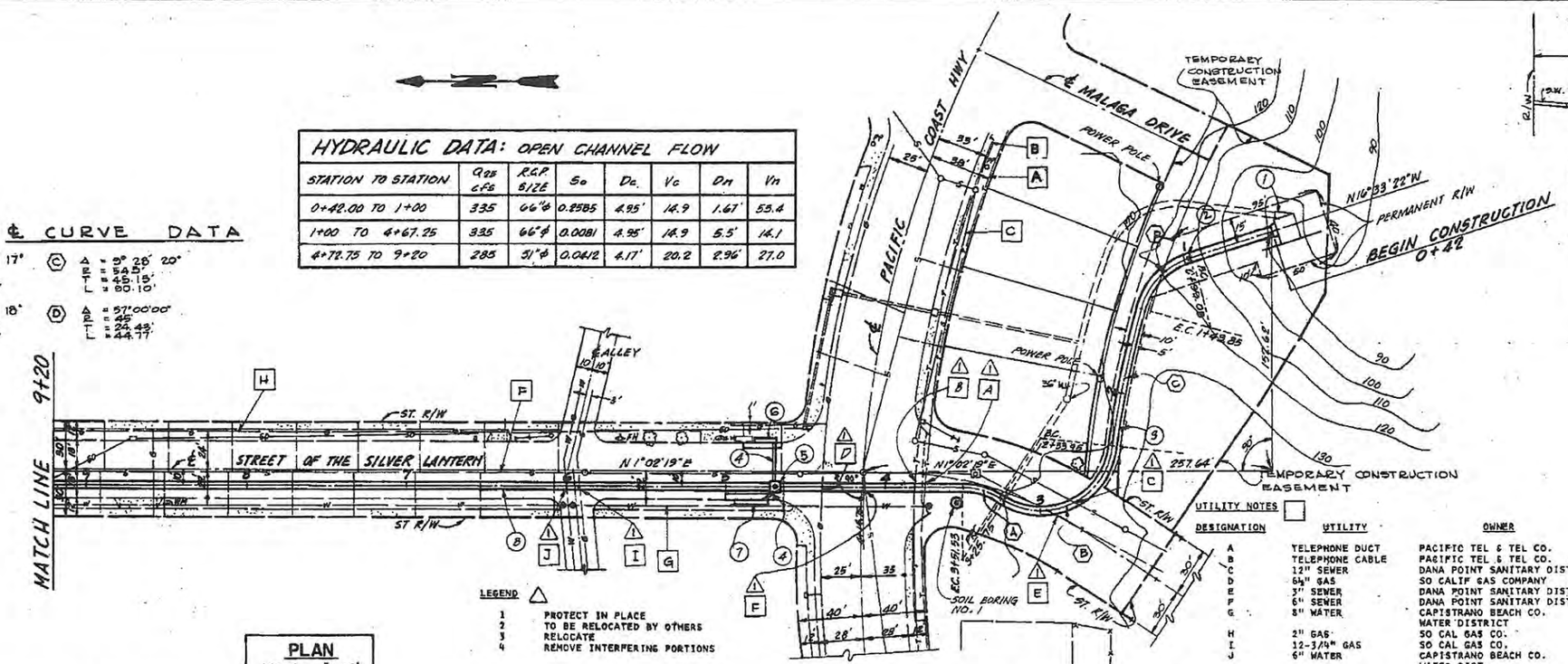
COUNTY OF ORANGE PROJECT
ADMINISTERED BY
ORANGE COUNTY FLOOD CONTROL DISTRICT
SANTA ANA CALIFORNIA

DWG. NO. LOOP01-713-2A

SHEET 1 OF 12 SHEETS

SP-015-01

EXHIBIT 5
5-013-1



HYDRAULIC DATA: OPEN CHANNEL FLOW

STATION TO STATION	Q25 cfs	R.C.P. SIZE	So	Dc	Vc	Dn	Vn
0+42.00 TO 1+00	335	66"ϕ	0.2585	4.95'	14.9	1.67'	53.4
1+00 TO 4+67.25	335	66"ϕ	0.0081	4.95'	14.9	5.5'	14.1
4+72.75 TO 9+20	285	51"ϕ	0.0412	4.17'	20.2	2.96'	27.0

℄ CURVE DATA

Ⓐ Δ = 32° 49' 17"
R = 45'
T = 13.25'
L = 25.78'

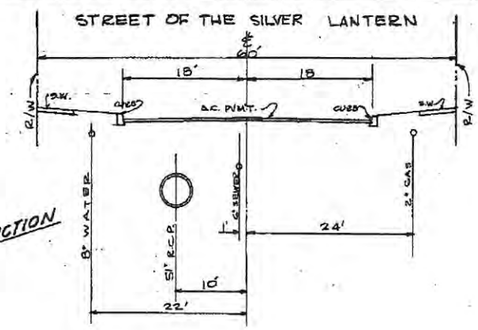
Ⓑ Δ = 116° 53' 18"
R = 45'
T = 73.27'
L = 91.80'

Ⓒ Δ = 9° 28' 20"
R = 545'
T = 45.15'
L = 90.10'

Ⓓ Δ = 57°00'00"
R = 45'
T = 24.43'
L = 44.77'

LEGEND △

1	PROTECT IN PLACE
2	TO BE RELOCATED BY OTHERS
3	RELOCATE
4	REMOVE INTERFERING PORTIONS



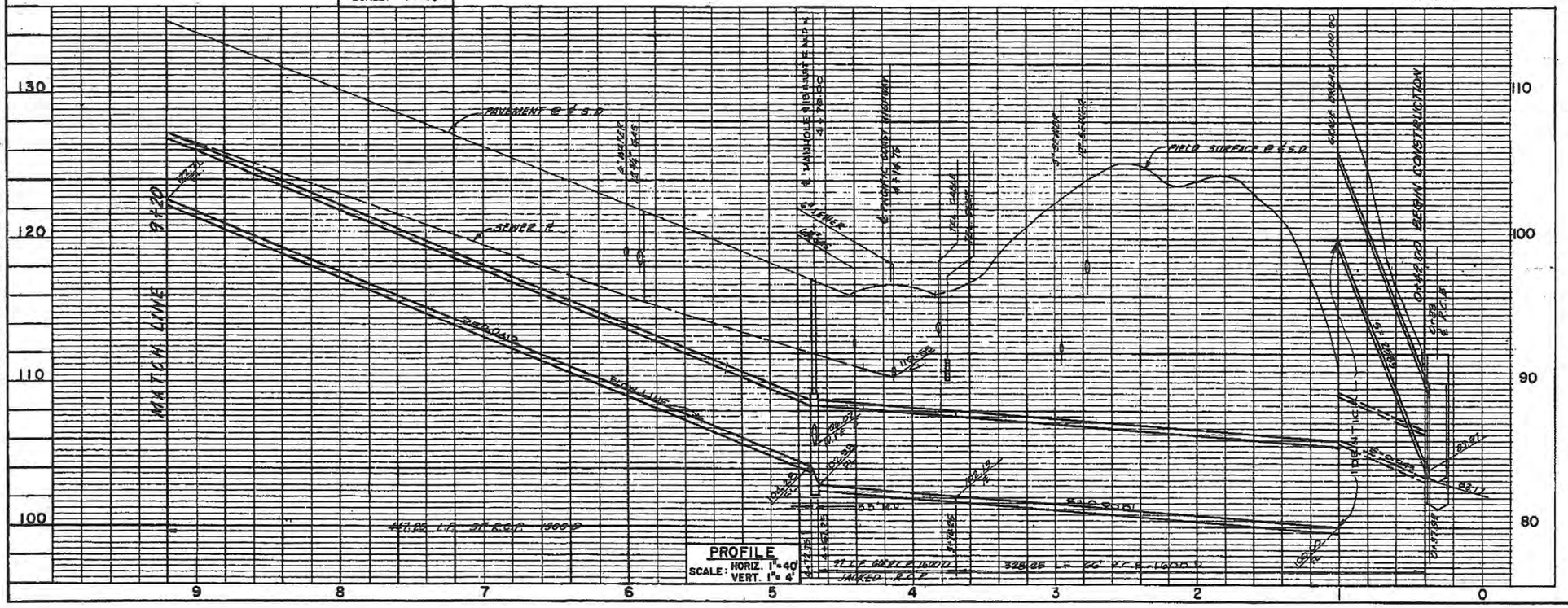
SECTION
4+73 TO 9+20
SCALE: 1"=10'

UTILITY NOTES ☐

DESIGNATION	UTILITY	OWNER
A	TELEPHONE DUCT	PACIFIC TEL & TEL CO.
B	TELEPHONE CABLE	PACIFIC TEL & TEL CO.
C	12" SEWER	DANA POINT SANITARY DIST.
D	6¼" GAS	SO CALIF GAS COMPANY
E	3" SEWER	DANA POINT SANITARY DIST
F	6" SEWER	DANA POINT SANITARY DIST.
G	8" WATER	CAPISTRANO BEACH CO. WATER DISTRICT
H	2" GAS	SO CAL GAS CO.
I	12-3/4" GAS	SO CAL GAS CO.
J	6" WATER	CAPISTRANO BEACH CO. WATER DIST.

CONSTRUCTION NOTES ○

1. CONSTRUCT OUTLET STRUCTURE PER DETAILS ON SHEET 11.
2. CONSTRUCT CONCRETE COLLAR PER L.A.C.F.C.D. STD. DWG. NO. 2-D393.
3. PLACE 66" R.C.P. 0+42 TO 4+67.25 PER PLAN, PROFILE AND SECTION.
4. CONSTRUCT 18" R.C.P. CONNECTOR. SEE PROFILE AND DETAILS SHEET 9.
5. CONSTRUCT MANHOLE PER O.C.F.C.D. STD. DWG. NO. STD. MH2-1.
6. CONSTRUCT INLET TYPE II PER O.C.R.D. STD. PLAN 302. L=14', H= 4.5'. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.
7. CONSTRUCT INLET TYPE II PER O.C.R.D. STD. PLAN 302. REDUCE WIDTH 6" OR AS NECESSARY TO CLEAR UTILITY, L=21.0', H=7.0'. CONNECTOR PIPE CONNECTION PER L.A.C.F.C.D. STD. DWG. 2-D224. LOCAL DEPRESSION PER DETAIL SHEET 10.
8. PLACE 51" R.C.P. 4+72.75 TO 9+20.00 PER PLAN, PROFILE AND SECTION.



DATUM OCFCD = OCS 1970 ADJUSTMENT

BENCH MARK: OCS S-785-70 ELEV. 122.975

0.8 MILES WEST ALONG PACIFIC COAST HIGHWAY FROM THE ATCHISON TOPEKA RAILWAY OVERPASS AT DOHENEY PARK, AT THE 'T' INTERSECTION OF ALCAZAR DRIVE, 35 FEET NORTH OF THE CENTERLINE OF THE NORTH LANES OF THE HIGHWAY, 0.5 FOOT NORTH OF THE NORTH EDGE OF THE SIDEWALK, 0.4 FOOT EAST OF THE EAST EDGE OF THE EAST CURB OF DRIVE, ABOUT 1 FOOT HIGHER THAN THE HIGHWAY, FLUSH WITH THE GROUND, AND SET IN THE TOP OF A CONCRETE POST.

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

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS		
MARK	DATE	DESCRIPTION

ORANGE COUNTY FLOOD CONTROL DISTRICT

GOLDEN LANTERN STORM DRAIN

PLAN & PROFILE
STA. 0+42 TO STA. 9+20

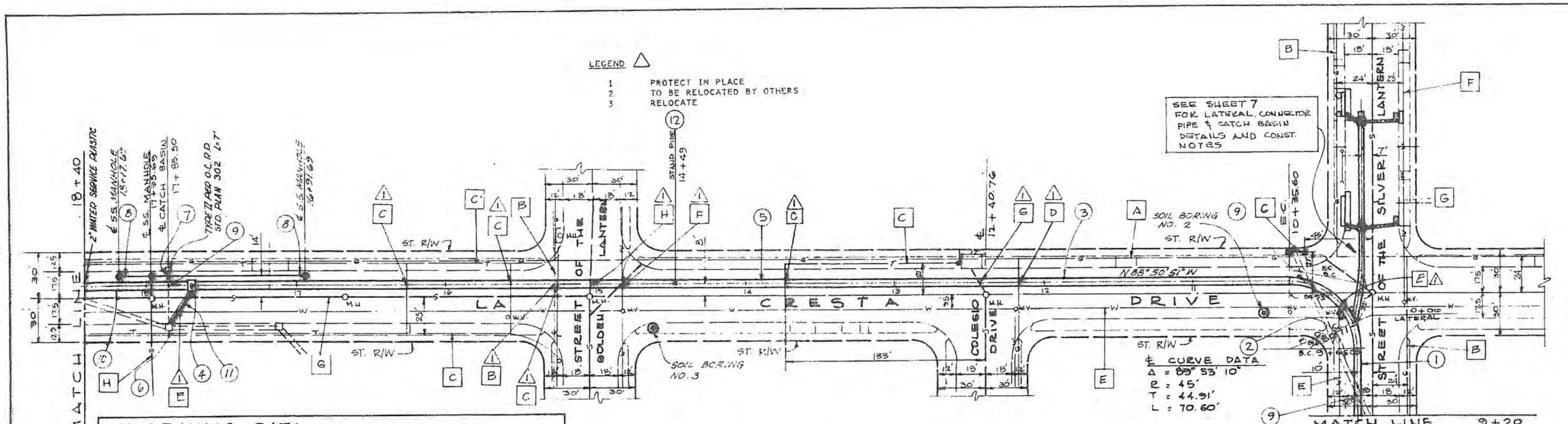
DESIGNED J.T.T.
DRAWN P.L.R. CHECKED H.A.C.
SUBMITTED DESIGN ENGINEER
RECOMMENDED DESIGN DIVISION ENGINEER

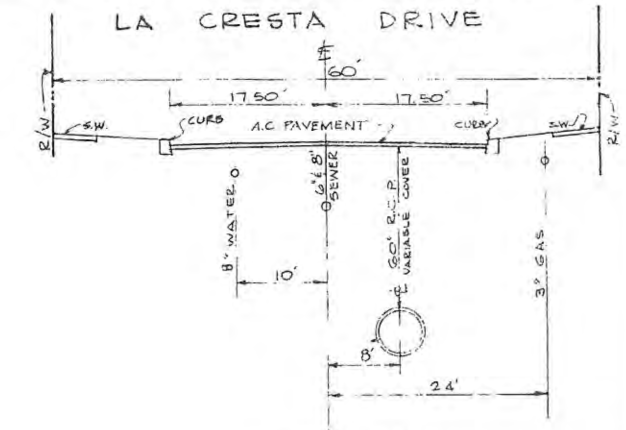
SCALE	DATE	DWG. NO.
AS SHOWN	AUG. 75	LOOP01-713-2A

SHEET 2 OF 12

SD-015-02

EXHIBIT 5





HYDRAULIC DATA: OPEN CHANNEL FLOW							
STATION TO STATION	Q25 cfs	R.C.P. SIZE	So	Dc	Vc	Dn	Vn
9+20 TO 9+80.30	285	51"φ	.0412	4.17'	20.2	2.96'	27.0
9+91.30 TO 10+35.60	240	60"φ	.0905	4.35'	13.2	1.90'	35.0
10+35.60 TO 17+65.00	240	60"φ	.0100	4.35'	13.2	3.79'	15.1
17+70.5 TO 17+95.00	230	54"φ	.0253	4.19'	14.9	3.87'	15.8
PRESSURE FLOW							
					V	Sf n=.012	Sf n=.014
17+95 TO 18+40	230	54"φ	.0056		14.5	.0117	.0159

UTILITY NOTES

DESIGNATION	UTILITY	OWNER
A	3" GAS	SO CAL GAS CO.
B	2" GAS	SO CAL GAS CO.
C	4" TELEPHONE CABLE	PACIFIC TEL & TEL CO
D	4" GAS	SO CAL GAS CO.
E	8" WATER	CAPISTRANO BEACH CO. WATER DIST.
F	6" WATER	CAPISTRANO BEACH CO. WATER DIST.
G	6" SEWER	DANA POINT SAN. DIST
H	8" SEWER	DANA POINT SAN. DIST.

PLAN
SCALE: 1" = 40'

CONSTRUCTION NOTES

1 PLACE 51" R.C.P. 9+20 TO 9+80.30 PER PLAN, PROFILE AND SECTION.

2 CONSTRUCT MANHOLE PER O.C.F.C.D. STD. DWG. STD-MH4-1, A=11'-10", ANGLE A=30°, B=30", C=11'-0", El.S=126.95', EL. R=127.05'.

3 PLACE 60" R.C.P. 9+91.30 TO 13+47.25 PER PLAN, PROFILE AND SECTION.

4 CONSTRUCT MANHOLE PER O.C.F.C.D. STD. DWG. STD.-MH2-1.

5 PLACE 60" R.C.P. 13+52.75 TO 17+65.00 PER PLAN PROFILE AND SECTION.

6 REMOVE INTERFERING PORTIONS OF EXISTING CATCH BASIN. PLUG INLETS WITH DOUBLE COURSE OF 8" BRICK AND MORTAR AND FILL TO GRADE. CONSTRUCT INLET TYPE I PER O.C.R.D. STD. PLAN 301. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.

7 CONSTRUCT 18" R.C.P. CONNECTOR. SEE PROFILE AND DETAILS SHEET 9.

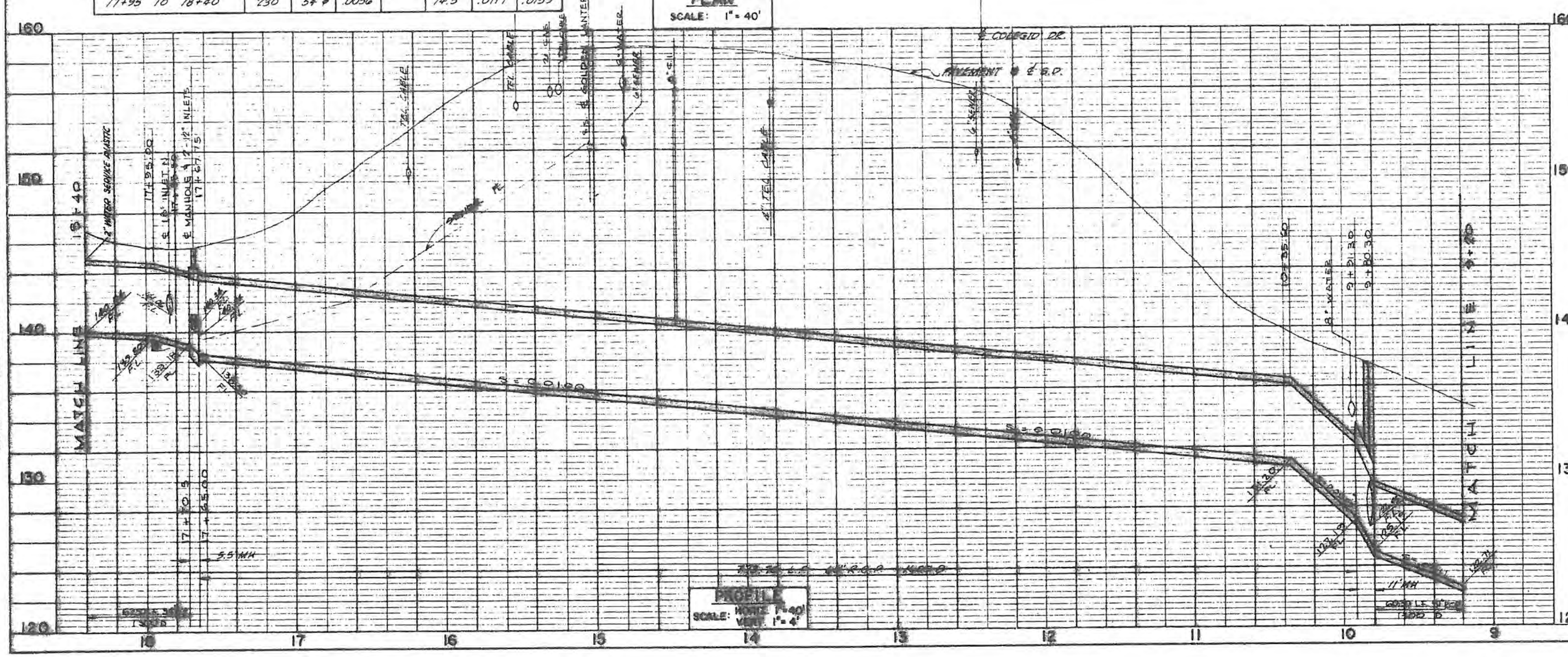
8 CONSTRUCT SEWER LINES PER DETAILS SHEET 10.

9 REMOVE INTERFERING PORTION OF 18" R.C.P.

10 PLACE 54" R.C.P. 17+70.50 TO 18+46.00 PER PLAN, PROFILE AND SECTION.

11 CONSTRUCT DOUBLE 12" R.C.P. CONNECTOR. SEE PROFILE AND DETAILS SHEET 9.

12 CONSTRUCT STAND-PIPE WITH 8" C.I. PIPE (CLASS 25) PER DETAIL SHEET 10.



DATUM OCFCD = OCS 1970 ADJUSTMENT

BENCH MARK: OCS S-783-70 ELEV. 122.975

0.8 MILES WEST ALONG PACIFIC COAST HIGHWAY FROM THE ATCHISON TOPEKA RAILWAY OVERPASS AT DOHENEY PARK, AT THE 'T' INTERSECTION OF ALCAZAR DRIVE, 35 FEET NORTH OF THE CENTERLINE OF THE NORTH LANES OF THE HIGHWAY, 0.5 FOOT NORTH OF THE NORTH EDGE OF THE SIDEWALK, 0.4 FOOT EAST OF THE EAST EDGE OF THE EAST CURB OF DRIVE, ABOUT 1 FOOT HIGHER THAN THE HIGHWAY, FLUSH WITH THE GROUND, AND SET IN THE TOP OF A CONCRETE POST.

3 inches on original drawing

GOLDEN LANTERN STORM DRAIN

PLAN & PROFILE

STA. 9+20 TO STA. 18+40

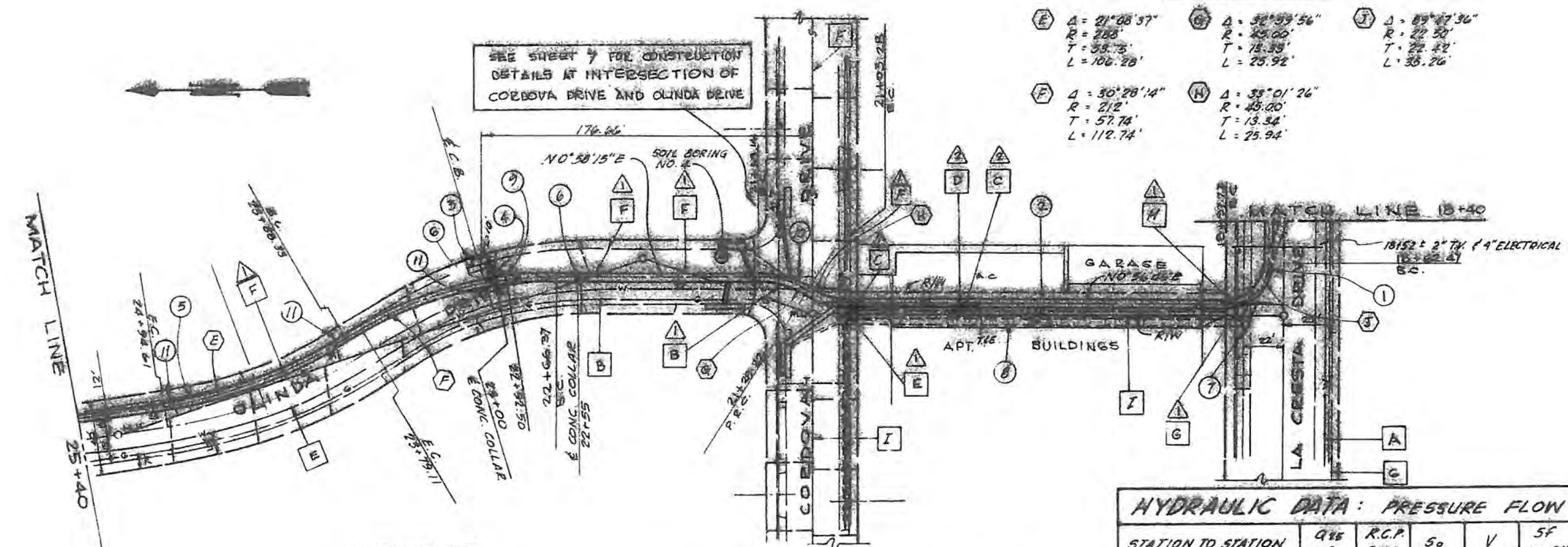
SCALE AS SHOWN | DATE AUG. 75

SHEET 3 OF 12

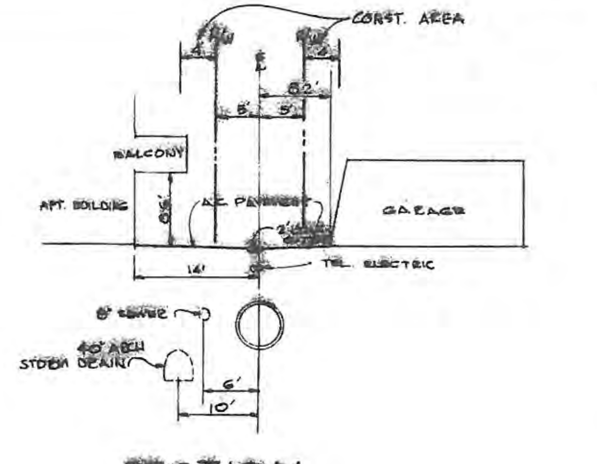
EXHIBIT 5

℄ CURVE DATA

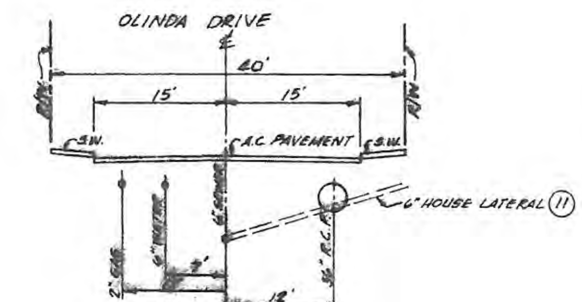
Curve	Δ	R	T	L
E	21°08'37"	288'	53.75'	106.28'
F	30°28'14"	212'	57.74'	112.74'
G	32°59'56"	45.00'	13.33'	25.92'
H	33°01'26"	45.00'	13.34'	25.94'
J	89°47'36"	22.50'	22.42'	35.26'



PLAN
SCALE: 1" = 40'



SECTION
19 + 50
SCALE 1" = 10'



SECTION
24+00
SCALE 1" = 10'

LEGEND △

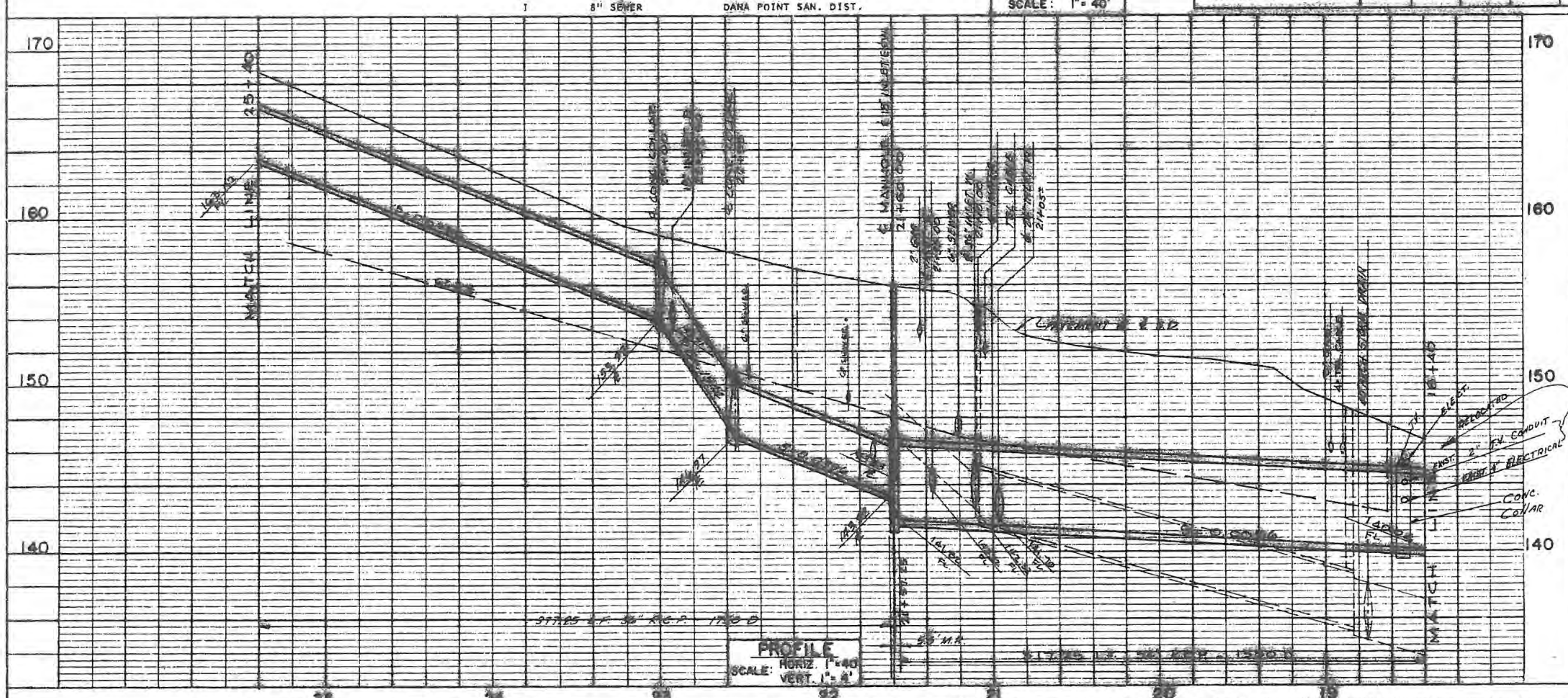
1. PROTECT IN PLACE
2. TO BE RELOCATED BY OTHERS
3. RELOCATE
4. REMOVE INTERFERING PORTIONS

UTILITY NOTES □

DESIGNATION	UTILITY	OWNER
A	8" WATER	CAPISTRANO BEACH CO. WATER DIST.
B	2" GAS	SO CAL GAS CO.
C	TELEPHONE CABLE	PACIFIC TEL & TEL CO.
D	ELECTRIC CABLE	SAN DIEGO GAS & ELECTRIC CO.
E	6" WATER	CAPISTRANO BEACH CO. WATER DIST.
F	6" SEWER	DANA POINT SAN. DIST.
G	4" TELEPHONE CABLE	PACIFIC TEL & TEL CO.
H	3" GAS	SO CAL GAS CO.
I	8" SEWER	DANA POINT SAN. DIST.

HYDRAULIC DATA: PRESSURE FLOW

STATION TO STATION	Q25 CFS	R.C.P. SIZE	So	V	Sf n=.012	Sf n=.014	
18+40 TO 21+57.25	230	54"Ø	.0056	14.5	.0117	.0159	
21+57.25 TO 22+55	145	36"Ø	.0596	20.5	.0403	.0549	
22+55 TO 23+00	145	36"Ø	.1544	20.5	.0403	.0549	
OPEN CHANNEL FLOW							
				Dc	Vc	Dn	Vn
23+00 TO 25+40	135	36"Ø	.0396	2.96'	19.1	2.51'	21.4



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

CONSTRUCTION NOTES ○

1. PLACE 54" R.C.P. 17+70.5 TO 21+57.25 PER PLAN, PROFILE AND SECTION.
2. RESTORE TO ORIGINAL CONDITION, ALL EXISTING IMPROVEMENTS (LOCATED BETWEEN CORDOVA DRIVE AND LA CRESTA DRIVE). A) DRIVEWAY APPROACH AT CORDOVA, B) DRIVEWAY APPROACH AT LA CRESTA, C) TWO SPEED BUMPS, D) EXISTING A.C. PAVEMENT.
3. CONSTRUCT INLET TYPE II PER O.C.R.D. STD. PLAN 302. L=10.0', H=3.5'. CONNECTOR PIPE CONNECTION PER L.A.C.F.C.D. STD. DWG. 2-D224. LOCAL DEPRESSION PER DETAIL SHEET 10. (L.D. MODIFIED - 3' U/S & 1½' D/S)
4. CONSTRUCT 18" R.C.P. CONNECTOR. SEE PROFILE AND DETAILS SHEET 9.
5. PLACE 36" R.C.P. 21+62.75 TO 25+40.00 PER PLAN, PROFILE AND SECTION.
6. CONSTRUCT CONCRETE COLLAR PER L.A.C.F.C.D. STD. DWG. NO. 2-D393.
7. PLUG INLET AND OUTLET OF MANHOLE WITH A DOUBLE COURSE OF 8" BRICK AND MORTAR. REMOVE TOP 2' OF STRUCTURE AND FILL REMAINING STRUCTURE WITH SAND. BACKFILL TOP 2' WITH NATIVE MATERIAL TO MATCH SURROUNDING GROUND.
8. FILL 40"± ARCH CONDUIT WITH 3/8" X NO. 4 AGGREGATE BETWEEN NORTH FACE OF MANHOLE AT LA CRESTA DRIVE AND SOUTHERLY RIGHT-OF-WAY LINE OF CORDOVA DRIVE. PROVIDE A BRICK AND MORTAR PLUG AT UPSTREAM END.
9. CONSTRUCT JUNCTION STRUCTURE PER L.A.C.F.C.D. STD: DWG. 2-D112. A=39°, B=18", C=2.7', D=36".
10. REMOVE INTERFERING PORTION OF 24" R.C.P. CONNECTOR.
11. RECONSTRUCT 6" HOUSE LATERALS PER O.C.S.D. STANDARD DRAWING S-.

DATUM OCFCD = OCS 1970 ADJUSTMENT

BENCH MARK: OCS 5-783-70 ELEV. 122.975

0.8 MILES WEST ALONG PACIFIC COAST HIGHWAY FROM THE ATCHISON TOPEKA RAILWAY OVERPASS AT DOHENEY PARK, AT THE 'T' INTERSECTION OF ALCAZAR DRIVE, 35 FEET NORTH OF THE CENTERLINE OF THE NORTH LANES OF THE HIGHWAY, 0.5 FOOT NORTH OF THE NORTH EDGE OF THE SIDEWALK, 0.4 FOOT EAST OF THE EAST EDGE OF THE EAST CURB OF DRIVE, ABOUT 1 FOOT HIGHER THAN THE HIGHWAY, FLUSH WITH THE GROUND, AND SET IN THE TOP OF A CONCRETE POST.

1/2 0 1 2
3 inches on original drawing

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS		
MARK	DATE	DESCRIPTION

ORANGE COUNTY FLOOD CONTROL DISTRICT

GOLDEN LANTERN STORM DRAIN

PLAN & PROFILE

STA. 18+40 TO STA. 25+40

RECOMMENDED

SUBMITTED

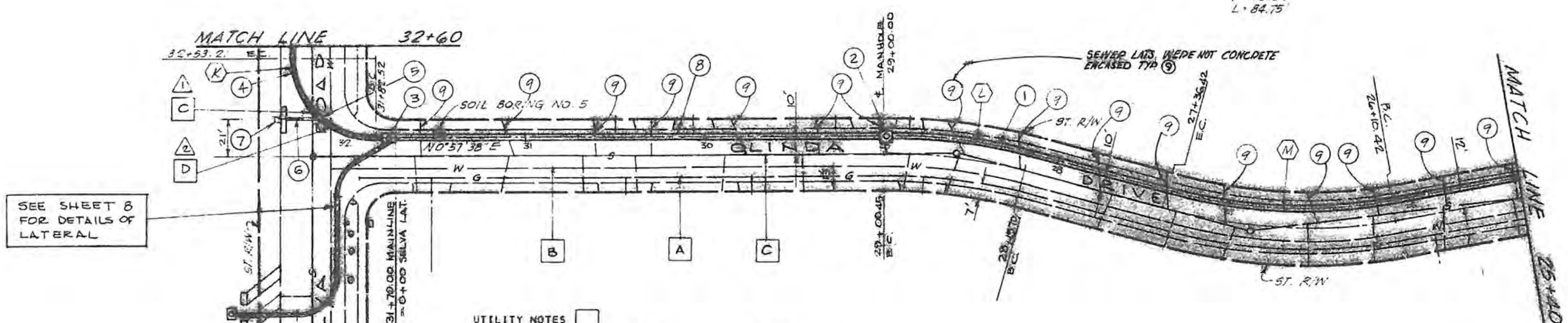
SCALE	DATE	DWG NO.
AS SHOWN	AUG. 75	L00P01-713-24

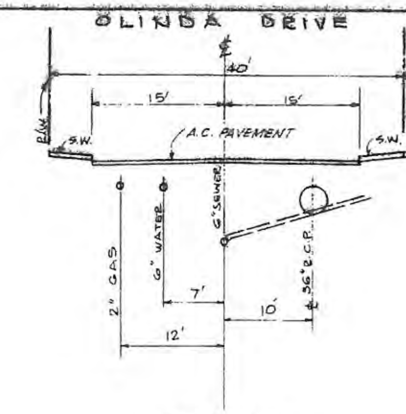
SHEET 4 OF 12

EXHIBIT 5

℄ CURVE DATA

Curve	Δ	R	T	L
K	90°00'43"	45'	45.01'	70.69'
L	15°39'55"	310'	42.64'	84.75'
M	24°58'55"	289'	64.02'	126.00'





SECTION
25+40 TO 31+70
SCALE: 1" = 10'

UTILITY NOTES ☐

DESIGNATION	UTILITY	OWNER
A	2" GAS	SO CAL GAS CO.
B	6" WATER	CAPISTRANO BEACH CO WATER DIST.
C	6" SEWER	DANA POINT SAN. DIST.
D	12" WATER	CAPISTRANO BEACH CO WATER DIST.

LEGEND △

1 PROTECT IN PLACE
2 TO BE RELOCATED BY OTHERS

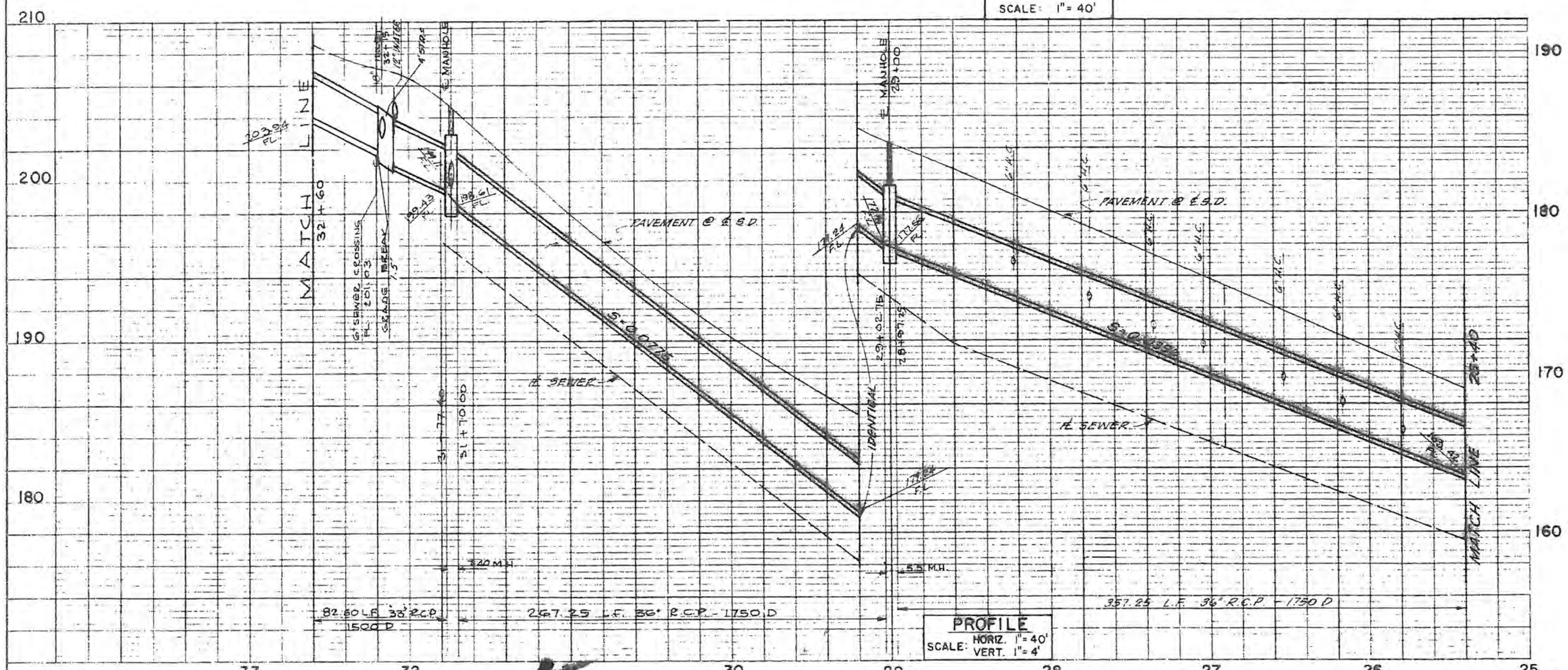
HYDRAULIC DATA : OPEN CHANNEL FLOW

STATION TO STATION	Q25 cfs	R.C.P. SIZE	So	Dc	Vc	Dn	Vn
25+40 TO 29+00	135	36"φ	.0396	2.96'	19.1	2.51'	21.4
29+00 TO 31+70	135	36"φ	.0775	2.96'	19.1	1.89'	28.8
31+77.4 TO 32+14	100	33"φ	.0775	2.71'	16.9	1.66'	26.6
32+14 TO 32+60	100	33"φ	.0362	2.71'	16.9	2.24'	19.3

CONSTRUCTION NOTES ○

1 PLACE 36" R.C.P. 25+40.00 TO 28+97.25 PER PLAN, PROFILE AND SECTION.
2 CONSTRUCT MANHOLE PER O.C.F.C.D. STD. DWG. STD.-MH2-1.
3 CONSTRUCT MANHOLE PER O.C.F.C.D. STD. DWG. STD MH2-1 A=8.23', ANGLE A=30°, B=24", C=7.3', El.S=199.31', EL. R=199.23'.
4 PLACE 33" R.C.P. 32+77.40 TO 32+60 PER PLAN, PROFILE AND SECTION.
5 CONSTRUCT JUNCTION STRUCTURE MH1-1 (LESS M.H.)
6 CONSTRUCT 18" R.C.P. CONNECTOR, SEE PROFILE AND DETAILS SHEET 9.
7 CONSTRUCT INLET TYPE I PER O.C.R.D. STD. PLAN 301, H=3.5'. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.
8 PLACE 36" R.C.P. 29+02.75 TO 31+70.00 PER PLAN, PROFILE AND SECTION.
9 RECONSTRUCT 6" HOUSE LATERALS PER O.C.S.D. STD. DRAWING S-.

PLAN
SCALE: 1" = 40'



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

DATUM OCFCD = OCS 1970 ADJUSTMENT

BENCH MARK: OCS 5-783-70 ELEV. 122.975

0.8 MILES WEST ALONG PACIFIC COAST HIGHWAY FROM THE ATCHISON TOPEKA RAILWAY OVERPASS AT DOHENEY PARK, AT THE 'T' INTERSECTION OF ALCAZAR DRIVE, 35 FEET NORTH OF THE CENTERLINE OF THE NORTH LANES OF THE HIGHWAY, 0.5 FOOT NORTH OF THE NORTH EDGE OF THE SIDEWALK, 0.4 FOOT EAST OF THE EAST EDGE OF THE EAST CURB OF DRIVE, ABOUT 1 FOOT HIGHER THAN THE HIGHWAY, FLUSH WITH THE GROUND, AND SET IN THE TOP OF A CONCRETE POST.

3 inches on original drawing

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS		
MARK	DATE	DESCRIPTION

ORANGE COUNTY FLOOD CONTROL DISTRICT

GOLDEN LANTERN STORM DRAIN

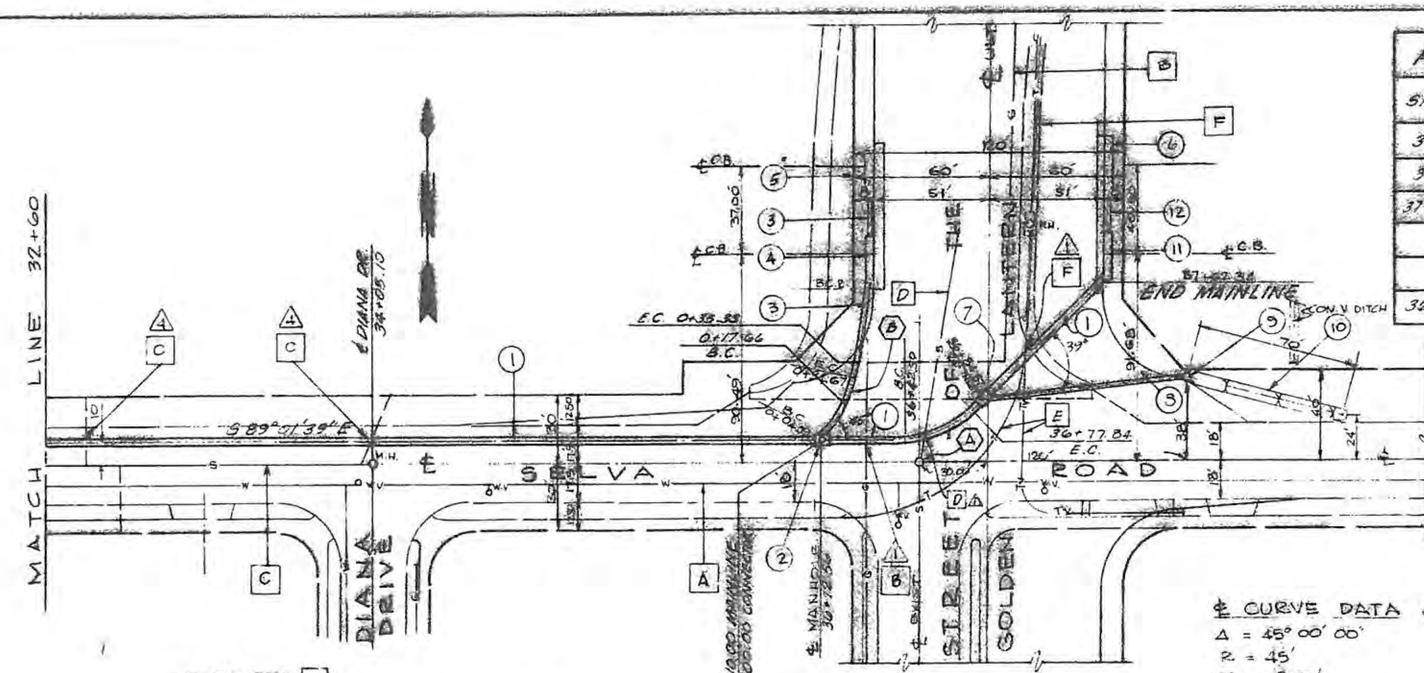
PLAN & PROFILE

STA. 25+40 TO STA. 32+60

DESIGNED
DRAWN
CHECKED H.A.C.
SUBMITTED — DESIGN ENGINEER
RECOMMENDED — DESIGN DIVISION ENGINEER

SCALE	DATE	DWG. NO.
AS SHOWN	AUG. 75	LOOP01-713-24

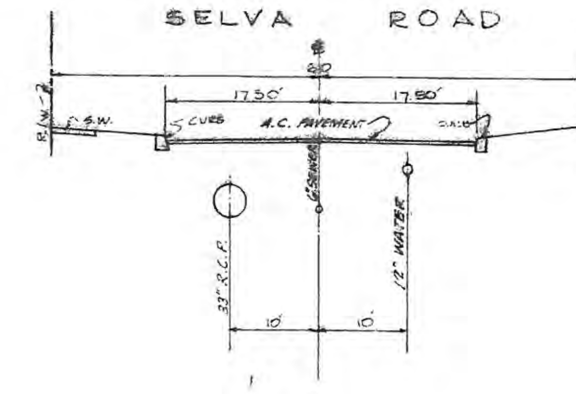
EXHIBIT 5



PLAN
SCALE: 1" = 40'

HYDRAULIC DATA: OPEN CHANNEL FLOW

STATION TO STATION	Q_{25} cfs	R.C.P. SIZE	S_o	D_c	V_c	D_N	V_N
32+60 TO 32+80	100	33"⌀	.0362	2.71'	16.9	2.24'	19.3
32+80 TO 36+09	100	33"⌀	.0580	2.71'	16.9	1.83'	23.8
37+01.6 TO 37+62.61	40	33"⌀	.0580	2.10'	8.2	1.06'	19.0
PRESSURE FLOW							
					V	SF n=.012	SF n=.014
36+14.90 TO 36+98.40	70	33"⌀	.0580		11.8	.0149	.0203



SECTION
32+60 TO 36+10
SCALE 1" = 10'

℄ CURVE DATA (A)
Δ = 45° 00' 00"
R = 45'
T = 18.64'
L = 35.34'

℄ CURVE DATA (B)
Δ = 38° 56' 21"
R = 45'
T = 15.91'
L = 30.58'

UTILITY NOTES □

DESIGNATION	UTILITY	OWNER
A	12" WATER	CAPISTRANO BEACH CO. WATER DIST.
B	4" GAS	SO. CAL GAS CO.
C	6" SEWER	DANA POINT SAN. DIST.
D	8" SEWER	DANA POINT SAN. DIST.
E	TELEPHONE CONDUIT	PACIFIC TEL & TEL CO.
F	TELEVISION CABLE	STORER CABLE TV INC.

LEGEND △
1 PROTECT IN PLACE
2 TO BE RELOCATED BY OTHERS
3 RELOCATE
4 REMOVE INTERFERING PORTIONS

CONSTRUCTION NOTES ○

1 PLACE 33" R.C.P. 32+60 TO 37+62.61, PER PLAN, PROFILE AND SECTION.

2 CONSTRUCT MANHOLE PER O.C.F.C.D. STD. DWG. STD. MH1-1 A=6.7', ANGLE A=45°, B=21", C=5.0', El.S=224.21, EL. R=224.51.

3 CONSTRUCT 21" R.C.P. CONNECTOR. SEE PROFILE AND DETAILS SHEET 9.

4 CONSTRUCT INLET TYPE II PER O.C.R.D. STD. PLAN 302. L=21', H=5.5'. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.

5 CONSTRUCT INLET TYPE II PER O.C.R.D. STD. PLAN 302. L=21', H=3.5'. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.

6 CONSTRUCT INLET TYPE II PER O.C.R.D. STD. PLAN 302. L=28', H=3.5'. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.

7 CONSTRUCT JUNCTION STRUCTURE PER L.A.C.F.C.D. STD. DWG. 2-D112. A=39°, B=24", C=3.1', D=33".

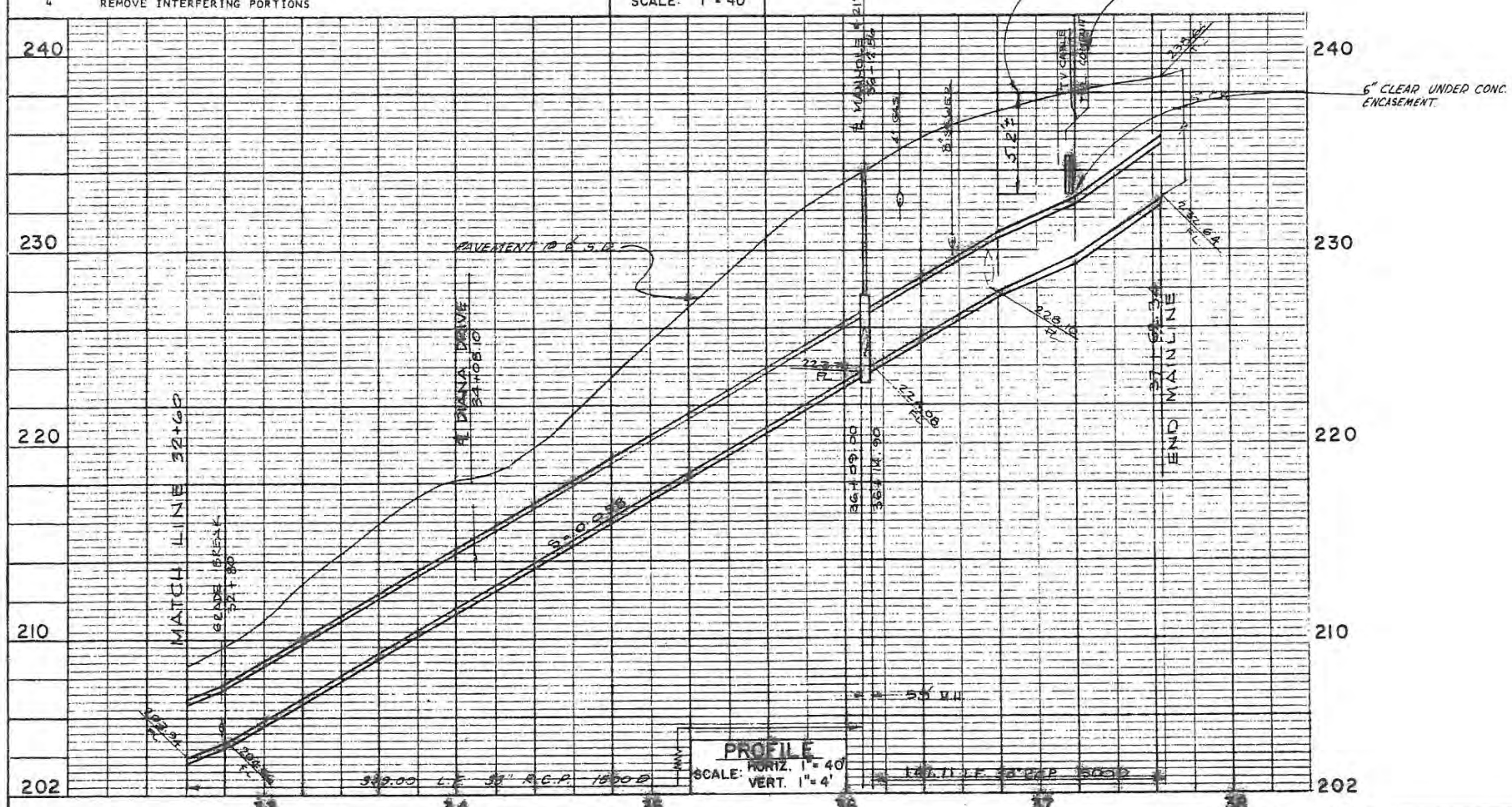
8 CONSTRUCT 24" R.C.P. CONNECTOR. SEE PROFILE AND DETAILS SHEET 10.

9 CONSTRUCT DROP INLET PER O.C.F.C.D. STD. DWG. STD.-D11-1. MODIFY TO PROVIDE 18" OPENING FOR 180 DEGREES. SEE DETAIL SHEET 10. EL. A=236.92 D_1=36", D_2=24", L_1=4.20', L_2=5.0'.

10 CONSTRUCT SWALE PER DETAILS SHEET 10.

11 CONSTRUCT INLET TYPE II PER O.C.R.D. STD. PLAN 302. L=21', H=6.0'. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.

12 CONSTRUCT 21" R.C.P. CONNECTOR. SEE PROFILE AND DETAILS SHEET 10.



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

DATUM OCFCD = OCS 1970 ADJUSTMENT

BENCH MARK: OCS S-783-70 ELEV. 122.975

0.8 MILES WEST ALONG PACIFIC COAST HIGHWAY FROM THE ATCHISON TOPEKA RAILWAY OVERPASS AT DOHENEY PARK, AT THE 'T' INTERSECTION OF ALCAZAR DRIVE, 35 FEET NORTH OF THE CENTERLINE OF THE NORTH LANES OF THE HIGHWAY, 0.5 FOOT NORTH OF THE NORTH EDGE OF THE SIDEWALK, 0.4 FOOT EAST OF THE EAST EDGE OF THE EAST CURB OF DRIVE, ABOUT 1 FOOT HIGHER THAN THE HIGHWAY, FLUSH WITH THE GROUND, AND SET IN THE TOP OF A CONCRETE POST.

1/2 0 1 2
3 inches on original drawing

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS		
MARK	DATE	DESCRIPTION

ORANGE COUNTY FLOOD CONTROL DISTRICT

GOLDEN LANTERN STORM DRAIN

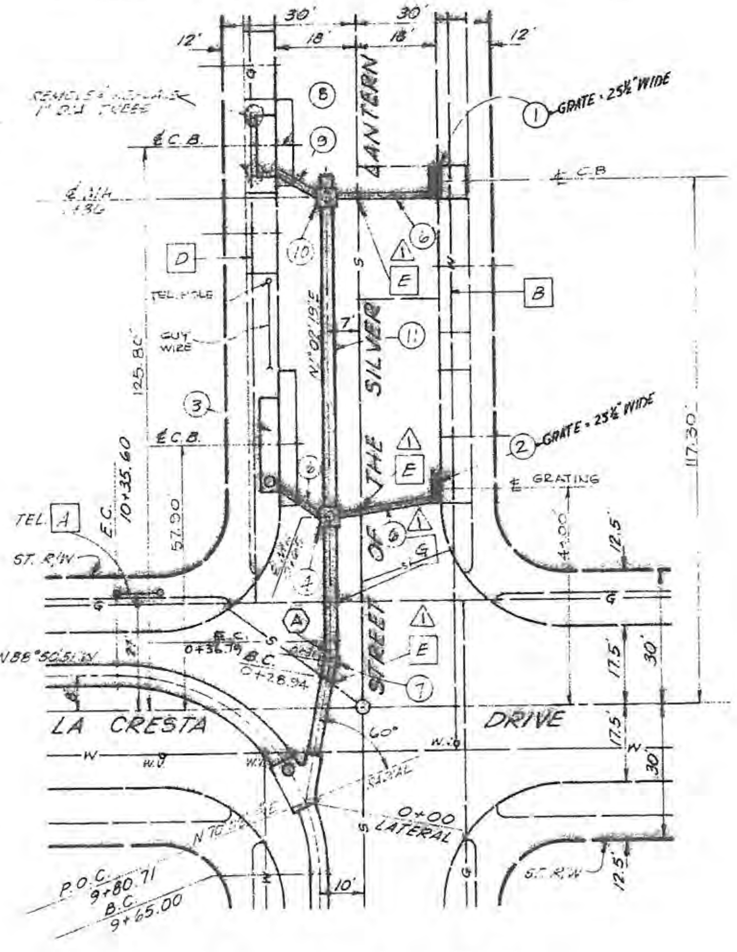
PLAN & PROFILE

STA. 32+60 TO STA. 37+62.34

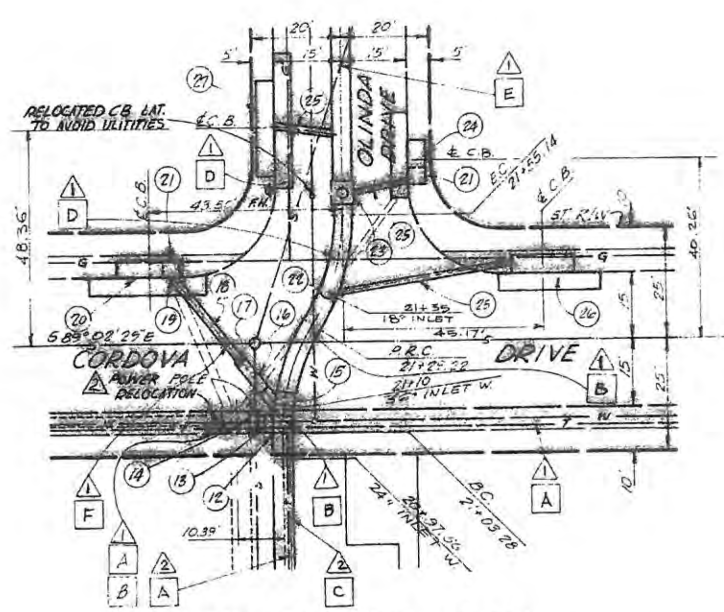
DESIGNED J.T.T.
DRAWN
CHECKED M.C.C.
SUBMITTED
RECOMMENDED
DESIGN DIVISION ENGINEER

SCALE	DATE	DWG. NO.
AS SHOWN	AUG. 75	LOOP01-713-24

Ⓐ ℄ CURVE DATA
Δ = 10° 00' 00"
R = 45.00'
T = 3.94'
L = 7.85'



INTERSECTION PLAN
SILVER LANTERN - LA CRESTA DRIVE
SCALE: 1" = 20'



INTERSECTION PLAN
OLINDA DRIVE - CORDOVA DRIVE
SCALE: 1" = 20'

CONSTRUCTION NOTES ◯

1 CONSTRUCT INLET TYPE IV PER O.C.R.D. STD PLAN 304, L=6.3',H=3.5' (2 GRATINGS).

2 CONSTRUCT INLET TYPE IV PER O.C.R.D. STD. PLAN 304 WITH 2 GRATINGS MODIFIED TO ELIMINATE SIDE OPENING. REDUCE WIDTH TO CONFORM TO MODIFICATION.

3 CONSTRUCT INLET TYPE II PER O.C.R.D. STD PLAN 302, L=21', H=3.5'. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.

4 CONSTRUCT MANHOLE PER O.C.F.C.D. STD. DWG. NO. STD-MH-1.

5 CONSTRUCT CONCRETE COLLAR PER L.A.C.F.C.D. STD DWG NO. 2-D393.

6 CONSTRUCT 18" R.C.P. CONNECTOR PER PROFILE THIS SHEET.

7 CONSTRUCT CONCRETE COLLAR PER L.A.C.F.C.D. STD. DWG. 2-D393.

8 CONSTRUCT INLET TYPE II PER O.C.R.D. STD PLAN 302, L=14', H=4.0'. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.

9 CONSTUCT 21" R.C.P. PER PROFILE THIS SHEET.

10 CONSTRUCT MANHOLE PER O.C.F.C.D. STD DWG NO. STD-MH-1. PROVIDE A 4 FOOT 30" R.C.P. STUB AT UPSTREAM END OF MANHOLE. SEAL END OF R.C.P. WITH A DOUBLE COURSE OF 8" BRICK AND MORTAR.

11 PLACE 30" R.C.P. PER PLAN AND PROFILE THIS SHEET.

12 CONSTRUCT JUNCTION STRUCTURE PER L.A.C.F.C.D. STD DWG NO. 2-D112, A=49.5°, B=24", C=2.7', D=54", El.S=141.70'

13 CONSTRUCT 24" R.C.P. CONNECTOR PER PROFILE SHEET 9.

14 CONNECT 24" R.C.P. CONNECTOR TO EXISTING CATCH BASIN PER L.A.C.F.C.D. STD DWG NO. 2-D224. SEE DETAILS, SHEET 9.

15 CONSTRUCT JUNCTION STRUCTURE PER L.A.C.F.C.D. STD DWG NO. 2-D112, A=41.5°, B=36", C=4.4', D=54"

16 CONSTRUCT 36" R.C.P. SEE PROFILES AND DETAILS SHEET 9.

17 CONSTRUCT CONCRETE COLLAR PER L.A.C.F.C.D. STD DWG NO. 2-D393.

18 CONSTRUCT 30" R.C.P. SEE PROFILES AND DETAILS SHEET 9.

19 CONNECT 27" R.C.P. TO CATCH BASIN PER L.A.C.F.C.D. STD. DWG. NO. 2-D224.

20 CONSTRUCT INLET TYPE II PER O.C.R.D. STD. PLAN 302, L=14', H=4.5'; MODIFY PER L.A.C.F.C.D. STD. DWG. 2-D461. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.

21 REMOVE INTERFERING PORTIONS OF EXISTING CATCH BASIN. PLUG INLETS WITH DOUBLE COURSE OF 8" BRICK & MORTAR AND FILL TO GRADE.

22 CONSTRUCT JUNCTION STRUCTURE PER L.A.C.F.C.D. STD DWG NO. 2-D193.

23 CONSTRUCT MANHOLE PER O.C.F.C.D. STD DWG NO. STD-MH/-1.

24 CONSTRUCT INLET TYPE II PER O.C.R.D. STD. PLANS 302, L=10', H=7.0'. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.

25 CONSTRUCT 18" R.C.P. CONNECTOR. SEE PROFILE SHEET 9.

26 CONSTRUCT INLET TYPE II PER O.C.R.D. STD. PLANS 302, L=7', H=3.5'; MODIFY PER L.A.C.F.C.D. STD. DWG. 2-D461. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.

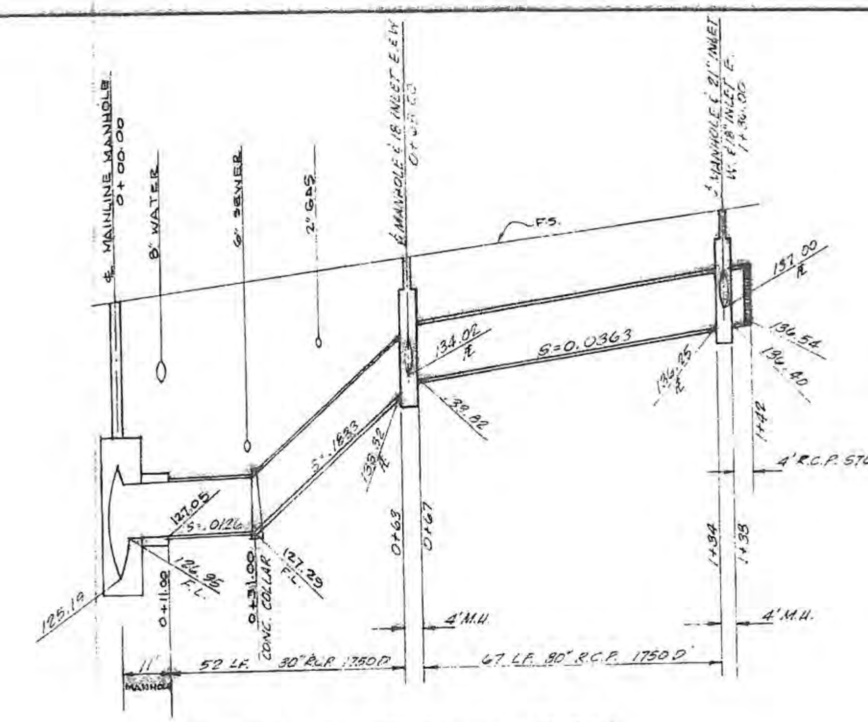
27 CONSTRUCT INLET TYPE II PER O.C.R.D. STD. PLANS 302, L=21', H=8.0'. CONSTRUCT LOCAL DEPRESSION PER DETAIL SHEET 10.

LEGEND △

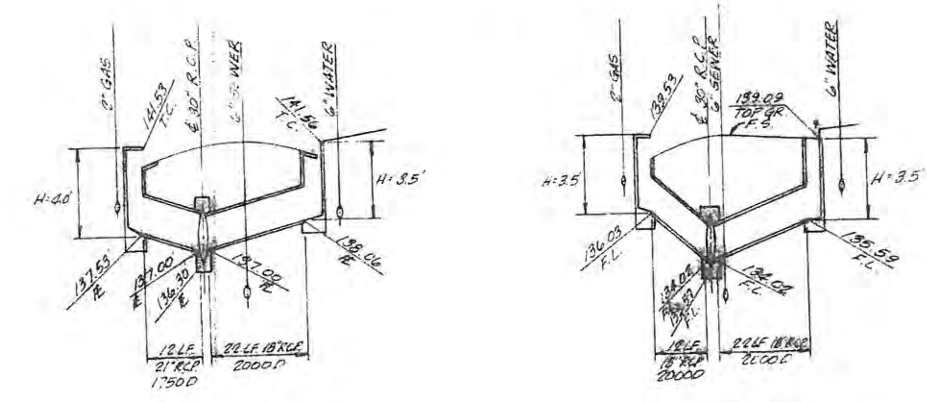
1 PROTECT IN PLACE
2 TO BE RELOCATED BY OTHERS
3 RELOCATE
4 REMOVE INTERFERING PORTIONS

UTILITY NOTES ☐

DESIGNATION	UTILITY	OWNER
A	TELEPHONE CABLE	PACIFIC TEL & TEL CO.
B	6" WATER	CAPISTRANO BEACH CO. WATER DISTRICT
C	ELECTRIC CABLE	SO CAL EDISON CO.
D	2" GAS	SO CAL GAS CO.
E	6" SEWER	DANA POINT SANITARY DIST.
F	8" SEWER	DANA POINT SANITARY DIST.
G	3" GAS	SO CAL GAS CO.



SILVER LANTERN LATERAL
SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'



SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'

3 inches on original drawing

PRELIMINARY REVISION CODE
Discard Prints Bearing Earlier Codes

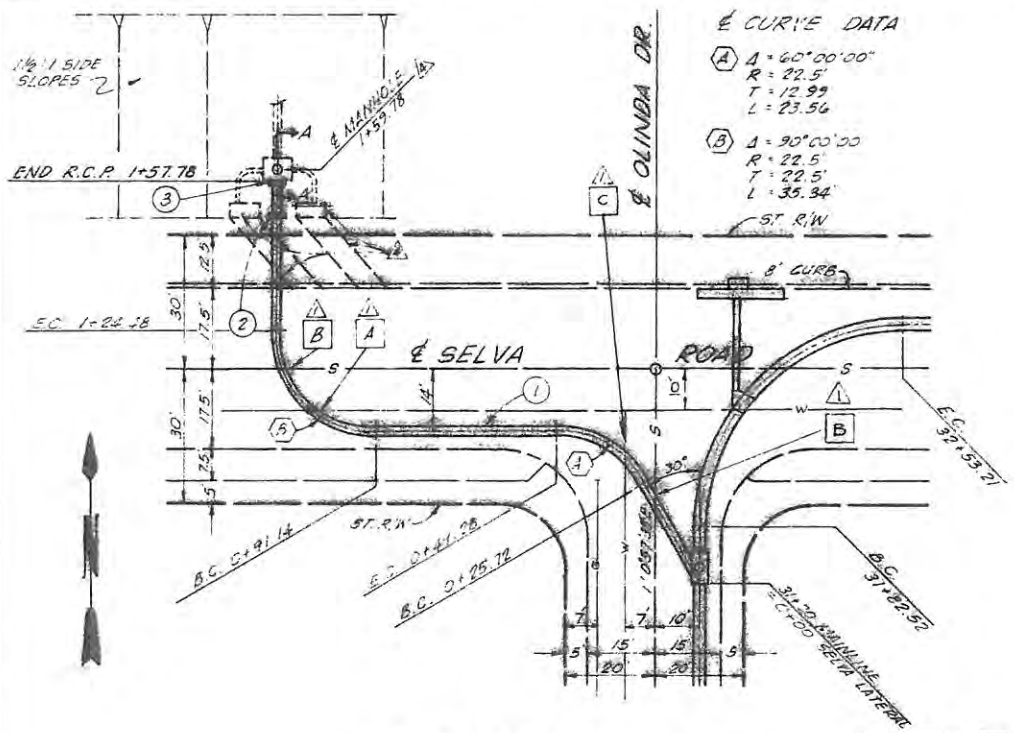
REVISIONS
MARK | DATE | DESCRIPTION

ORANGE COUNTY FLOOD CONTROL DISTRICT
GOLDEN LANTERN STORM DRAIN
INTERSECTION DETAILS
LA CRESTA DRIVE AT SILVER LANTERN
CORDOVA DRIVE AT OLINDA DRIVE

RECOMMENDED
SUBMITTED

SCALE	DATE	DWG. NO.
AS SHOWN	AUG. 76	L06P01-713-24

EXHIBIT 5



INTERSECTION PLAN
SELVA ROAD - OLINDA DRIVE
SCALE: 1" = 20'

CONSTRUCTION NOTES ◯

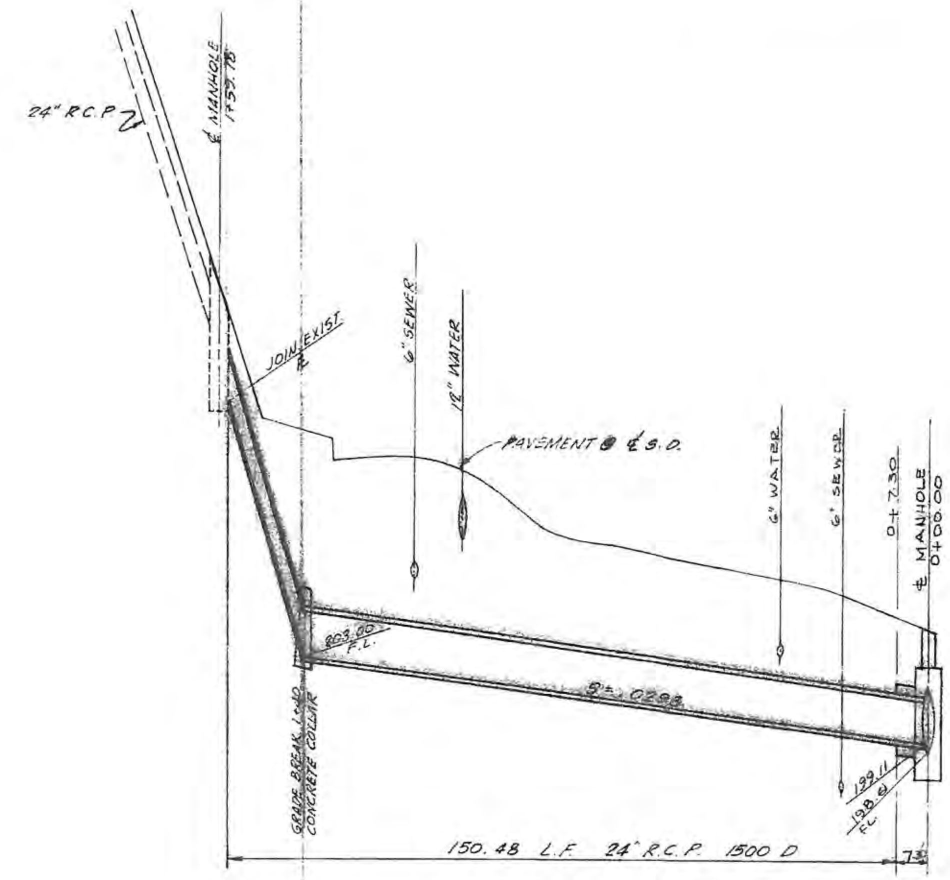
1. CONSTRUCT 24" R.C.P. CONNECTOR PER PROFILE THIS SHEET.
2. CONSTRUCT CONCRETE COLLAR PER L.A.C.F.C.D. STD. DWG. 2-D393.
3. CONNECT 24" R.C.P. TO EXISTING MANHOLE PER SECTION A-A THIS SHEET.
4. MODIFY CATCH BASIN PER DETAIL 'A' THIS SHEET. LOCAL DEPRESSION PER DETAIL SHEET 10.

UTILITY NOTES ☐

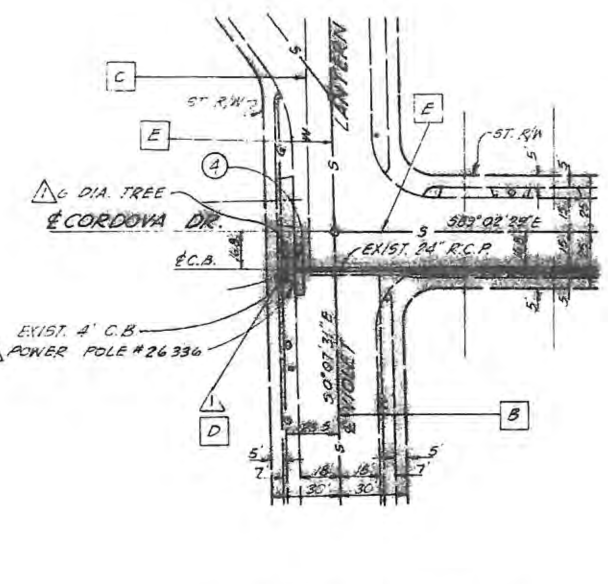
DESIGNATION	UTILITY	OWNER
A	12" WATER	CAPISTRANO BEACH CO. WATER DIST.
B	6" SEWER	DANA POINT SAN. DIST.
C	6" WATER	CAPISTRANO BEACH CO. WATER DIST.
D	2" GAS	SO CAL GAS CO.
E	8" SEWER	DANA POINT SAN. DIST.

LEGEND △

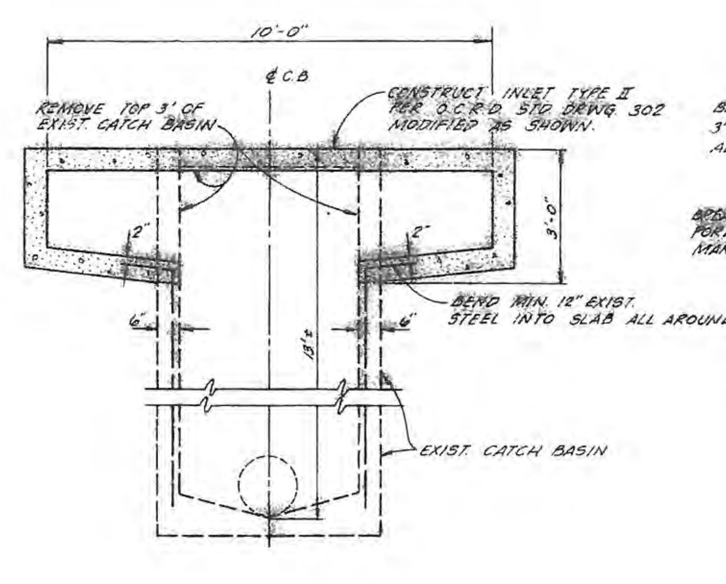
1. PROTECT IN PLACE
2. TO BE RELOCATED BY OTHERS
3. RELOCATE
4. REMOVE INTERFERING PORTIONS



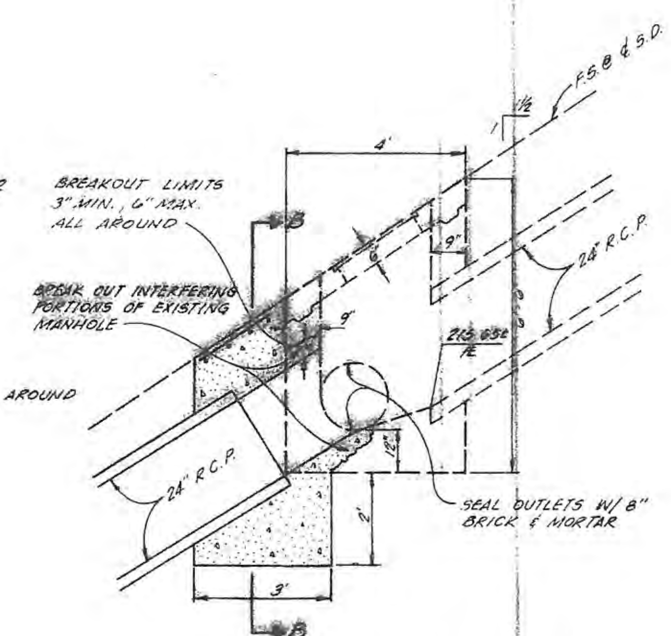
SELVA LATERAL PROFILE
SCALE: HORIZ. 1" = 20' VERT. 1" = 4'



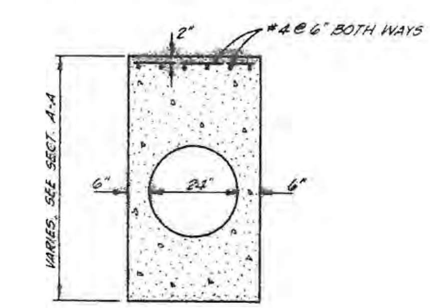
INTERSECTION PLAN
VIOLET LANTERN - CORDOVA DRIVE
SCALE: 1" = 40'



DETAIL "A"
CATCH BASIN MODIFICATION
SCALE: 1/2" = 1'-0"



SECTION A-A
SCALE: 1/2" = 1'-0"



SECTION B-B
SCALE: 1/2" = 1'-0"

3 inches on original drawing

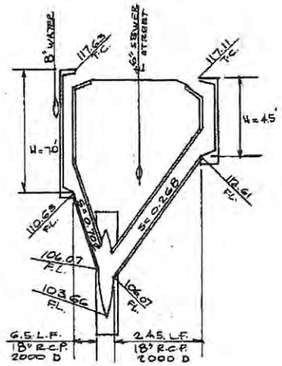
PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes
REVISIONS: MARK | DATE | DESCRIPTION

ORANGE COUNTY FLOOD CONTROL DISTRICT
GOLDEN LANTERN STORM DRAIN
INTERSECTION DETAILS
SELVA ROAD AT OLINDA DRIVE
CORDOVA DRIVE AT VIOLET LANTERN

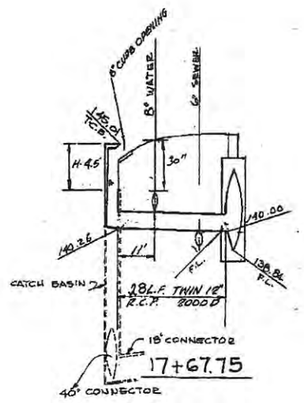
DESIGNED J.T.T. DRAWN R.A.G. CHECKED R.A.C.
SUBMITTED
RECOMMENDED
SCALE AS SHOWN | DATE AUG. 75 | LO6PO1-713-1/4

SHEET 8 OF 12

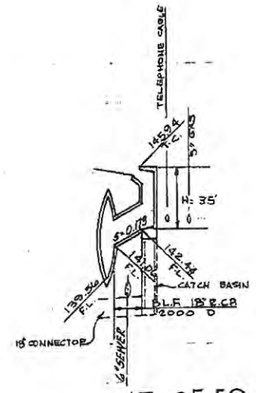
EXHIBIT 5



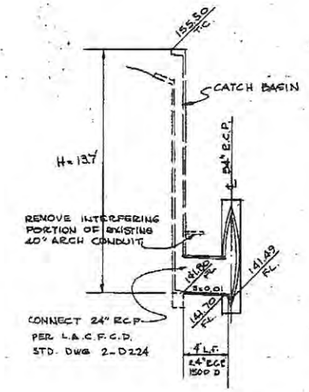
4+70.00



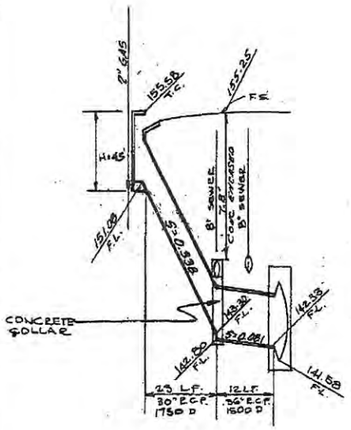
17+67.75



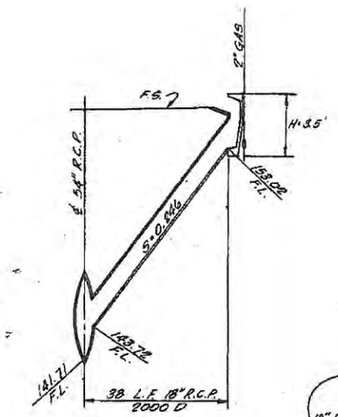
17+85.50



21+05±



21+10.00



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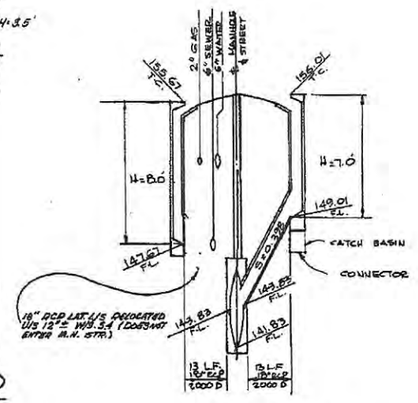
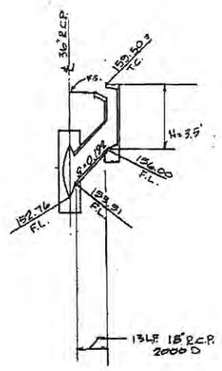
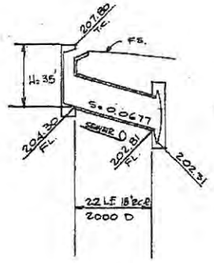


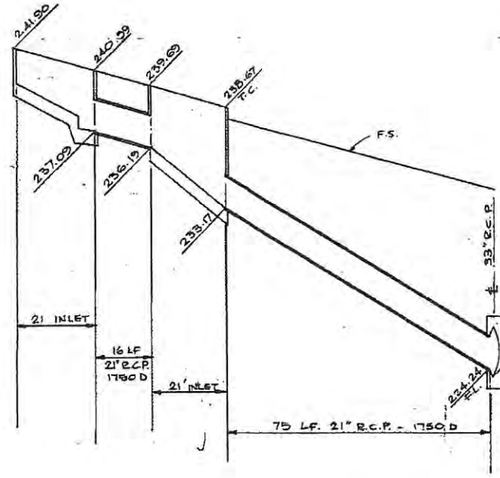
21+60.00



22+92.50



32+15.00



36+12.56

1/2 0 1 2

3 inches on original drawing

MAINLINE CONNECTORS PROFILES

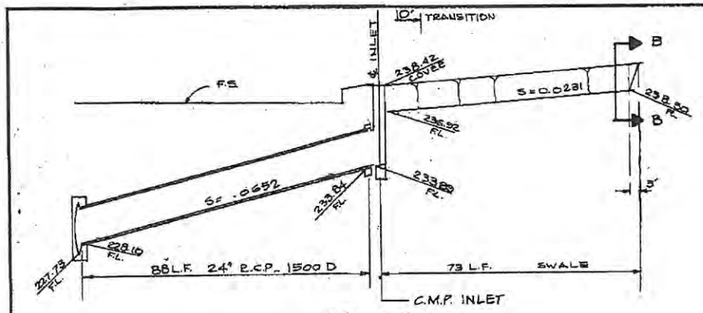
SCALE: 1" = 20' HORIZ.
1" = 4' VERT.

PRELIMINARY REVISION CODE Disregard Prints Bearing Earlier Codes			
REVISIONS			ORANGE COUNTY FLOOD CONTROL DISTRICT
MARK	DATE	DESCRIPTION	GOLDEN LANTERN STORM DRAIN
			MAINLINE CONNECTORS PROFILES & DETAILS
DESIGNED J.T.T			RECOMMENDED
DRAWN NNM	CHECKED M.A.C.		DESIGN DIVISION ENGINEER
SUBMITTED DESIGN ENGINEER			SCALE AS SHOWN / DATE AUG. 75 / DWG. NO. L00P01-713-2A

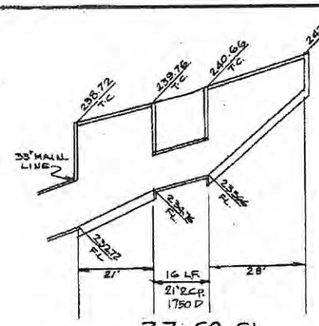
SHEET 9 OF 12

50-015-09

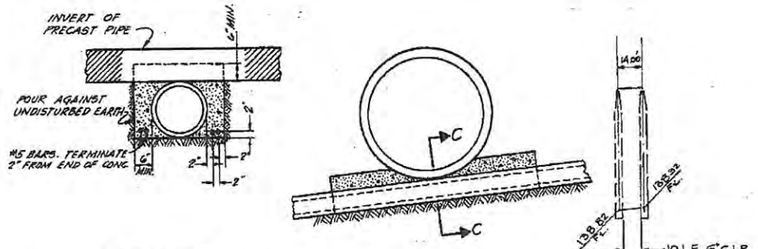
EXHIBIT 5

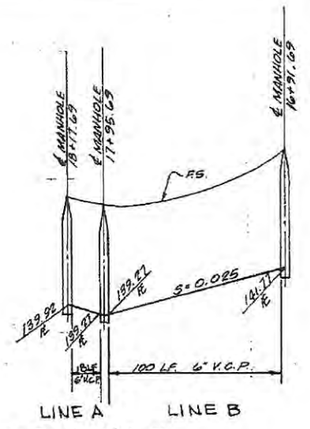


37+00.00
CONNECTOR PROFILE
SCALE : 1" = 20' HORIZ.
1" = 4' VERT.

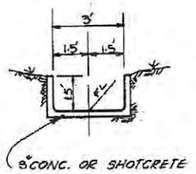


37+62.61
CONNECTOR PROFILE
SCALE : 1" = 20' HORIZ.
1" = 4' VERT.

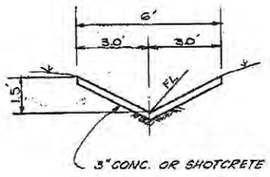




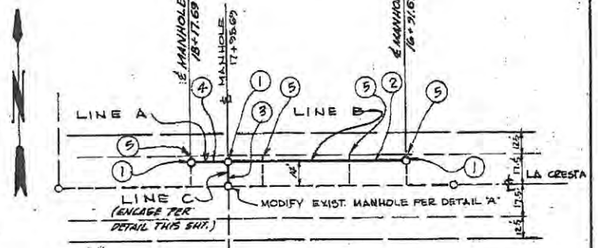
PROFILE
SCALE : 1" = 4' VERT.
1" = 40' HORIZ.



SECTION 'A-A'



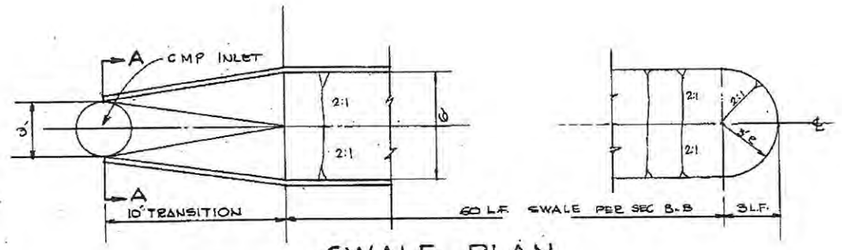
SECTION 'B-B'



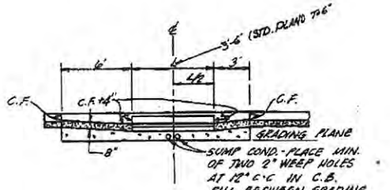
SEWER RECONSTRUCTION PLAN
SCALE: 1" = 40'

SEWER RECONSTRUCTION NOTES

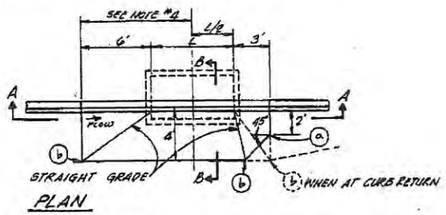
1. CONSTRUCT SEWER MANHOLE PER O.C.S.D. STD DWG NO. S-33-1.
2. CONSTRUCT 100 L.F. 6" V.C.P. PER DETAILS THIS SHEET.
3. CONSTRUCT 10 L.F. 6" C.I. PIPE WITH CONCRETE ENCASEMENT PER DETAILS THIS SHEET.
4. CONSTRUCT 18 L.F. 6" V.C.P. PER DETAILS THIS SHEET.
5. CONNECT EXISTING HOUSE LATERALS TO MAINLINE.



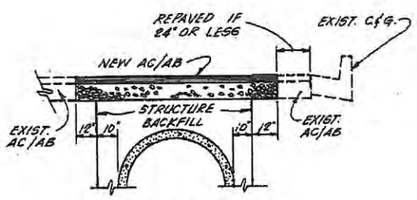
SWALE PLAN
SCALE 1/4"= 1'-0"



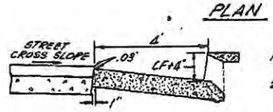
SECTION A-A



PLAN



PAVEMENT PAYLINE DETAIL
NO SCALE



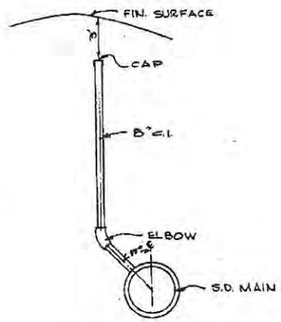
SECTION B-B

POINT	6" TO 10" C.F. TRANS. DISTANCE BEHIND T.C.	8" TO 12" C.F. TRANS. DISTANCE BEHIND T.C.
a	.38'	.50'
b	.34'	.47'

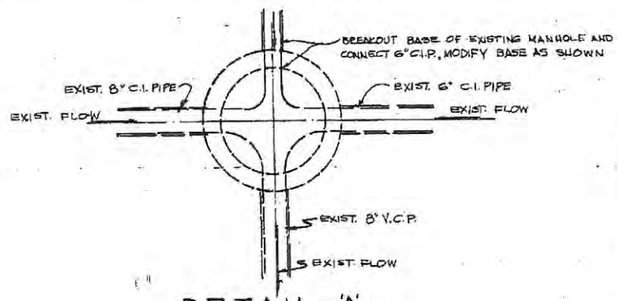
BASED ON 1.7% STREET CROSSFALL

NOTES:
1. LOCAL DEPRESSION SHALL BE CLASS 'B' PORTLAND CEMENT CONCRETE, 8" THICK.
2. LOCAL DEPRESSION SHALL CONFORM TO SAME SHAPE WHETHER GRATE INLET OR CURB OPENING, OR BOTH, ARE USED.
3. LENGTH OF OPENING "L" SHALL BE SPECIFIED ON PLANS.
4. BOTH ENDS OF DEPRESSION SHALL BE SYMMETRICAL ABOUT ℄ OF OPENING IN SUMP CONDITION.
5. SEE O.C.R.D. STD. PLAN 305 FOR CURB OPENING DETAIL.

LOCAL DEPRESSION DETAIL



STAND PIPE DETAIL
NO SCALE



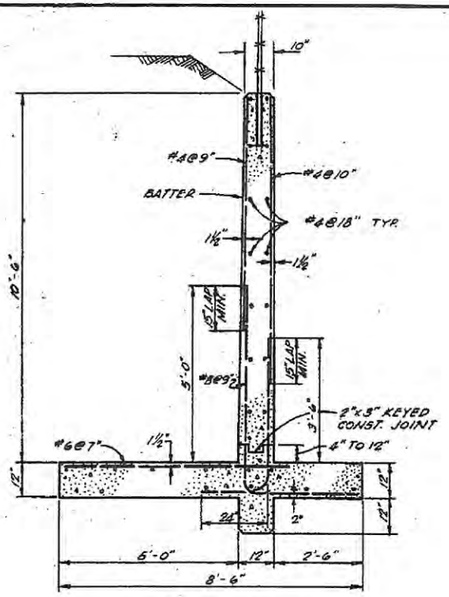
DETAIL 'A'

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

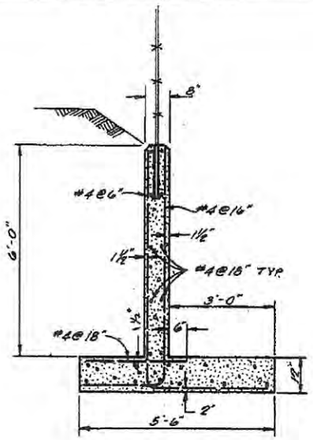
PRELIMINARY REVISION CODE Disregard Prints Bearing Earlier Codes			ORANGE COUNTY FLOOD CONTROL DISTRICT
REVISIONS			GOLDEN LANTERN STORM DRAIN MAINLINE CONNECTOR PROFILES & DETAILS SEWER CONSTRUCTION DETAILS
MARK	DATE	DESCRIPTION	
DESIGNED J.T.T.			RECOMMENDED
DRAWN MNM CHECKED M.A.C.			DESIGN DIVISION ENGINEER
SUBMITTED DESIGN ENGINEER			SCALE AS SHOWN / DATE AUG. 75 / DWG. NO. L00P01-713-2 4

EXHIBIT 5

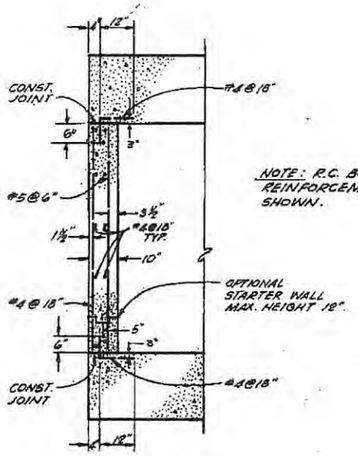
SHEET 10 OF 12
SD-015-10



SECTION B-B
SCALE: ½" = 1'-0"

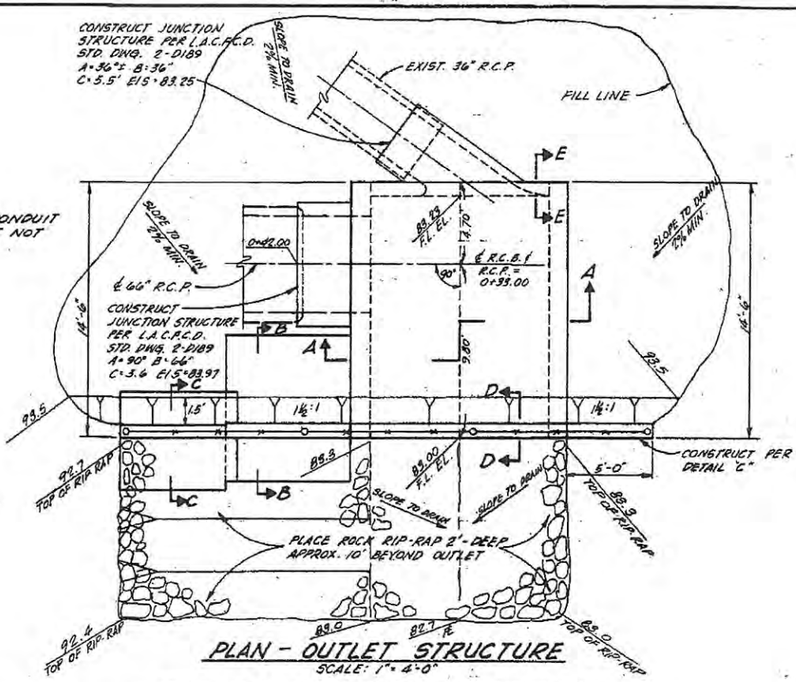


SECTION C-C
SCALE: ½" = 1'-0"

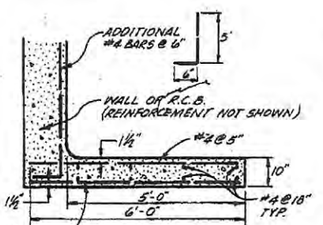


NOTE: R.C. BOX CONDUIT REINFORCEMENT NOT SHOWN.

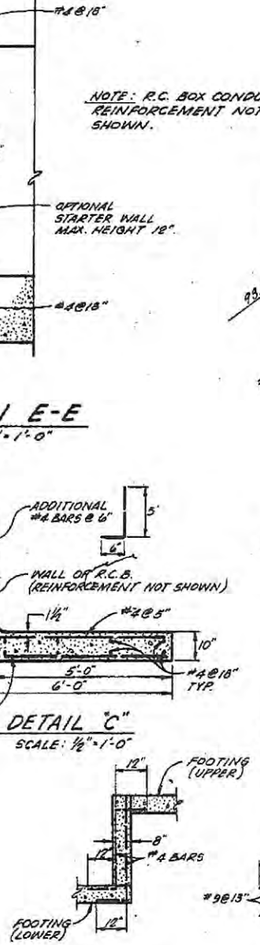
SECTION E-E
SCALE: ½" = 1'-0"



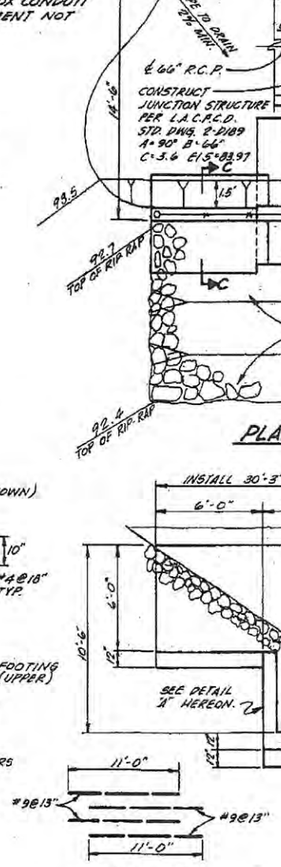
PLAN - OUTLET STRUCTURE
SCALE: 1" = 4'-0"



DETAIL "C"
SCALE: ½" = 1'-0"

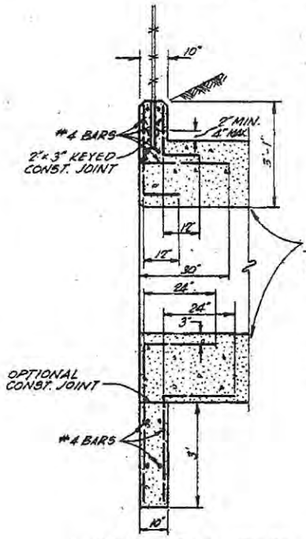


DETAIL "A"
NO SCALE



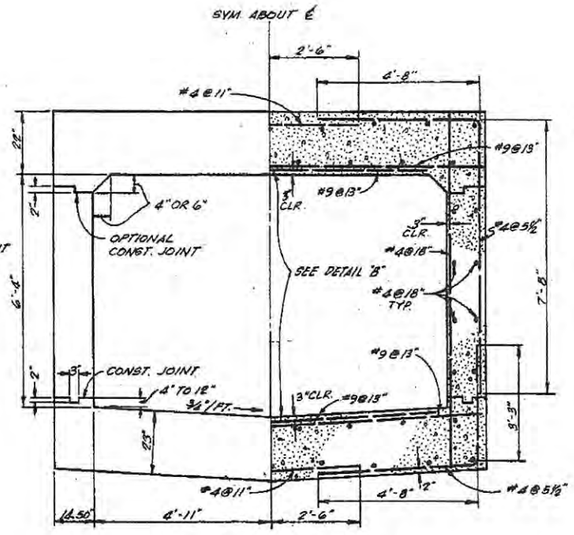
DETAIL "B"
NO SCALE

ELEVATION OUTLET STRUCTURE
SCALE: 1" = 4'-0"



NOTE: R.C. BOX CONDUIT REINFORCEMENT NOT SHOWN.

SECTION D-D
SCALE: ½" = 1'-0"



SECTION A-A
SCALE: ½" = 1'-0"

STRUCTURAL NOTES FOR OUTLET STRUCTURE

1. ALL REINFORCING STEEL SHALL HAVE 1½" CLEAR CONCRETE COVER UNLESS SHOWN OTHERWISE.
2. THE VERTICAL WALL STEEL IN THE INTERIOR FACE OF WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICE SHALL BE 20 BAR DIAMETERS IN LENGTH

   THE VERTICAL LENGTHS OF ALL STEEL IN EXTERIOR FACE HAS BEEN CALCULATED FOR A FOUR INCH STARTER WALL. IF THE HEIGHT OF STARTER WALL IS VARIED, THE STEEL LENGTH SHALL BE VARIED SO AS TO MAINTAIN A 30" DIAMETER LAP BETWEEN BARS BASED ON THE SMALLER DIAMETER.
3. LONGITUDINAL STEEL SHALL BE LAPPED 20 BAR DIAMETERS AT SPLICES.

DESIGN DATA
DESIGN LOADS
(EARTH @ 110 p.c.f., CONCRETE 150 p.c.f.)

RETAINING WALL
62.5 p.s.f. e.f.p. LATERAL LOAD WITH 2' SURCHARGE

BOX SECTION
LIVE LOAD H 320-44 TRUCK
DEAD LOAD 22 FEET OF FILL
LATERAL LOAD 37 p.s.f. e.f.p.

DESIGN METHOD
WORKING STRENGTH METHOD

ALLOWABLE STRESSES
CONCRETE $f'_c = 3000$ psi
$f_c = 1350$ psi
REINFORCEMENT $f_s = 20{,}000$ psi
SHEAR AND BOND STRESSES PER ACI 318-71, n = 9.2

1/2 0 1 2
3 inches on original drawing

PRELIMINARY REVISION CODE Disregard Prints Bearing Earlier Codes			
REVISIONS			ORANGE COUNTY FLOOD CONTROL DISTRICT
MARK	DATE	DESCRIPTION	GOLDEN LANTERN STORM DRAIN
			OUTLET STRUCTURE PLAN & DETAILS
DESIGNED J.T.T.			RECOMMENDED
DRAWN R.G.G.	CHECKED M.A.C.		DESIGN DIVISION ENGINEER
SUBMITTED		DESIGN ENGINEER	SCALE AS SHOWN / DATE AUG. 75 / DWG. NO. LOOP01-713-24

SHEET 11 OF 12

EXHIBIT 5

SD-015-11

BORING LOG — GEOLABS, INC.
GEOLOGY AND SOIL ENGINEERING

Project: Golden Lantern Storm Drain
Boring No. 1 Location: See Plate 1 W.O. 918-00 Drill Date: 5/12/75
Surface Elev. ____ Logged by: V.S. Driving Weight: 1500# - 12" drop

WATER	DEPTH (FEET)	GRAPHIC LOG	UNIT (soil, fill, alluvium, siltstone, etc.) MATERIAL DESCRIPTION (% sand, silt, clay; color, consolidation, etc.) ATTITUDE MEASUREMENTS: B-Bedding F-Fault J-Joint RS-Rupture Surface C-Contact	GROUP SYMBOL U.S.C.S.	PENE. RESIST BLOWS/FOOT	C-CORE B-BAG	DRY DENSITY pcf	MOISTURE CONTENT (%)
	0		FILL: SILTY SAND: Medium brown, mixed with clods of SILTY CLAY and traces of GRAVEL, occasional pieces of asphaltic concrete, moist, loosely to moderately compacted.	SM CL				
	5				1	C	112.0	7.2
	10		NATURAL GROUND: SILTY SAND: Light brown to gray, medium to fine grained, slightly clayey, moist medium dense.	SM	2	C	105.0	10.0
▽			SILTY CLAY: Dark brown, moist, medium stiff. INVERT ELEVATION	CL				
	15		SILTY SAND: Dark brown, fine grained, moist, medium dense.	SM	3	C B	108.0	10.9
	20		SAND: Light brown, trace of gravel, slightly moist, dense, very hard BOULDERS at 22'-24'.	SP				
	25		Becoming yellowish colored, fine to medium grained with trace of small pebbles, very dense.		26*	C B	110.0	4.5
	30		Hard rock encountered @ 28'-29'. SAND: Yellowish-white, well graded, slightly moist, very dense.	SW SP	40*	C	126.0	4.1
	35		SILTY SAND: Medium brown with cobbles, very dense, very slow drilling. End of boring at 33.5 feet. No caving No water *7500-hammer 12"-drop	SM				

BORING LOG — GEOLABS, INC.
GEOLOGY AND SOIL ENGINEERING

Project: Golden Lantern Storm Drain
Boring No. 5 Location: See Plate 5 W.O. 918-00 Drill Date: 5/12/75
Surface Elev. ____ Logged by: V.S. Driving Weight: 1500# - 12" drop

WATER	DEPTH (FEET)	GRAPHIC LOG	UNIT (soil, fill, alluvium, siltstone, etc.) MATERIAL DESCRIPTION (% sand, silt, clay; color, consolidation, etc.) ATTITUDE MEASUREMENTS: B-Bedding F-Fault J-Joint RS-Rupture Surface C-Contact	GROUP SYMBOL U.S.C.S.	PENE. RESIST BLOWS/FOOT	C-CORE B-BAG	DRY DENSITY pcf	MOISTURE CONTENT (%)
	0		FILL: SILTY CLAY: Brown, wet, soft.	CL				
			SANDY CLAY: Dark brown, wet, soft to medium stiff.	CL				
▽	5		INVERT ELEVATION CLAY SILT with SAND: Brown, very moist, soft.	ML	Push	C	115.0	14.6
	10		NATURAL GROUND: BEDROCK: CLAYEY SILTSTONE: Dark brown, very weathered, moist, firm with occasional stringers of gypsum and orange bands, moist, firm.	ML	2	C	83.0	37.8
					4	C	82.0	39.8
	15		End of Boring at 13 feet. No caving No water					

BORING LOG — GEOLABS, INC.
GEOLOGY AND SOIL ENGINEERING

Project: Golden Lantern Storm Drain
Boring No. 2 Location: See Plate 2 W.O. 918-00 Drill Date: 5/12/75
Surface Elev. ____ Logged by: V.S. Driving Weight: 1500# - 12" Drop

WATER	DEPTH (FEET)	GRAPHIC LOG	UNIT (soil, fill, alluvium, siltstone, etc.) MATERIAL DESCRIPTION (% sand, silt, clay; color, consolidation, etc.) ATTITUDE MEASUREMENTS: B-Bedding F-Fault J-Joint RS-Rupture Surface C-Contact	GROUP SYMBOL U.S.C.S.	PENE. RESIST BLOWS/FOOT	C-CORE B-BAG	DRY DENSITY pcf	MOISTURE CONTENT (%)
	0		FILL: SILTY SAND: medium brown, moist, loose.	SM				
			SANDY CLAY: Dark brown, very moist, soft.	CL				
	5		NATURAL GROUND: BEDROCK: CLAYEY SILTSTONE: Mottled brown and gray, very moist, firm.	ML	4	C	90.0	28.8
▽			Below 5 feet becoming medium brown with yellow streak, occasional lenses of fine SAND and trace of gypsum. Thickly badded to massive, moist, very firm. INVERT ELEVATION					
	10		Slightly sandy at 10 feet.		5	C	88.0	33.0
	15				10	C	89.0	33.2
	20		Becoming dark green to black colored at 20 feet.		14	C	91.0	30.7
			End of Boring at 22 feet. No caving No water					

BORING LOG — GEOLABS, INC.
GEOLOGY AND SOIL ENGINEERING

Project: Golden Lantern Storm Drain
Boring No. 3 Location: See Plate 3 W.O. 918-00 Drill Date: 5/12/75
Surface Elev. ____ Logged by: V.S. Driving Weight: 1500# - 12" Drop

WATER	DEPTH (FEET)	GRAPHIC LOG	UNIT (soil, fill, alluvium, siltstone, etc.) MATERIAL DESCRIPTION (% sand, silt, clay; color, consolidation, etc.) ATTITUDE MEASUREMENTS: B-Bedding F-Fault J-Joint RS-Rupture Surface C-Contact	GROUP SYMBOL U.S.C.S.	PENE. RESIST BLOWS/FOOT	C-CORE B-BAG	DRY DENSITY pcf	MOISTURE CONTENT (%)
	0		NATURAL GROUND SILTY SAND: Light brown, moist, loose.	SM				
			SANDY CLAY: Medium brown, moist, stiff.	CL				
	5		CLAYEY SAND: Medium brown, moist, dense.	SC				
			SILTY SAND: Brown, fine grained, moist, dense.	SM	6	C B	124.0	10.2
	10				10	C-B	12.1	9.2
			@ 12' becoming light gray, very fine grained, moist, very dense.					
	15		With few gravel and cobbles at 14 feet.			B		
			BEDROCK CLAYEY SILTSTONE: Mottled gray and brown, weathered, moist, very firm.	ML	6	C	98.0	27.3
	20		SAND: Brown with orange streaks, silty.	SP				
▽			SILTSTONE: Light gray, moist, very firm grades to medium brown at 22 feet, occasional lenses of sand, and trace of gypsum. INVERT ELEVATION	ML	6	C B	98.0	24.0
	25				9	C	100.0	25.2
	30		End of Boring at 28 feet. No caving No water					

BORING LOG — GEOLABS, INC.
GEOLOGY AND SOIL ENGINEERING

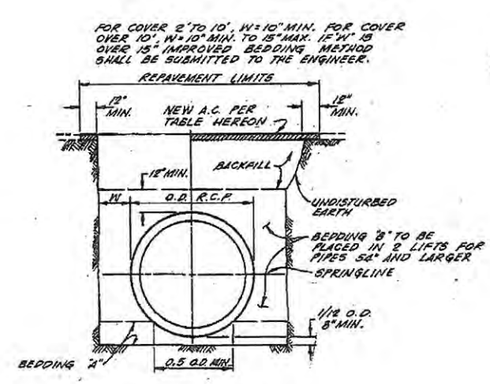
Project: Golden Lantern Storm Drain
Boring No. 4 Location: See Plate 4 W.O. 918-00 Drill Date: 5/12/75
Surface Elev. ____ Logged by: V.S. Driving Weight: 1500# - 12" drop

WATER	DEPTH (FEET)	GRAPHIC LOG	UNIT (soil, fill, alluvium, siltstone, etc.) MATERIAL DESCRIPTION (% sand, silt, clay; color, consolidation, etc.) ATTITUDE MEASUREMENTS: B-Bedding F-Fault J-Joint RS-Rupture Surface C-Contact	GROUP SYMBOL U.S.C.S.	PENE. RESIST BLOWS/FOOT	C-CORE B-BAG	DRY DENSITY pcf	MOISTURE CONTENT (%)
	0		FILL: SILTY CLAY: Very moist, soft.	CL				
			SANDY CLAY: Light brown, wet, soft.	CL				
	3		SILTY SAND: Light brown, fine grained, slightly clayey, wet, loose to very loose.	SM	Push	C	99.0	21.9
	10		SILTY CLAY: Black, trace of organic, very moist, soft to medium stiff.	CL				
			NATURAL GROUND: SILTY SAND: Mottled, brown and gray, very moist, medium dense.	SM	1	C	100.6	25.1
▽			BEDROCK: INVERT ELEVATION CLAYEY SILTSTONE: Medium brown with orange bands, moist, firm.					
	15		Layer of SAND, saturated, water seeping at rapid rate.	SP	9	C	124.0	12.9
			Back to SILTSTONE, dark gray, very firm.	ML	8	C		
	20		End of Boring at 17 feet. Caving at 15 feet. Water at 14.5 feet.					

BORING LOCATION MAP
SCALE: 1" = 600'

EXCAVATION & PAVING NOTES
1. AT TIMES OF RESURFACING OPERATIONS, ALL PORTLAND CEMENT AND BITUMINOUS TYPE WEARING SURFACES SHALL BE CUT WITH A PAVEMENT SAW.
2. IF SIDEWALLS CAVE IN, EXCAVATE TO SURFACE AND 12" INTO UNDISTURBED MATERIAL OR TO NEXT PAVEMENT JOINT IF WITHIN 3 FT.

BEDDING NOTES
1. BEDDING "A" SHALL BE COMPOSED OF SAND, NO. 3 OR NO. 4 CRUSHED ROCK OR GRAVEL, OR OTHER GRANULAR MATERIAL APPROVED BY THE ENGINEER.
2. BEDDING "B" SHALL BE COMPOSED OF SAND OR OTHER GRANULAR MATERIAL APPROVED BY THE ENGINEER AND SHALL BE COMPACTED AND APPROVED PRIOR TO PLACING BALANCE OF BACKFILL.
3. SAND-CEMENT SLURRY MAY BE USED FOR BEDDING.



BEDDING DETAIL
NO SCALE

REPAVEMENT SCHEDULE

LIMIT	REPLACEMENT SECTION
ST. OF THE SILVER LANTERN P.C.H. TO LA CRESTA DR.	0.25' AC/NS
LA CRESTA DRIVE ST. OF THE SILVER LANTERN TO 450' ± WEST OF ST. OF THE GOLDEN LANTERN	0.25' AC/NS
OLINDA DRIVE CORDOVA DR. TO SELVA RD.	0.30' AC/NS
SELVA ROAD OLINDA DR. TO ST. OF THE GOLDEN LANTERN	0.30' AC/NS

NOTE: THESE BORING LOGS WERE ACCOMPANIED BY A SOILS INVESTIGATION REPORT PREPARED BY GEOLABS, INC. THE REPORT IS AVAILABLE FOR STUDY IN THE OFFICE OF THE DISTRICT.

1/2 0 1 2
3 inches on original drawing

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

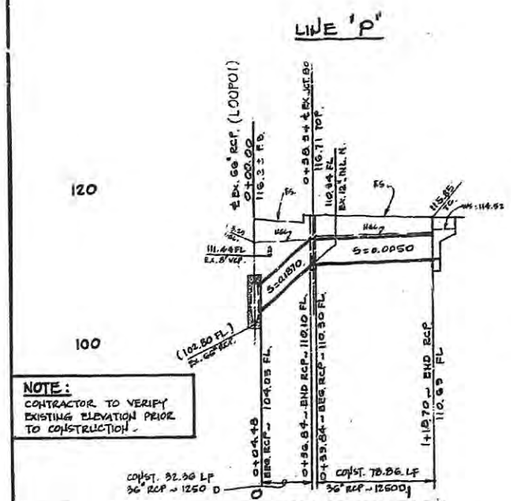
REVISIONS		
MARK	DATE	DESCRIPTION

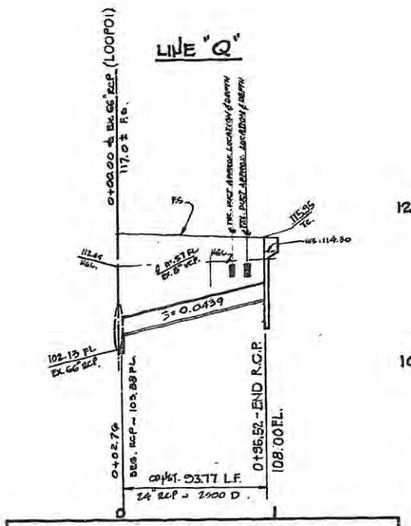
ORANGE COUNTY FLOOD CONTROL DISTRICT
GOLDEN LANTERN STORM DRAIN
LOG OF BORINGS & BEDDING DETAIL

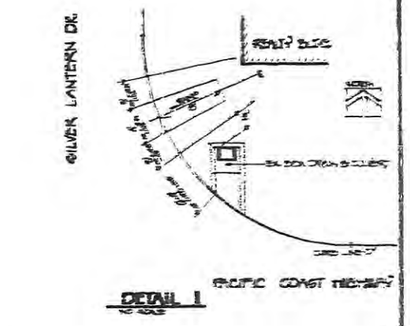
DESIGNED V.S.T.
DRAWN R.A.G. CHECKED W.A.C.
SUBMITTED ____ DESIGN ENGINEER
RECOMMENDED ____ DESIGN DIVISION ENGINEER
SCALE AS SHOWN | DATE AUG. 75 | DWG. NO. LOOP01-713-2A

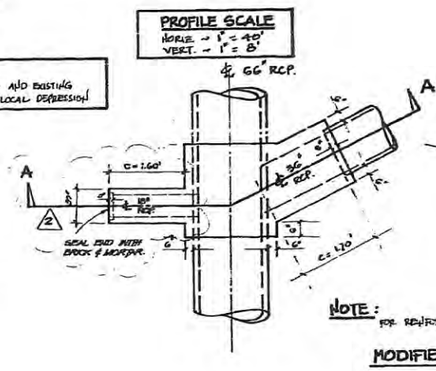
SHEET 12 OF 12
SD-015-12

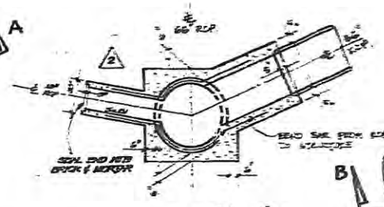
EXHIBIT 5

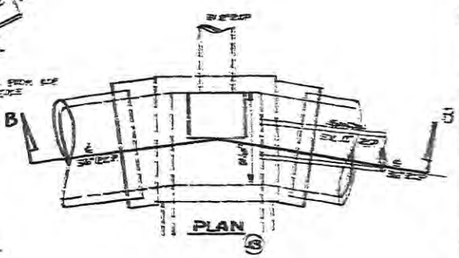












NOTE:
CONTRACTOR TO VERIFY EXISTING ELEVATION PRIOR TO CONSTRUCTION.

NOTE:
CONTRACTOR TO MATCH EXISTING TOP OF CURB AND EXISTING PAVEMENT AT EDGES OF CATCH BASIN AND LOCAL DEPRESSION

NOTE: FOR REINFORCING SEE O.C.E.M.A. STD. PLAN NO. 3.3

PLAN APPROVED FOR CONNECTIONS
TO LOOP01 STORM DRAIN

Jack W. Schwarz 12-29-91
JACK SCHWARZ — DATE
ORANGE CO. E.M.A. REGULATION

BREAK INTO WALLS & RECHANNEL FLOOR. REINFORCING STEEL FOR INSIDE FACE OF CATCH BASIN WALL SHALL BE CUT @ CENTER OF OPENINGS AND BENT INTO WALLS OF MONOLITHIC CONNECTION. REINFORCING STEEL FOR OUTSIDE FACE OF CATCH BASIN SHALL BE CUT 2" CLEAR OF OPENINGS

(51) — ABANDONED PIPE SHALL BE FILLED W/ 1 SACK CEMENT SLURRY & PLUGGED W/ PCC EACH END.
(50) — CONST. WHEELCHAIR RAMP DETAIL NO. 1 FOR STD. 113-B. 2 ECR. NOTE: SEE DETAIL 1, ABOVE.
△2 (49) — CONST. MODIFIED JCT. STR. TYPE IV OF OCEMA. STD. NO. 313 PER DETAIL ABOVE
(48) — BREAK IN AND CONNECT 36" RCP INTO EX. SD. JCT. BOX PER DETAIL 2 RIGHT
(47) — SAWCUT & REMOVE EX. CONC. WALK AND REPLACE SAME KIND
(46) — REMOVE & REPLACE EX. 2'x3' GAS BOX AT SAME LOCATION
(45) — SAWCUT & REMOVE EX. PAVM'T AND REPLACE SAME KIND.
(44) — REMOVE EX. CURB & GUTTER AND REPLACE SAME KIND
(43) — REMOVE EX. 12" RCP
(42) — CONST. DRAINAGE INLET TYPE OL. (SIZE PER PLAN) PER CALTRANS STD. NO. D72 AND GUTTER DEPRESSION STD. NO. D78 IN GRADE SAG. W= 2.00', C.M.= 0.67'
(41) — REMOVE EXISTING 4' CATCH BASIN AND ITS PIPE CONNECTORS.
(40) — CONST. JUNCTION STRUCTURE TYPE II PER O.C.E.M.A. STD. NO. 305

CONSTRUCTION NOTES

NOTICE TO CONTRACTOR

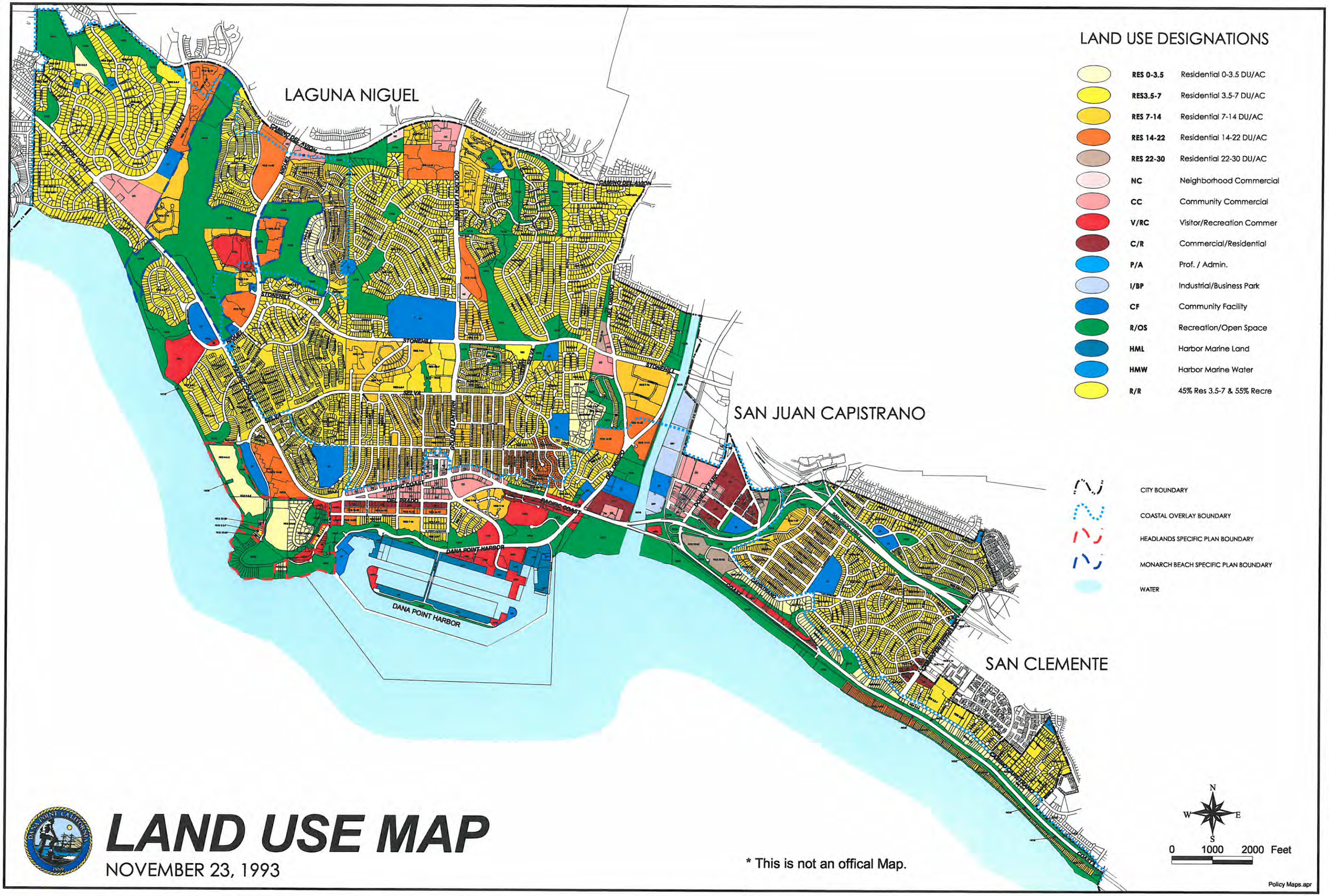
THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. APPROVAL OF THIS PLAN BY THE CALIFORNIA DEPARTMENT OF TRANSPORTATION DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OR COMPLETENESS OF THE LOCATION OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THE CONTRACTOR IS REQUIRED TO TAKE ALL DUE PRECAUTIONARY MEANS TO PROTECT THE UTILITY LINES NOT OF RECORD OR NOT SHOWN ON THIS PLAN.

vtn

TRACT NO. 11153
STORM DRAIN MODIFICATIONS
PACIFIC COAST HWY.
DANA POINT
SHEET 23 OF 23 SHEETS

TR. IMP. (11153)

EXHIBIT 5



LAND USE MAP

NOVEMBER 23, 1993

* This is not an offical Map.

EXHIBIT 6

LAGUNA NIGUEL

SAN JUAN CAPISTRANO

SAN CLEMENTE

LEGEND

RESIDENTIAL

RSF 2	RESIDENTIAL SINGLE FAMILY 2 DU/AC
RSF 3	RESIDENTIAL SINGLE FAMILY 3 DU/AC
RSF 4	RESIDENTIAL SINGLE FAMILY 4 DU/AC
RSF 7	RESIDENTIAL SINGLE FAMILY 7 DU/AC
RSF 12	RESIDENTIAL SINGLE FAMILY 12 DU/AC
RSF 22	RESIDENTIAL SINGLE FAMILY 22 DU/AC
RBR 12	RESIDENTIAL BEACH ROAD 12 DU/AC
RBRD 18	RESIDENTIAL BEACH ROAD DUPLEX 18 DU/AC
RD 14	RESIDENTIAL DUPLEX 14 DU/AC
RMF 17	RESIDENTIAL MULTIPLE FAMILY 7 DU/AC
RMF 14	RESIDENTIAL MULTIPLE FAMILY 14 DU/AC
RMF 22	RESIDENTIAL MULTIPLE FAMILY 22 DU/AC
RMF 30	RESIDENTIAL MULTIPLE FAMILY 30 DU/AC

MIXED USE

C/R	COMMERCIAL / RESIDENTIAL
P/R	PROFESSIONAL / RESIDENTIAL
TC-MU	TOWN CENTER MIXED-USE

COMMUNITY / OPEN SPACE

REC	RECREATION
OS	OPEN SPACE
CONS	CONSERVATION
CD	COMMUNITY FACILITIES
DPHPC	DP HARBOR PLANNED COMMUNITY
TC	TRANSPORTATION CORRIDOR

COMMERCIAL / PROFESSIONAL

NC	NEIGHBORHOOD COMMERCIAL
C C/P	COMMUNITY COMMERCIAL / PEDESTRIAN
C C/V	COMMUNITY COMMERCIAL / VEHICLE
V/RC	VISITOR / RECREATION COMMERCIAL
P/A	PROFESSIONAL / ADMINISTRATION
I/B	INDUSTRIAL / BUSINESS

OVERLAY DISTRICTS

DPSP	DP SPECIFIC PLAN OVERLAY *Ref. ZC 85-10P* *Approved by the Orange County Planning Commission on April 9, 1985 and adopted by Ordinance No. 3528 by the Orange County Board of Supervisors on May 15, 1985.*
SPO ZONE	SPECIFIC PLAN OVERLAY ZONES *MBSP - Monarch Beach Specific Plan* *HDCP - Headlands Conservation Plan*
FP-2	FLOODPLAIN OVERLAY (FP-2)
FP-3	FLOODPLAIN OVERLAY (FP-3)

TOWN CENTER BOUNDARY	Town Center Boundary
PRD BOUNDARY	PRD 8
CITY BOUNDARY	City Boundary
COASTAL OVERLAY BOUNDARY	Coastal_Overlay_Boundary
MINIMUM SETBACK FROM COASTAL BLUFF	
WATER	

DISCLAIMER

This map is a public resource of general information. The feature data provided on this map represents the most accurate zoning and parcel information available at the most recent data of revision. In the event of a conflict between zoning information on this map and an adopted City Resolution or Ordinance, the City Resolution or Ordinance shall govern.

The City of Dana Point makes no warranty, representation or guaranty as to the content, accuracy, or completeness of any information provided herein. The City of Dana Point shall assume no liability for any errors, omissions, or an inaccuracy in the information provided and is not responsible for any claims, losses or damages resulting from the use of this map.

DanaPoint_ZoningMap_09_19_10.mxd

ZONING MAP

REVISED: JUNE 3, 2008 PRINTED: SEPTEMBER 09, 2010

NORTH

0 500 1,000 2,000 Feet

EXHIBIT 7

APPENDIX B. 10-YEAR HIGH CONFIDENCE HYDROLOGY CALCULATIONS

B.1

Existing 10-Year 60" Hydrology w/o Harbor (Consistent w/ City MPD)


```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
        (c) Copyright 1983-2012 Advanced Engineering Software (aes)
            Ver. 19.0  Release Date: 06/01/2012  License ID 1355

                        Analysis prepared by:

                      Fuscoe Engineering, Inc.
                          16795 Von Karman
                             Suite 100
                          Irvine, CA 92606

------------------------------------------------------------------------
  FILE NAME: DPHOSR2.DAT
  TIME/DATE OF STUDY: 15:40 04/26/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *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
  2   18.0      5.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.67 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (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     101.00 TO NODE     102.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   280.00
  ELEVATION DATA: UPSTREAM(FEET) =     295.00  DOWNSTREAM(FEET) =    290.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.288
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20       0.500    75    8.29
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.44
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.44

************************************************************************
  FLOW PROCESS FROM NODE     102.00 TO NODE     103.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  290.00  DOWNSTREAM ELEVATION(FEET) =  285.00
```

```
  STREET LENGTH(FEET) =   135.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.66
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.65
  STREET FLOW TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =    8.77
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.942
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.50      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.50      SUBAREA RUNOFF(CFS) =    6.39
  EFFECTIVE AREA(ACRES) =      3.80    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       9.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.35
  FLOW VELOCITY(FEET/SEC.) =  5.11   DEPTH*VELOCITY(FT*FT/SEC.) =   2.01
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =     415.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  285.00  DOWNSTREAM ELEVATION(FEET) =  253.00
  STREET LENGTH(FEET) =   345.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.11
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.13
  STREET FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    9.51
  *  10 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
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.60      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    8.78
  EFFECTIVE AREA(ACRES) =      7.40    AREA-AVERAGED Fm(INCH/HR) =  0.10
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        7.4        PEAK FLOW RATE(CFS) =      18.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.96
  FLOW VELOCITY(FEET/SEC.) =  8.23   DEPTH*VELOCITY(FT*FT/SEC.) =   3.54
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    104.00 =     760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  253.00  DOWNSTREAM ELEVATION(FEET) =  225.00
  STREET LENGTH(FEET) =   630.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.24
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.11
  STREET FLOW TRAVEL TIME(MIN.) =   1.65   Tc(MIN.) =   11.16
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.563
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.70      0.20     0.500    75
  PUBLIC PARK                D        0.10      0.20     0.850    75
  COMMERCIAL                 D        1.10      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.287
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    4.28
  EFFECTIVE AREA(ACRES) =      9.30    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        9.3        PEAK FLOW RATE(CFS) =      20.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.40
  FLOW VELOCITY(FEET/SEC.) =  6.43   DEPTH*VELOCITY(FT*FT/SEC.) =   3.16
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    105.00 =    1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   204.30  DOWNSTREAM(FEET) =   202.30
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.69
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   11.18
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    106.00 =    1415.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =   11.18
  RAINFALL INTENSITY(INCH/HR) =   2.56
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.46
  EFFECTIVE STREAM AREA(ACRES) =       9.30
  TOTAL STREAM AREA(ACRES) =       9.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.69

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 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) =    330.00  DOWNSTREAM(FEET) =    320.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.880
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.699
  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
  "11+ DWELLINGS/ACRE"       D        1.00      0.20     0.200    75    5.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      3.29
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.29

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   310.00  DOWNSTREAM(FEET) =   265.00
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.15
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.29
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    6.14
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    109.00 =     505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =    6.14
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.609
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        3.90      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =   12.53
  EFFECTIVE AREA(ACRES) =      4.90   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      15.74

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   265.00  DOWNSTREAM(FEET) =   258.00
  FLOW LENGTH(FEET) =   560.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.74
  PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =    7.31
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    110.00 =    1065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.31
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.265
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.30      0.20     0.500    75
  PUBLIC PARK                D        2.10      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.716
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    9.55
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      23.77

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   258.00  DOWNSTREAM(FEET) =   238.00
  FLOW LENGTH(FEET) =   175.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.77
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    7.45
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    111.00 =    1240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.229
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        5.50      0.20     0.500    75
  PUBLIC PARK                D        0.80      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.544
  SUBAREA AREA(ACRES) =    6.30      SUBAREA RUNOFF(CFS) =   17.69
  EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      41.20

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   238.00  DOWNSTREAM(FEET) =   202.30
```

```
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.38
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.20
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    7.60
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    106.00 =    1475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =    7.60
  RAINFALL INTENSITY(INCH/HR) =   3.19
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.47
  EFFECTIVE STREAM AREA(ACRES) =      14.60
  TOTAL STREAM AREA(ACRES) =      14.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.20

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       20.69   11.18    2.560  0.20( 0.09) 0.46       9.3     101.00
      2       41.20    7.60    3.193  0.20( 0.09) 0.47      14.6     107.00

  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       58.87    7.60    3.193  0.20( 0.09) 0.47      20.9     107.00
      2       53.47   11.18    2.560  0.20( 0.09) 0.46      23.9     101.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      58.87    Tc(MIN.) =     7.60
  EFFECTIVE AREA(ACRES) =      20.92   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.9
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    106.00 =    1475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    330.00  DOWNSTREAM(FEET) =    328.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.309
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.543
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.10      0.20     0.500    75   11.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.42
```

 TOTAL AREA(ACRES) =   1.10   PEAK FLOW RATE(CFS) =   2.42

****
 FLOW PROCESS FROM NODE   113.00 TO NODE   114.00 IS CODE = 62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION # 2 USED)<<<<<
==
 UPSTREAM ELEVATION(FEET) = 328.70 DOWNSTREAM ELEVATION(FEET) = 327.40
 STREET LENGTH(FEET) =   225.00   CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   4.00
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) = 0.33
   HALFSTREET FLOOD WIDTH(FEET) =   10.17
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   1.74
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   0.57
 STREET FLOW TRAVEL TIME(MIN.) =   2.16   Tc(MIN.) =   13.47
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.301
 SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
      LAND USE   GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"   D   1.60   0.20   0.500   75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
 SUBAREA AREA(ACRES) =   1.60   SUBAREA RUNOFF(CFS) =   3.17
 EFFECTIVE AREA(ACRES) =   2.70   AREA-AVERAGED Fm(INCH/HR) = 0.10
 AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.50
 TOTAL AREA(ACRES) =   2.7   PEAK FLOW RATE(CFS) =   5.35

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) = 11.52
 FLOW VELOCITY(FEET/SEC.) = 1.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.66
 LONGEST FLOWPATH FROM NODE   112.00 TO NODE   114.00 =   525.00 FEET.

****
 FLOW PROCESS FROM NODE   114.00 TO NODE   115.00 IS CODE = 31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
 ELEVATION DATA: UPSTREAM(FEET) =   312.40 DOWNSTREAM(FEET) =   310.80
 FLOW LENGTH(FEET) =   180.00   MANNING'S N = 0.013
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.34
 ESTIMATED PIPE DIAMETER(INCH) = 15.00   NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =   5.35
 PIPE TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =   14.03
 LONGEST FLOWPATH FROM NODE   112.00 TO NODE   115.00 =   705.00 FEET.

****
 FLOW PROCESS FROM NODE   115.00 TO NODE   115.00 IS CODE = 81

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
 MAINLINE Tc(MIN.) =   14.03
 * 10 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
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"   D   1.30   0.20   0.500   75

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    2.51
  EFFECTIVE AREA(ACRES) =      4.00   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.0       PEAK FLOW RATE(CFS) =       7.73

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   310.80  DOWNSTREAM(FEET) =   247.20
  FLOW LENGTH(FEET) =   825.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.35
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.73
  PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =   15.06
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    116.00 =    1530.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.06
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.158
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        4.60      0.20     0.500    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.461
  SUBAREA AREA(ACRES) =    5.10      SUBAREA RUNOFF(CFS) =    9.48
  EFFECTIVE AREA(ACRES) =      9.10   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.1       PEAK FLOW RATE(CFS) =      16.89

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   247.20  DOWNSTREAM(FEET) =   234.20
  FLOW LENGTH(FEET) =   765.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.16
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.89
  PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =   16.45
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    117.00 =    2295.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.00      0.20     0.500    75
  COMMERCIAL                 D        0.40      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.386
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    2.49
```

```
  EFFECTIVE AREA(ACRES) =     10.50   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       10.5       PEAK FLOW RATE(CFS) =      18.51

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.10      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.10      SUBAREA RUNOFF(CFS) =    5.44
  EFFECTIVE AREA(ACRES) =     13.60   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       13.6       PEAK FLOW RATE(CFS) =      23.95

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   234.20  DOWNSTREAM(FEET) =   228.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.99
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.95
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   16.56
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    125.00 =    2395.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.56
  RAINFALL INTENSITY(INCH/HR) =   2.04
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.47
  EFFECTIVE STREAM AREA(ACRES) =      13.60
  TOTAL STREAM AREA(ACRES) =      13.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      23.95

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    336.00  DOWNSTREAM(FEET) =    328.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.463
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.227
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.70      0.20     0.500    75    7.46
  PUBLIC PARK                D        0.20      0.20     0.850    75    9.27
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.537
  SUBAREA RUNOFF(CFS) =      5.33
  TOTAL AREA(ACRES) =      1.90   PEAK FLOW RATE(CFS) =      5.33

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  307.00
  STREET LENGTH(FEET) =   675.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.08
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.00
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.31
  STREET FLOW TRAVEL TIME(MIN.) =   2.81   Tc(MIN.) =   10.28
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.20      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.20      SUBAREA RUNOFF(CFS) =    7.45
  EFFECTIVE AREA(ACRES) =      5.10    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.1        PEAK FLOW RATE(CFS) =      11.86

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.34
  FLOW VELOCITY(FEET/SEC.) =  4.22   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    120.00 =     950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  307.00  DOWNSTREAM ELEVATION(FEET) =  301.00
  STREET LENGTH(FEET) =   115.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.99
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.06
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.10
```

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  STREET FLOW TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =   10.61
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.638
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.70      0.20     0.500    75
  PUBLIC PARK                D        1.90      0.20     0.850    75
  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 =  0.564
  SUBAREA AREA(ACRES) =    5.40      SUBAREA RUNOFF(CFS) =   12.27
  EFFECTIVE AREA(ACRES) =     10.50    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       10.5        PEAK FLOW RATE(CFS) =      23.91

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.59
  FLOW VELOCITY(FEET/SEC.) =  6.09   DEPTH*VELOCITY(FT*FT/SEC.) =   2.42
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    121.00 =    1065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   296.00  DOWNSTREAM(FEET) =   280.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.89
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.91
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   10.80
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    122.00 =    1265.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  280.00  DOWNSTREAM ELEVATION(FEET) =  262.00
  STREET LENGTH(FEET) =   270.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.22
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.53
    HALFSTREET FLOOD WIDTH(FEET) =   20.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.50
  STREET FLOW TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =   11.33
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.540
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        7.90      0.20     0.500    75
  PUBLIC PARK                D        0.90      0.20     0.850    75
  COMMERCIAL                 D        0.60      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.508
  SUBAREA AREA(ACRES) =    9.40      SUBAREA RUNOFF(CFS) =   20.63
```

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  EFFECTIVE AREA(ACRES) =     19.90    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       19.9        PEAK FLOW RATE(CFS) =      43.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.57   HALFSTREET FLOOD WIDTH(FEET) =  22.85
  FLOW VELOCITY(FEET/SEC.) =  8.98   DEPTH*VELOCITY(FT*FT/SEC.) =   5.12
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    123.00 =    1535.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  262.00  DOWNSTREAM ELEVATION(FEET) =  239.00
  STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      44.16
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.55
    HALFSTREET FLOOD WIDTH(FEET) =   21.60
    AVERAGE FLOW VELOCITY(FEET/SEC.) =   10.13
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.55
  STREET FLOW TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   11.74
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.489
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.20      0.20     0.850    75
  COMMERCIAL                 D        0.30      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.08
  EFFECTIVE AREA(ACRES) =     20.40    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       20.4        PEAK FLOW RATE(CFS) =      43.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  21.52
  FLOW VELOCITY(FEET/SEC.) = 10.11   DEPTH*VELOCITY(FT*FT/SEC.) =   5.53
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    124.00 =    1785.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   232.60  DOWNSTREAM(FEET) =   228.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.44
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      43.78
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    125.00 =    1855.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 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.) =   11.80
  RAINFALL INTENSITY(INCH/HR) =   2.48
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.52
  EFFECTIVE STREAM AREA(ACRES) =      20.40
  TOTAL STREAM AREA(ACRES) =      20.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      43.78

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       23.95   16.56    2.044  0.20( 0.09) 0.47      13.6     112.00
      2       43.78   11.80    2.481  0.20( 0.10) 0.52      20.4     118.00

  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       64.69   11.80    2.481  0.20( 0.10) 0.51      30.1     118.00
      2       59.68   16.56    2.044  0.20( 0.10) 0.50      34.0     112.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      64.69    Tc(MIN.) =    11.80
  EFFECTIVE AREA(ACRES) =      30.10   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =       34.0
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    125.00 =    2395.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   228.00  DOWNSTREAM(FEET) =   224.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.69
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   11.84
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    132.00 =    2445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 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.) =   11.84
  RAINFALL INTENSITY(INCH/HR) =   2.48
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =      30.10
  TOTAL STREAM AREA(ACRES) =      34.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      64.69

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    322.00  DOWNSTREAM(FEET) =    320.50
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.589
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.977
  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
  "11+ DWELLINGS/ACRE"       D        0.40      0.20     0.200    75    9.15
  COMMERCIAL                 D        0.20      0.20     0.100    75    8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.167
  SUBAREA RUNOFF(CFS) =      1.59
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.59

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  320.50  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   600.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   12.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.60
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   6.23   Tc(MIN.) =   14.82
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.178
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.40      0.20     0.500    75
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.20      0.20     0.200    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.264
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    2.10
  EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       3.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.02
  FLOW VELOCITY(FEET/SEC.) =  1.67   DEPTH*VELOCITY(FT*FT/SEC.) =   0.69
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    128.00 =     900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    129.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  318.00  DOWNSTREAM ELEVATION(FEET) =  302.00
  STREET LENGTH(FEET) =   640.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
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  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   14.57
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.77
  STREET FLOW TRAVEL TIME(MIN.) =   2.55   Tc(MIN.) =   17.37
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.989
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        5.50      0.20     0.500    75
  COMMERCIAL                 D        0.90      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.444
  SUBAREA AREA(ACRES) =    6.40      SUBAREA RUNOFF(CFS) =   10.94
  EFFECTIVE AREA(ACRES) =      8.10    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        8.1        PEAK FLOW RATE(CFS) =      13.92

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.62
  FLOW VELOCITY(FEET/SEC.) =  4.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.24
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    129.00 =    1540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    130.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  302.00  DOWNSTREAM ELEVATION(FEET) =  264.00
  STREET LENGTH(FEET) =   450.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.54
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.58
  STREET FLOW TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =   18.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.930
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        6.10      0.20     0.500    75
  COMMERCIAL                 D        0.70      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.459
  SUBAREA AREA(ACRES) =    6.80      SUBAREA RUNOFF(CFS) =   11.25
  EFFECTIVE AREA(ACRES) =     14.90    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =       14.9        PEAK FLOW RATE(CFS) =      24.74
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.38
  FLOW VELOCITY(FEET/SEC.) =  8.55   DEPTH*VELOCITY(FT*FT/SEC.) =   4.05
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    130.00 =    1990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  264.00  DOWNSTREAM ELEVATION(FEET) =  242.00
  STREET LENGTH(FEET) =   310.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.09
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.91
  STREET FLOW TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   18.95
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.892
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.40      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) =    0.40      SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =     15.30    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       15.3        PEAK FLOW RATE(CFS) =      24.91

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.09
  FLOW VELOCITY(FEET/SEC.) =  8.00   DEPTH*VELOCITY(FT*FT/SEC.) =   3.88
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    131.00 =    2300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   237.10  DOWNSTREAM(FEET) =   224.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.36
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.91
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   18.97
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    132.00 =    2350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 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.) =   18.97
```

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 RAINFALL INTENSITY(INCH/HR) =   1.89
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.42
 EFFECTIVE STREAM AREA(ACRES) =      15.30
 TOTAL STREAM AREA(ACRES) =      15.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      24.91

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       64.69   11.84    2.477  0.20( 0.10) 0.51      30.1     118.00
     1       59.68   16.59    2.042  0.20( 0.10) 0.50      34.0     112.00
     2       24.91   18.97    1.891  0.20( 0.08) 0.42      15.3     126.00

 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       85.27   11.84    2.477  0.20( 0.10) 0.48      39.6     118.00
     2       83.28   16.59    2.042  0.20( 0.10) 0.48      47.4     112.00
     3       79.94   18.97    1.891  0.20( 0.10) 0.48      49.3     126.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      85.27    Tc(MIN.) =    11.84
 EFFECTIVE AREA(ACRES) =      39.64   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       49.3
 LONGEST FLOWPATH FROM NODE    112.00 TO NODE    132.00 =    2445.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   224.00  DOWNSTREAM(FEET) =   202.30
 FLOW LENGTH(FEET) =   445.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.96
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      85.27
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.21
 LONGEST FLOWPATH FROM NODE    112.00 TO NODE    106.00 =    2890.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       85.27   12.21    2.434  0.20( 0.10) 0.48      39.6     118.00
     2       83.28   16.97    2.016  0.20( 0.10) 0.48      47.4     112.00
     3       79.94   19.35    1.870  0.20( 0.10) 0.48      49.3     126.00
 LONGEST FLOWPATH FROM NODE    112.00 TO NODE    106.00 =    2890.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       58.87    7.60    3.193  0.20( 0.09) 0.47      20.9     107.00
     2       53.47   11.18    2.560  0.20( 0.09) 0.46      23.9     101.00
 LONGEST FLOWPATH FROM NODE    107.00 TO NODE    106.00 =    1475.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      129.21    7.60    3.193  0.20( 0.10) 0.48      45.6     107.00
     2      135.76   11.18    2.560  0.20( 0.10) 0.48      60.2     101.00
```

3	136.01	12.21	2.434	0.20(0.10)	0.48	63.5	118.00
4	124.96	16.97	2.016	0.20(0.09)	0.47	71.3	112.00
5	118.45	19.35	1.870	0.20(0.09)	0.47	73.2	126.00

TOTAL AREA(ACRES) = 73.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 136.01 Tc(MIN.) = 12.212
EFFECTIVE AREA(ACRES) = 63.54 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 73.2
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 106.00 = 2890.00 FEET.

****
FLOW PROCESS FROM NODE 106.00 TO NODE 135.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 202.30 DOWNSTREAM(FEET) = 141.50
FLOW LENGTH(FEET) = 1090.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.96
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 136.01
PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 12.97
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 135.00 = 3980.00 FEET.

****
FLOW PROCESS FROM NODE 135.00 TO NODE 135.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 12.97
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.351
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"8-10 DWELLINGS/ACRE"	D	5.70	0.20	0.400	75
COMMERCIAL	D	0.60	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.371
SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 12.91
EFFECTIVE AREA(ACRES) = 69.84 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 79.5 PEAK FLOW RATE(CFS) = 141.91

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	136.87	8.37	3.023	0.20(0.09)	0.46	51.9	107.00
2	141.96	11.94	2.465	0.20(0.09)	0.47	66.5	101.00
3	141.91	12.97	2.351	0.20(0.09)	0.47	69.8	118.00
4	130.72	17.73	1.965	0.20(0.09)	0.47	77.6	112.00
5	124.06	20.15	1.827	0.20(0.09)	0.46	79.5	126.00

NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) = 141.96 Tc(MIN.) = 11.94
AREA-AVERAGED Fm(INCH/HR) = 0.09 AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.47 EFFECTIVE AREA(ACRES) = 66.50

****
FLOW PROCESS FROM NODE 135.00 TO NODE 144.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 141.50 DOWNSTREAM(FEET) = 141.00
FLOW LENGTH(FEET) = 15.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.65
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 141.96
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 11.95

 LONGEST FLOWPATH FROM NODE 112.00 TO NODE 144.00 = 3995.00 FEET.

****
 FLOW PROCESS FROM NODE 144.00 TO NODE 144.00 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.) = 11.95
 RAINFALL INTENSITY(INCH/HR) = 2.46
 AREA-AVERAGED Fm(INCH/HR) = 0.09
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.47
 EFFECTIVE STREAM AREA(ACRES) = 66.50
 TOTAL STREAM AREA(ACRES) = 79.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 141.96

****
 FLOW PROCESS FROM NODE 136.00 TO NODE 137.00 IS CODE = 21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 230.00
 ELEVATION DATA: UPSTREAM(FEET) = 335.00 DOWNSTREAM(FEET) = 332.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.794
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.405
 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
 "11+ DWELLINGS/ACRE" D 3.20 0.20 0.200 75 6.79
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA RUNOFF(CFS) = 9.69
 TOTAL AREA(ACRES) = 3.20 PEAK FLOW RATE(CFS) = 9.69

****
 FLOW PROCESS FROM NODE 137.00 TO NODE 138.00 IS CODE = 62

 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION # 2 USED)<<<<<
==
 UPSTREAM ELEVATION(FEET) = 332.00 DOWNSTREAM ELEVATION(FEET) = 308.00
 STREET LENGTH(FEET) = 575.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 5.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 13.16
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) = 0.42
   HALFSTREET FLOOD WIDTH(FEET) = 14.76
   AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.73
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.42
 STREET FLOW TRAVEL TIME(MIN.) = 1.67 Tc(MIN.) = 8.47
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.002
 SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
      LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE" D 2.60 0.20 0.200 75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    6.93
  EFFECTIVE AREA(ACRES) =      5.80    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        5.8        PEAK FLOW RATE(CFS) =      15.46

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.70
  FLOW VELOCITY(FEET/SEC.) =  5.99   DEPTH*VELOCITY(FT*FT/SEC.) =   2.64
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    138.00 =     805.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    138.00 TO NODE    139.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  308.00  DOWNSTREAM ELEVATION(FEET) =  280.00
  STREET LENGTH(FEET) =   440.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.35
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.48
    HALFSTREET FLOOD WIDTH(FEET) =   17.70
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.47
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.58
  STREET FLOW TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =    9.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.819
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        4.80      0.20     0.200    75
  COMMERCIAL                 D        0.70      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.187
  SUBAREA AREA(ACRES) =    5.50      SUBAREA RUNOFF(CFS) =   13.77
  EFFECTIVE AREA(ACRES) =     11.30    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       11.3        PEAK FLOW RATE(CFS) =      28.28

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  19.41
  FLOW VELOCITY(FEET/SEC.) =  7.94   DEPTH*VELOCITY(FT*FT/SEC.) =   4.05
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    139.00 =    1245.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    139.00 TO NODE    140.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  280.00  DOWNSTREAM ELEVATION(FEET) =  255.00
  STREET LENGTH(FEET) =   425.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
```

```
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      29.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   20.12
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.07
  STREET FLOW TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =   10.36
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.675
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.50      0.20     0.500    75
  COMMERCIAL                 D        0.70      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.267
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.83
  EFFECTIVE AREA(ACRES) =     12.50    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       12.5        PEAK FLOW RATE(CFS) =      29.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.12
  FLOW VELOCITY(FEET/SEC.) =  7.78   DEPTH*VELOCITY(FT*FT/SEC.) =   4.06
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    140.00 =    1670.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    141.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   257.00  DOWNSTREAM(FEET) =   250.00
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.50
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.64
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   10.44
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    141.00 =    1765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    142.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  250.00  DOWNSTREAM ELEVATION(FEET) =  160.00
  STREET LENGTH(FEET) =  1225.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.56
    HALFSTREET FLOOD WIDTH(FEET) =   21.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    9.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.22   Tc(MIN.) =   12.66
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.384
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D       11.20      0.20     0.400    75
  COMMERCIAL                 D        0.30      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.392
  SUBAREA AREA(ACRES) =   11.50      SUBAREA RUNOFF(CFS) =   23.86
  EFFECTIVE AREA(ACRES) =     24.00    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =       24.0        PEAK FLOW RATE(CFS) =      50.23

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.59   HALFSTREET FLOOD WIDTH(FEET) =  23.71
  FLOW VELOCITY(FEET/SEC.) =  9.63   DEPTH*VELOCITY(FT*FT/SEC.) =   5.65
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    142.00 =    2990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    143.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.00  DOWNSTREAM(FEET) =   145.00
  FLOW LENGTH(FEET) =   285.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.97
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.23
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   13.05
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    143.00 =    3275.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    143.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.05
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.342
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        5.60      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    5.60      SUBAREA RUNOFF(CFS) =   11.40
  EFFECTIVE AREA(ACRES) =     29.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =       29.6       PEAK FLOW RATE(CFS) =      60.73

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    144.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   145.00  DOWNSTREAM(FEET) =   141.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.17
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.73
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.09
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    144.00 =    3320.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    144.00 TO NODE    144.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.09
```

```
  RAINFALL INTENSITY(INCH/HR) =   2.34
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.31
  EFFECTIVE STREAM AREA(ACRES) =      29.60
  TOTAL STREAM AREA(ACRES) =      29.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      60.73

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      136.87    8.38    3.020  0.20( 0.09) 0.46      51.9     107.00
      1      141.96   11.95    2.464  0.20( 0.09) 0.47      66.5     101.00
      1      141.91   12.98    2.350  0.20( 0.09) 0.47      69.8     118.00
      1      130.72   17.75    1.964  0.20( 0.09) 0.47      77.6     112.00
      1      124.06   20.16    1.826  0.20( 0.09) 0.46      79.5     126.00
      2       60.73   13.09    2.339  0.20( 0.06) 0.31      29.6     136.00

  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      187.38    8.38    3.020  0.20( 0.08) 0.42      70.9     107.00
      2      200.47   11.95    2.464  0.20( 0.08) 0.42      93.5     101.00
      3      202.44   12.98    2.350  0.20( 0.08) 0.42      99.2     118.00
      4      202.40   13.09    2.339  0.20( 0.08) 0.42      99.6     136.00
      5      181.46   17.75    1.964  0.20( 0.08) 0.42     107.2     112.00
      6      171.11   20.16    1.826  0.20( 0.08) 0.42     109.1     126.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     202.44    Tc(MIN.) =    12.98
  EFFECTIVE AREA(ACRES) =      99.21   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =      109.1
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    144.00 =    3995.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    144.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   141.00  DOWNSTREAM(FEET) =   139.00
  FLOW LENGTH(FEET) =   325.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  47.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.57
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     202.44
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.45
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    145.00 =    4320.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 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.) =   13.45
  RAINFALL INTENSITY(INCH/HR) =   2.30
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.42
  EFFECTIVE STREAM AREA(ACRES) =      99.21
  TOTAL STREAM AREA(ACRES) =     109.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     202.44

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    147.00 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) =    218.00  DOWNSTREAM(FEET) =    216.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.364
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.833
  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        1.20      0.20     0.400    75    9.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.97
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      2.97

********************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    148.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  216.00  DOWNSTREAM ELEVATION(FEET) =  210.00
  STREET LENGTH(FEET) =   405.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.14
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.20
  STREET FLOW TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   11.51
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.517
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        2.30      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    5.05
  EFFECTIVE AREA(ACRES) =      3.50    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.5        PEAK FLOW RATE(CFS) =       7.68

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.60
  FLOW VELOCITY(FEET/SEC.) =  3.41   DEPTH*VELOCITY(FT*FT/SEC.) =   1.43
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    148.00 =     675.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    148.00 TO NODE    149.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  210.00  DOWNSTREAM ELEVATION(FEET) =  175.00
  STREET LENGTH(FEET) =   475.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
```

```
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.36
  STREET FLOW TRAVEL TIME(MIN.) =   1.20   Tc(MIN.) =   12.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.378
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        1.90      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    3.93
  EFFECTIVE AREA(ACRES) =      5.40    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        5.4        PEAK FLOW RATE(CFS) =      11.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.33
  FLOW VELOCITY(FEET/SEC.) =  6.82   DEPTH*VELOCITY(FT*FT/SEC.) =   2.54
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    149.00 =    1150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    149.00 TO NODE    149.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.378
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        1.50      0.20     0.400    75
  COMMERCIAL                 D        1.40      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.255
  SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    6.07
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      17.24

****************************************************************************
  FLOW PROCESS FROM NODE    149.00 TO NODE    145.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  175.00  DOWNSTREAM ELEVATION(FEET) =  146.00
  STREET LENGTH(FEET) =   580.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.63
```

```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.51
    HALFSTREET FLOOD WIDTH(FEET) =   19.65
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.61
  STREET FLOW TRAVEL TIME(MIN.) =   1.37   Tc(MIN.) =   14.09
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.242
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        7.90      0.20     0.400    75
  COMMERCIAL                 D        0.70      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.376
  SUBAREA AREA(ACRES) =    8.60      SUBAREA RUNOFF(CFS) =   16.77
  EFFECTIVE AREA(ACRES) =     16.90    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =       16.9        PEAK FLOW RATE(CFS) =      33.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  21.68
  FLOW VELOCITY(FEET/SEC.) =  7.52   DEPTH*VELOCITY(FT*FT/SEC.) =   4.13
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    145.00 =    1730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 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.) =   14.09
  RAINFALL INTENSITY(INCH/HR) =   2.24
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.36
  EFFECTIVE STREAM AREA(ACRES) =      16.90
  TOTAL STREAM AREA(ACRES) =      16.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      33.00

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      187.38    8.86    2.925  0.20( 0.08) 0.42      70.9     107.00
      1      200.47   12.42    2.410  0.20( 0.08) 0.42      93.5     101.00
      1      202.44   13.45    2.302  0.20( 0.08) 0.42      99.2     118.00
      1      202.40   13.56    2.292  0.20( 0.08) 0.42      99.6     136.00
      1      181.46   18.23    1.934  0.20( 0.08) 0.42     107.2     112.00
      1      171.11   20.65    1.801  0.20( 0.08) 0.42     109.1     126.00
      2       33.00   14.09    2.242  0.20( 0.07) 0.36      16.9     146.00

  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      214.67    8.86    2.925  0.20( 0.08) 0.42      81.5     107.00
      2      231.81   12.42    2.410  0.20( 0.08) 0.41     108.4     101.00
      3      234.82   13.45    2.302  0.20( 0.08) 0.41     115.3     118.00
      4      234.88   13.56    2.292  0.20( 0.08) 0.41     115.9     136.00
      5      233.01   14.09    2.242  0.20( 0.08) 0.41     117.4     146.00
      6      209.78   18.23    1.934  0.20( 0.08) 0.41     124.1     112.00
      7      197.40   20.65    1.801  0.20( 0.08) 0.41     126.0     126.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     234.88    Tc(MIN.) =    13.56
  EFFECTIVE AREA(ACRES) =     115.87   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =      126.0
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    145.00 =    4320.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   139.00  DOWNSTREAM(FEET) =   125.00
  FLOW LENGTH(FEET) =   780.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  41.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.87
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     234.88
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   14.28
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    150.00 =    5100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.28
  RAINFALL INTENSITY(INCH/HR) =   2.22
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =     115.87
  TOTAL STREAM AREA(ACRES) =     126.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     234.88

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    152.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    235.00  DOWNSTREAM(FEET) =    230.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.751
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.418
  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        0.30      0.20     0.850    75   10.73
  COMMERCIAL                 D        0.30      0.20     0.100    75    6.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA RUNOFF(CFS) =      1.79
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.79

****************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    153.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  230.00  DOWNSTREAM ELEVATION(FEET) =  195.00
  STREET LENGTH(FEET) =   390.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.61
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.53
  STREET FLOW TRAVEL TIME(MIN.) =   1.16   Tc(MIN.) =    7.91
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.121
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.40      0.20     0.850    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.433
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.46
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.09

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.47
  FLOW VELOCITY(FEET/SEC.) =  5.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    153.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  195.00  DOWNSTREAM ELEVATION(FEET) =  180.00
  STREET LENGTH(FEET) =   275.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.88
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.11
  STREET FLOW TRAVEL TIME(MIN.) =   0.79   Tc(MIN.) =    8.70
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.956
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        3.70      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    3.70      SUBAREA RUNOFF(CFS) =    9.58
  EFFECTIVE AREA(ACRES) =      5.20    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        5.2        PEAK FLOW RATE(CFS) =      13.45

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.13
  FLOW VELOCITY(FEET/SEC.) =  6.36   DEPTH*VELOCITY(FT*FT/SEC.) =   2.60
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    154.00 =     965.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    155.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
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```
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  180.00  DOWNSTREAM ELEVATION(FEET) =  175.00
  STREET LENGTH(FEET) =   125.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.48
    HALFSTREET FLOOD WIDTH(FEET) =   17.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.07
  STREET FLOW TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =    9.03
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.894
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        6.00      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    6.00      SUBAREA RUNOFF(CFS) =   15.19
  EFFECTIVE AREA(ACRES) =     11.20    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       11.2        PEAK FLOW RATE(CFS) =      28.35

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  6.35   DEPTH*VELOCITY(FT*FT/SEC.) =   3.09
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    155.00 =    1090.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    156.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  175.00  DOWNSTREAM ELEVATION(FEET) =  139.00
  STREET LENGTH(FEET) =   570.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.26
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   16.24
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.48
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.38
  STREET FLOW TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =   10.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        3.90      0.20     0.400    75
  RESIDENTIAL
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  "11+ DWELLINGS/ACRE"       D        6.20      0.20     0.200    75
  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 =  0.264
  SUBAREA AREA(ACRES) =   10.90      SUBAREA RUNOFF(CFS) =   25.81
  EFFECTIVE AREA(ACRES) =     22.10    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       22.1        PEAK FLOW RATE(CFS) =      52.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.80
  FLOW VELOCITY(FEET/SEC.) =  7.91   DEPTH*VELOCITY(FT*FT/SEC.) =   3.82
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    156.00 =    1660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   133.50  DOWNSTREAM(FEET) =   125.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.62
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.04
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   10.32
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    150.00 =    1700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.32
  RAINFALL INTENSITY(INCH/HR) =   2.68
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.34
  EFFECTIVE STREAM AREA(ACRES) =      22.10
  TOTAL STREAM AREA(ACRES) =      22.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      52.04

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      214.67    9.60    2.794  0.20( 0.08) 0.42      81.5     107.00
      1      231.81   13.15    2.333  0.20( 0.08) 0.41     108.4     101.00
      1      234.82   14.18    2.234  0.20( 0.08) 0.41     115.3     118.00
      1      234.88   14.28    2.225  0.20( 0.08) 0.41     115.9     136.00
      1      233.01   14.82    2.178  0.20( 0.08) 0.41     117.4     146.00
      1      209.78   18.98    1.890  0.20( 0.08) 0.41     124.1     112.00
      1      197.40   21.40    1.765  0.20( 0.08) 0.41     126.0     126.00
      2       52.04   10.32    2.680  0.20( 0.07) 0.34      22.1     151.00

  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      265.17    9.60    2.794  0.20( 0.08) 0.40     102.0     107.00
      2      270.18   10.32    2.680  0.20( 0.08) 0.40     109.0     151.00
      3      276.92   13.15    2.333  0.20( 0.08) 0.40     130.5     101.00
      4      277.97   14.18    2.234  0.20( 0.08) 0.40     137.4     118.00
      5      277.84   14.28    2.225  0.20( 0.08) 0.40     138.0     136.00
      6      275.04   14.82    2.178  0.20( 0.08) 0.40     139.5     146.00
      7      246.08   18.98    1.890  0.20( 0.08) 0.40     146.2     112.00
      8      231.20   21.40    1.765  0.20( 0.08) 0.40     148.1     126.00
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     277.97    Tc(MIN.) =    14.18
  EFFECTIVE AREA(ACRES) =     137.44   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =      148.1
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    150.00 =    5100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    159.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   125.00  DOWNSTREAM(FEET) =   102.00
  FLOW LENGTH(FEET) =   610.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.79
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     277.97
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   14.59
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    159.00 =    5710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    159.00 TO NODE    159.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.59
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.198
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        5.10      0.20     0.400    75
  COMMERCIAL                 D        3.30      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.282
  SUBAREA AREA(ACRES) =    8.40      SUBAREA RUNOFF(CFS) =   16.19
  EFFECTIVE AREA(ACRES) =    145.84   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =      156.5       PEAK FLOW RATE(CFS) =     278.14

****************************************************************************
  FLOW PROCESS FROM NODE    159.00 TO NODE    159.00 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.) =   14.59
  RAINFALL INTENSITY(INCH/HR) =   2.20
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.39
  EFFECTIVE STREAM AREA(ACRES) =     145.84
  TOTAL STREAM AREA(ACRES) =     156.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     278.14

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    161.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   260.00
  ELEVATION DATA: UPSTREAM(FEET) =    145.00  DOWNSTREAM(FEET) =    143.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.441
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.232
  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        0.50      0.20     0.100    75    7.44
  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) =      0.50   PEAK FLOW RATE(CFS) =      1.45

****************************************************************************
  FLOW PROCESS FROM NODE    161.00 TO NODE    162.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  143.00  DOWNSTREAM ELEVATION(FEET) =  138.00
  STREET LENGTH(FEET) =   345.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   2.06   Tc(MIN.) =    9.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.810
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.70      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) =    1.70      SUBAREA RUNOFF(CFS) =    4.27
  EFFECTIVE AREA(ACRES) =      2.20    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.2        PEAK FLOW RATE(CFS) =       5.52

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.40
  FLOW VELOCITY(FEET/SEC.) =  3.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    162.00 =     605.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    162.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.810
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.50      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) =    2.50      SUBAREA RUNOFF(CFS) =    6.28
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      11.80

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    163.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   132.00  DOWNSTREAM(FEET) =   127.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.77
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.80
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    9.60
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    163.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    163.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.60
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.793
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.70      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) =    1.70      SUBAREA RUNOFF(CFS) =    4.24
  EFFECTIVE AREA(ACRES) =      6.40   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.4       PEAK FLOW RATE(CFS) =      15.97

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    164.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   127.00  DOWNSTREAM(FEET) =   117.50
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.59
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.97
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   10.15
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    164.00 =    1035.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    164.00 TO NODE    164.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.15
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.706
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        1.40      0.20     0.400    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.321
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    4.52
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      19.99

****************************************************************************
  FLOW PROCESS FROM NODE    164.00 TO NODE    165.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   117.50  DOWNSTREAM(FEET) =   114.50
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.78
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      19.99
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   10.18
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    165.00 =    1070.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.18
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.701
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.20      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) =    2.20      SUBAREA RUNOFF(CFS) =    5.31
  EFFECTIVE AREA(ACRES) =     10.50   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =       10.5       PEAK FLOW RATE(CFS) =      25.26

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    159.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   114.50  DOWNSTREAM(FEET) =   102.00
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.14
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.26
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   10.41
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    159.00 =    1290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    159.00 TO NODE    159.00 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.) =   10.41
  RAINFALL INTENSITY(INCH/HR) =   2.67
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.14
  EFFECTIVE STREAM AREA(ACRES) =      10.50
  TOTAL STREAM AREA(ACRES) =      10.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      265.17   10.01    2.727  0.20( 0.08) 0.39     110.4     107.00
      1      270.18   10.73    2.621  0.20( 0.08) 0.39     117.4     151.00
      1      276.92   13.56    2.292  0.20( 0.08) 0.39     138.9     101.00
      1      278.14   14.59    2.198  0.20( 0.08) 0.39     145.8     118.00
      1      277.97   14.69    2.189  0.20( 0.08) 0.39     146.4     136.00
      1      275.04   15.23    2.144  0.20( 0.08) 0.39     147.9     146.00
      1      248.60   19.41    1.866  0.20( 0.08) 0.40     154.6     112.00
      1      234.55   21.83    1.745  0.20( 0.08) 0.40     156.5     126.00
      2       25.26   10.41    2.667  0.20( 0.03) 0.14      10.5     160.00

  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	290.01	10.01	2.727	0.20(0.07)	0.37	120.5	107.00
2	293.22	10.41	2.667	0.20(0.07)	0.37	124.9	160.00
3	295.00	10.73	2.621	0.20(0.07)	0.37	127.9	151.00
4	298.59	13.56	2.292	0.20(0.08)	0.38	149.4	101.00
5	298.90	14.59	2.198	0.20(0.08)	0.38	156.3	118.00
6	298.65	14.69	2.189	0.20(0.08)	0.38	156.9	136.00
7	295.30	15.23	2.144	0.20(0.08)	0.38	158.4	146.00
8	266.20	19.41	1.866	0.20(0.08)	0.38	165.1	112.00
9	250.98	21.83	1.745	0.20(0.08)	0.38	167.0	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 298.90 Tc(MIN.) = 14.59
EFFECTIVE AREA(ACRES) = 156.34 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.38
TOTAL AREA(ACRES) = 167.0
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 159.00 = 5710.00 FEET.

****
FLOW PROCESS FROM NODE 159.00 TO NODE 168.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 102.00 DOWNSTREAM(FEET) = 94.30
FLOW LENGTH(FEET) = 1005.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 53.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.76
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 298.90
PIPE TRAVEL TIME(MIN.) = 1.22 Tc(MIN.) = 15.81
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 168.00 = 6715.00 FEET.

****
FLOW PROCESS FROM NODE 168.00 TO NODE 168.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
MAINLINE Tc(MIN.) = 15.81
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.099
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	7.50	0.20	0.100	75
PUBLIC PARK	D	0.20	0.20	0.850	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.119
SUBAREA AREA(ACRES) = 7.70 SUBAREA RUNOFF(CFS) = 14.38
EFFECTIVE AREA(ACRES) = 164.04 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.37
TOTAL AREA(ACRES) = 174.7 PEAK FLOW RATE(CFS) = 299.14

****
FLOW PROCESS FROM NODE 168.00 TO NODE 169.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 94.30 DOWNSTREAM(FEET) = 93.50
FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 56.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.09
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 299.14
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 16.01
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 169.00 = 6865.00 FEET.

****
FLOW PROCESS FROM NODE 169.00 TO NODE 169.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

```
  TIME OF CONCENTRATION(MIN.) =   16.01
  RAINFALL INTENSITY(INCH/HR) =   2.08
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.37
  EFFECTIVE STREAM AREA(ACRES) =     164.04
  TOTAL STREAM AREA(ACRES) =     174.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     299.14

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    171.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    145.00  DOWNSTREAM(FEET) =    140.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.751
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.418
  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        0.90      0.20     0.100    75    6.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.75
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.75

****************************************************************************
  FLOW PROCESS FROM NODE    171.00 TO NODE    172.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   128.00
  FLOW LENGTH(FEET) =   265.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.24
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.75
  PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =    7.79
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    172.00 =     565.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    172.00 TO NODE    172.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.148
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        3.10      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) =    3.10      SUBAREA RUNOFF(CFS) =    8.73
  EFFECTIVE AREA(ACRES) =      4.00   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.0       PEAK FLOW RATE(CFS) =      11.26

****************************************************************************
  FLOW PROCESS FROM NODE    172.00 TO NODE    169.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   128.00  DOWNSTREAM(FEET) =    93.50
  FLOW LENGTH(FEET) =   215.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.28
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.26
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    7.98
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    169.00 =     780.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    169.00 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.) =    7.98
  RAINFALL INTENSITY(INCH/HR) =   3.11
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       4.00
  TOTAL STREAM AREA(ACRES) =       4.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      290.01   11.44    2.526  0.20( 0.07) 0.35     128.2     107.00
      1      293.22   11.84    2.477  0.20( 0.07) 0.35     132.6     160.00
      1      295.00   12.15    2.440  0.20( 0.07) 0.36     135.6     151.00
      1      298.59   14.98    2.164  0.20( 0.07) 0.36     157.1     101.00
      1      299.14   16.01    2.084  0.20( 0.07) 0.37     164.0     118.00
      1      298.94   16.12    2.076  0.20( 0.07) 0.37     164.6     136.00
      1      295.78   16.65    2.037  0.20( 0.07) 0.37     166.1     146.00
      1      268.52   20.87    1.790  0.20( 0.07) 0.37     172.8     112.00
      1      254.01   23.31    1.680  0.20( 0.07) 0.37     174.7     126.00
      2       11.26    7.98    3.106  0.20( 0.02) 0.10       4.0     170.00

  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      261.23    7.98    3.106  0.20( 0.07) 0.34      93.4     170.00
      2      299.16   11.44    2.526  0.20( 0.07) 0.35     132.2     107.00
      3      302.19   11.84    2.477  0.20( 0.07) 0.35     136.6     160.00
      4      303.83   12.15    2.440  0.20( 0.07) 0.35     139.6     151.00
      5      306.41   14.98    2.164  0.20( 0.07) 0.36     161.1     101.00
      6      306.67   16.01    2.084  0.20( 0.07) 0.36     168.0     118.00
      7      306.44   16.12    2.076  0.20( 0.07) 0.36     168.6     136.00
      8      303.14   16.65    2.037  0.20( 0.07) 0.36     170.1     146.00
      9      274.98   20.87    1.790  0.20( 0.07) 0.36     176.8     112.00
     10      260.07   23.31    1.680  0.20( 0.07) 0.36     178.7     126.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     306.67    Tc(MIN.) =    16.01
  EFFECTIVE AREA(ACRES) =     168.04   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =      178.7
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    169.00 =    6865.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    173.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    93.50  DOWNSTREAM(FEET) =    91.80
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  53.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.86
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     306.67
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   16.22
```

 LONGEST FLOWPATH FROM NODE 112.00 TO NODE 173.00 = 7045.00 FEET.

****
 FLOW PROCESS FROM NODE 173.00 TO NODE 173.00 IS CODE = 1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 16.22
 RAINFALL INTENSITY(INCH/HR) = 2.07
 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.36
 EFFECTIVE STREAM AREA(ACRES) = 168.04
 TOTAL STREAM AREA(ACRES) = 178.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 306.67

****
 FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 500.00
 ELEVATION DATA: UPSTREAM(FEET) = 140.00 DOWNSTREAM(FEET) = 115.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.648
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.448
 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 0.70 0.20 0.100 75 6.65
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" D 0.60 0.20 0.500 75 8.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.285
 SUBAREA RUNOFF(CFS) = 3.97
 TOTAL AREA(ACRES) = 1.30 PEAK FLOW RATE(CFS) = 3.97

****
 FLOW PROCESS FROM NODE 301.00 TO NODE 173.00 IS CODE = 31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
 ELEVATION DATA: UPSTREAM(FEET) = 100.00 DOWNSTREAM(FEET) = 91.80
 FLOW LENGTH(FEET) = 50.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.10
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.97
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 6.70
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 173.00 = 550.00 FEET.

****
 FLOW PROCESS FROM NODE 173.00 TO NODE 173.00 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.) = 6.70
 RAINFALL INTENSITY(INCH/HR) = 3.43
 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.28
 EFFECTIVE STREAM AREA(ACRES) = 1.30
 TOTAL STREAM AREA(ACRES) = 1.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.97

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	261.23	8.19	3.060	0.20(0.07)	0.34	93.4	170.00
1	299.16	11.64	2.501	0.20(0.07)	0.35	132.2	107.00
1	302.19	12.04	2.453	0.20(0.07)	0.35	136.6	160.00
1	303.83	12.36	2.417	0.20(0.07)	0.35	139.6	151.00
1	306.41	15.19	2.148	0.20(0.07)	0.36	161.1	101.00
1	306.67	16.22	2.069	0.20(0.07)	0.36	168.0	118.00
1	306.44	16.32	2.061	0.20(0.07)	0.36	168.6	136.00
1	303.14	16.86	2.023	0.20(0.07)	0.36	170.1	146.00
1	274.98	21.08	1.780	0.20(0.07)	0.36	176.8	112.00
1	260.07	23.52	1.672	0.20(0.07)	0.36	178.7	126.00
2	3.97	6.70	3.432	0.20(0.06)	0.28	1.3	300.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	244.42	6.70	3.432	0.20(0.07)	0.34	77.8	300.00
2	264.76	8.19	3.060	0.20(0.07)	0.34	94.7	170.00
3	302.03	11.64	2.501	0.20(0.07)	0.35	133.5	107.00
4	305.01	12.04	2.453	0.20(0.07)	0.35	137.9	160.00
5	306.61	12.36	2.417	0.20(0.07)	0.35	140.9	151.00
6	308.87	15.19	2.148	0.20(0.07)	0.36	162.4	101.00
7	309.04	16.22	2.069	0.20(0.07)	0.36	169.3	118.00
8	308.80	16.32	2.061	0.20(0.07)	0.36	169.9	136.00
9	305.45	16.86	2.023	0.20(0.07)	0.36	171.4	146.00
10	277.00	21.08	1.780	0.20(0.07)	0.36	178.1	112.00
11	261.96	23.52	1.672	0.20(0.07)	0.36	180.0	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 309.04 Tc(MIN.) = 16.22
EFFECTIVE AREA(ACRES) = 169.34 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 180.0
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 173.00 = 7045.00 FEET.

****
FLOW PROCESS FROM NODE 173.00 TO NODE 175.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 91.80 DOWNSTREAM(FEET) = 74.40
FLOW LENGTH(FEET) = 470.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 38.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.38
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 309.04
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 16.52
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 175.00 = 7515.00 FEET.

****
FLOW PROCESS FROM NODE 175.00 TO NODE 175.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 16.52
RAINFALL INTENSITY(INCH/HR) = 2.05
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.36
EFFECTIVE STREAM AREA(ACRES) = 169.34
TOTAL STREAM AREA(ACRES) = 180.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 309.04

****

```
 FLOW PROCESS FROM NODE    176.00 TO NODE    177.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    120.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.994
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.102
 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.)
 CONDOMINIUMS               D        0.90      0.20     0.350    75    7.99
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA RUNOFF(CFS) =      2.46
 TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.46

****************************************************************************
 FLOW PROCESS FROM NODE    177.00 TO NODE    178.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   110.00  DOWNSTREAM(FEET) =   105.00
 FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.79
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.46
 PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =    8.83
 LONGEST FLOWPATH FROM NODE    176.00 TO NODE    178.00 =     590.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    178.00 TO NODE    178.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.83
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.931
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        1.50      0.20     0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    3.86
 EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       6.18

****************************************************************************
 FLOW PROCESS FROM NODE    178.00 TO NODE    179.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   105.00  DOWNSTREAM(FEET) =    80.00
 FLOW LENGTH(FEET) =   390.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.86
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.18
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =    9.38
 LONGEST FLOWPATH FROM NODE    176.00 TO NODE    179.00 =     980.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    179.00 TO NODE    179.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

MAINLINE Tc(MIN.) = 9.38
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.831
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	3.00	0.20	0.350	75
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.20	0.20	0.200	75
PUBLIC PARK	D	0.40	0.20	0.850	75
COMMERCIAL	D	0.90	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.338
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 11.19
EFFECTIVE AREA(ACRES) = 6.90 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 17.16

****
FLOW PROCESS FROM NODE 179.00 TO NODE 175.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 80.00 DOWNSTREAM(FEET) = 74.40
FLOW LENGTH(FEET) = 80.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.89
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.16
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 9.46
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 175.00 = 1060.00 FEET.

****
FLOW PROCESS FROM NODE 175.00 TO NODE 175.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.46
RAINFALL INTENSITY(INCH/HR) = 2.82
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.34
EFFECTIVE STREAM AREA(ACRES) = 6.90
TOTAL STREAM AREA(ACRES) = 6.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.16

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	244.42	7.03	3.339	0.20(0.07)	0.34	77.8	300.00
1	264.76	8.51	2.994	0.20(0.07)	0.34	94.7	170.00
1	302.03	11.96	2.463	0.20(0.07)	0.35	133.5	107.00
1	305.01	12.36	2.417	0.20(0.07)	0.35	137.9	160.00
1	306.61	12.67	2.383	0.20(0.07)	0.35	140.9	151.00
1	308.87	15.50	2.123	0.20(0.07)	0.36	162.4	101.00
1	309.04	16.52	2.046	0.20(0.07)	0.36	169.3	118.00
1	308.80	16.63	2.039	0.20(0.07)	0.36	169.9	136.00
1	305.45	17.17	2.002	0.20(0.07)	0.36	171.4	146.00
1	277.00	21.40	1.765	0.20(0.07)	0.36	178.1	112.00
1	261.96	23.85	1.658	0.20(0.07)	0.36	180.0	126.00
2	17.16	9.46	2.817	0.20(0.07)	0.34	6.9	176.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	259.59	7.03	3.339	0.20(0.07)	0.34	82.9	300.00
2	281.18	8.51	2.994	0.20(0.07)	0.34	100.9	170.00

3	292.22	9.46	2.817	0.20(0.07)	0.34	112.3	176.00
4	316.98	11.96	2.463	0.20(0.07)	0.35	140.4	107.00
5	319.67	12.36	2.417	0.20(0.07)	0.35	144.8	160.00
6	321.05	12.67	2.383	0.20(0.07)	0.35	147.8	151.00
7	321.70	15.50	2.123	0.20(0.07)	0.36	169.3	101.00
8	321.39	16.52	2.046	0.20(0.07)	0.36	176.2	118.00
9	321.10	16.63	2.039	0.20(0.07)	0.36	176.8	136.00
10	317.52	17.17	2.002	0.20(0.07)	0.36	178.3	146.00
11	287.59	21.40	1.765	0.20(0.07)	0.36	185.0	112.00
12	271.89	23.85	1.658	0.20(0.07)	0.36	186.9	126.00

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     321.70    Tc(MIN.) =    15.50
  EFFECTIVE AREA(ACRES) =     169.33   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =      186.9
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    175.00 =    7515.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    180.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    74.40  DOWNSTREAM(FEET) =    51.60
  FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.38
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     321.70
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   15.63
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    180.00 =    7785.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 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.) =   15.63
  RAINFALL INTENSITY(INCH/HR) =   2.11
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.36
  EFFECTIVE STREAM AREA(ACRES) =     169.33
  TOTAL STREAM AREA(ACRES) =     186.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     321.70

****************************************************************************
  FLOW PROCESS FROM NODE    181.00 TO NODE    182.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    120.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.994
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.102
  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.)
  CONDOMINIUMS               D        1.10      0.20     0.350    75    7.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      3.00
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      3.00

****************************************************************************
  FLOW PROCESS FROM NODE    182.00 TO NODE    183.00 IS CODE =  31
----------------------------------------------------------------------------
```

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 110.00 DOWNSTREAM(FEET) = 105.00
FLOW LENGTH(FEET) = 70.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.34
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.00
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 8.11
LONGEST FLOWPATH FROM NODE 181.00 TO NODE 183.00 = 370.00 FEET.

****

FLOW PROCESS FROM NODE 183.00 TO NODE 183.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 8.11
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.078
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	2.00	0.20	0.350	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA AREA(ACRES) = 2.00 SUBAREA RUNOFF(CFS) = 5.41
EFFECTIVE AREA(ACRES) = 3.10 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 3.1 PEAK FLOW RATE(CFS) = 8.39

****

FLOW PROCESS FROM NODE 183.00 TO NODE 184.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 105.00 DOWNSTREAM(FEET) = 60.00
FLOW LENGTH(FEET) = 415.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.57
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.39
PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 8.55
LONGEST FLOWPATH FROM NODE 181.00 TO NODE 184.00 = 785.00 FEET.

****

FLOW PROCESS FROM NODE 184.00 TO NODE 184.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 8.55
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.985
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	3.10	0.20	0.350	75
COMMERCIAL	D	0.40	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.321
SUBAREA AREA(ACRES) = 3.50 SUBAREA RUNOFF(CFS) = 9.20
EFFECTIVE AREA(ACRES) = 6.60 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.33
TOTAL AREA(ACRES) = 6.6 PEAK FLOW RATE(CFS) = 17.33

****

FLOW PROCESS FROM NODE 184.00 TO NODE 180.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 60.00 DOWNSTREAM(FEET) = 51.60
FLOW LENGTH(FEET) = 70.00 MANNING'S N = 0.013

```
 DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.29
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.33
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.61
 LONGEST FLOWPATH FROM NODE    181.00 TO NODE    180.00 =     855.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 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.) =    8.61
 RAINFALL INTENSITY(INCH/HR) =   2.97
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.33
 EFFECTIVE STREAM AREA(ACRES) =       6.60
 TOTAL STREAM AREA(ACRES) =       6.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.33

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      259.59    7.17    3.302  0.20( 0.07) 0.34      82.9     300.00
     1      281.18    8.64    2.967  0.20( 0.07) 0.34     100.9     170.00
     1      292.22    9.59    2.795  0.20( 0.07) 0.34     112.3     176.00
     1      316.98   12.09    2.448  0.20( 0.07) 0.35     140.4     107.00
     1      319.67   12.49    2.402  0.20( 0.07) 0.35     144.8     160.00
     1      321.05   12.80    2.369  0.20( 0.07) 0.35     147.8     151.00
     1      321.70   15.63    2.113  0.20( 0.07) 0.36     169.3     101.00
     1      321.39   16.65    2.037  0.20( 0.07) 0.36     176.2     118.00
     1      321.10   16.76    2.030  0.20( 0.07) 0.36     176.8     136.00
     1      317.52   17.30    1.993  0.20( 0.07) 0.36     178.3     146.00
     1      287.59   21.53    1.759  0.20( 0.07) 0.36     185.0     112.00
     1      271.89   23.98    1.653  0.20( 0.07) 0.36     186.9     126.00
     2       17.33    8.61    2.973  0.20( 0.07) 0.33       6.6     181.00

 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      275.66    7.17    3.302  0.20( 0.07) 0.34      88.4     300.00
     2      298.10    8.61    2.973  0.20( 0.07) 0.34     107.2     181.00
     3      298.48    8.64    2.967  0.20( 0.07) 0.34     107.5     170.00
     4      308.49    9.59    2.795  0.20( 0.07) 0.34     118.9     176.00
     5      331.18   12.09    2.448  0.20( 0.07) 0.35     147.0     107.00
     6      333.60   12.49    2.402  0.20( 0.07) 0.35     151.4     160.00
     7      334.78   12.80    2.369  0.20( 0.07) 0.35     154.4     151.00
     8      333.90   15.63    2.113  0.20( 0.07) 0.35     175.9     101.00
     9      333.14   16.65    2.037  0.20( 0.07) 0.36     182.8     118.00
    10      332.81   16.76    2.030  0.20( 0.07) 0.36     183.4     136.00
    11      329.01   17.30    1.993  0.20( 0.07) 0.36     184.9     146.00
    12      297.68   21.53    1.759  0.20( 0.07) 0.36     191.6     112.00
    13      281.35   23.98    1.653  0.20( 0.07) 0.36     193.5     126.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     334.78    Tc(MIN.) =    12.80
 EFFECTIVE AREA(ACRES) =     154.45   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =      193.5
 LONGEST FLOWPATH FROM NODE    112.00 TO NODE    180.00 =    7785.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    180.00 TO NODE    185.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.60  DOWNSTREAM(FEET) =    46.80
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.98
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     334.78
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   12.83
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    185.00 =    7840.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.83
  RAINFALL INTENSITY(INCH/HR) =   2.37
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =     154.45
  TOTAL STREAM AREA(ACRES) =     193.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     334.78

****************************************************************************
  FLOW PROCESS FROM NODE    186.00 TO NODE    187.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   260.00
  ELEVATION DATA: UPSTREAM(FEET) =    120.00  DOWNSTREAM(FEET) =    115.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.195
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.590
  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        0.60      0.20     0.100    75    6.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.93
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.93

****************************************************************************
  FLOW PROCESS FROM NODE    187.00 TO NODE    188.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  115.00  DOWNSTREAM ELEVATION(FEET) =  105.00
  STREET LENGTH(FEET) =   365.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.56
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.20
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.89
  STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    8.10
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.080
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        1.80      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) =    1.80      SUBAREA RUNOFF(CFS) =    4.96
  EFFECTIVE AREA(ACRES) =      2.40    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =       6.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.09
  FLOW VELOCITY(FEET/SEC.) =  3.50   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
  LONGEST FLOWPATH FROM NODE    186.00 TO NODE    188.00 =     625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    188.00 TO NODE    189.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  105.00  DOWNSTREAM ELEVATION(FEET) =   70.00
  STREET LENGTH(FEET) =   360.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.35
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.96
  STREET FLOW TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =    9.01
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.896
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 D        0.70      0.20     0.850    75
  COMMERCIAL                  D        3.00      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.242
  SUBAREA AREA(ACRES) =    3.70      SUBAREA RUNOFF(CFS) =    9.48
  EFFECTIVE AREA(ACRES) =      6.10    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =        6.1        PEAK FLOW RATE(CFS) =      15.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   9.99
  FLOW VELOCITY(FEET/SEC.) =  7.03   DEPTH*VELOCITY(FT*FT/SEC.) =   2.29
  LONGEST FLOWPATH FROM NODE    186.00 TO NODE    189.00 =     985.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    189.00 TO NODE    185.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    60.00  DOWNSTREAM(FEET) =    46.80
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.58
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.70
```

PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 9.06
LONGEST FLOWPATH FROM NODE 186.00 TO NODE 185.00 = 1055.00 FEET.

****

FLOW PROCESS FROM NODE 185.00 TO NODE 185.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

==========

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.06
RAINFALL INTENSITY(INCH/HR) = 2.89
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.19
EFFECTIVE STREAM AREA(ACRES) = 6.10
TOTAL STREAM AREA(ACRES) = 6.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.70

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	275.66	7.20	3.295	0.20(0.07)	0.34	88.4	300.00
1	298.10	8.64	2.968	0.20(0.07)	0.34	107.2	181.00
1	298.48	8.67	2.962	0.20(0.07)	0.34	107.5	170.00
1	308.49	9.62	2.790	0.20(0.07)	0.34	118.9	176.00
1	331.18	12.12	2.445	0.20(0.07)	0.35	147.0	107.00
1	333.60	12.52	2.399	0.20(0.07)	0.35	151.4	160.00
1	334.78	12.83	2.366	0.20(0.07)	0.35	154.4	151.00
1	333.90	15.65	2.111	0.20(0.07)	0.35	175.9	101.00
1	333.14	16.68	2.035	0.20(0.07)	0.36	182.8	118.00
1	332.81	16.79	2.028	0.20(0.07)	0.36	183.4	136.00
1	329.01	17.33	1.991	0.20(0.07)	0.36	184.9	146.00
1	297.68	21.56	1.757	0.20(0.07)	0.36	191.6	112.00
1	281.35	24.01	1.652	0.20(0.07)	0.36	193.5	126.00
2	15.70	9.06	2.887	0.20(0.04)	0.19	6.1	186.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	289.91	7.20	3.295	0.20(0.07)	0.33	93.3	300.00
2	313.48	8.64	2.968	0.20(0.07)	0.33	113.0	181.00
3	313.88	8.67	2.962	0.20(0.07)	0.33	113.3	170.00
4	318.35	9.06	2.887	0.20(0.07)	0.33	118.4	186.00
5	323.65	9.62	2.790	0.20(0.07)	0.34	125.0	176.00
6	344.44	12.12	2.445	0.20(0.07)	0.34	153.1	107.00
7	346.61	12.52	2.399	0.20(0.07)	0.34	157.5	160.00
8	347.61	12.83	2.366	0.20(0.07)	0.34	160.5	151.00
9	345.33	15.65	2.111	0.20(0.07)	0.35	182.0	101.00
10	344.15	16.68	2.035	0.20(0.07)	0.35	188.9	118.00
11	343.78	16.79	2.028	0.20(0.07)	0.35	189.5	136.00
12	339.78	17.33	1.991	0.20(0.07)	0.35	191.0	146.00
13	307.16	21.56	1.757	0.20(0.07)	0.35	197.7	112.00
14	290.25	24.01	1.652	0.20(0.07)	0.36	199.6	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 347.61 Tc(MIN.) = 12.83
EFFECTIVE AREA(ACRES) = 160.55 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 199.6
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 185.00 = 7840.00 FEET.

****

FLOW PROCESS FROM NODE 185.00 TO NODE 191.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

==========

ELEVATION DATA: UPSTREAM(FEET) = 46.80 DOWNSTREAM(FEET) = 5.50

```
  FLOW LENGTH(FEET) =   515.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.76
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     347.61
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   13.08
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    191.00 =    8355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    191.00 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.) =   13.08
  RAINFALL INTENSITY(INCH/HR) =   2.34
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.34
  EFFECTIVE STREAM AREA(ACRES) =     160.55
  TOTAL STREAM AREA(ACRES) =     199.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     347.61

****************************************************************************
  FLOW PROCESS FROM NODE    192.00 TO NODE    193.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   280.00
  ELEVATION DATA: UPSTREAM(FEET) =    142.00  DOWNSTREAM(FEET) =    140.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.955
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.70      0.20     0.500    75    9.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.66
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.66

****************************************************************************
  FLOW PROCESS FROM NODE    193.00 TO NODE    194.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  140.00  DOWNSTREAM ELEVATION(FEET) =  138.00
  STREET LENGTH(FEET) =   320.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =   13.12
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.335
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.40      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    2.82
  EFFECTIVE AREA(ACRES) =      2.10    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.1        PEAK FLOW RATE(CFS) =       4.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.26
  FLOW VELOCITY(FEET/SEC.) =  1.80   DEPTH*VELOCITY(FT*FT/SEC.) =   0.60
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    194.00 =     600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    194.00 TO NODE    195.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  138.00  DOWNSTREAM ELEVATION(FEET) =  135.00
  STREET LENGTH(FEET) =   415.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.87
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
  STREET FLOW TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   16.25
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.066
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        4.10      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.10      SUBAREA RUNOFF(CFS) =    7.26
  EFFECTIVE AREA(ACRES) =      6.20    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.2        PEAK FLOW RATE(CFS) =      10.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.76
  FLOW VELOCITY(FEET/SEC.) =  2.39   DEPTH*VELOCITY(FT*FT/SEC.) =   1.01
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    195.00 =    1015.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    195.00 TO NODE    196.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   120.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.98
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.97
```

```
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   16.29
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    196.00 =    1065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    196.00 TO NODE    196.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.064
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.50      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =    6.19
  EFFECTIVE AREA(ACRES) =      9.70   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        9.7       PEAK FLOW RATE(CFS) =      17.14

****************************************************************************
  FLOW PROCESS FROM NODE    196.00 TO NODE    197.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   120.00  DOWNSTREAM(FEET) =   110.00
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.24
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.14
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   16.42
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    197.00 =    1200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    197.00 TO NODE    197.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.42
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.054
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.80      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.80      SUBAREA RUNOFF(CFS) =    4.92
  EFFECTIVE AREA(ACRES) =     12.50   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      21.98

****************************************************************************
  FLOW PROCESS FROM NODE    197.00 TO NODE    198.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   110.00  DOWNSTREAM(FEET) =   100.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.82
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.98
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   16.46
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    198.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    198.00 TO NODE    198.00 IS CODE =  81
```

```
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.46
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.051
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.70      0.20     0.500    75
  PUBLIC PARK                D        1.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
  SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    5.02
  EFFECTIVE AREA(ACRES) =     15.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =       15.4       PEAK FLOW RATE(CFS) =      26.97

********************************************************************************
  FLOW PROCESS FROM NODE    198.00 TO NODE    199.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    73.00
  FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.15
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.97
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   16.72
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    199.00 =    1550.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.033
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.60      0.20     0.500    75
  PUBLIC PARK                D        1.30      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.617
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =    6.70
  EFFECTIVE AREA(ACRES) =     19.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      33.41

********************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    200.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    73.00  DOWNSTREAM(FEET) =    59.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.53
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.41
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   16.90
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    200.00 =    1750.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    200.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
```

```
  MAINLINE Tc(MIN.) =   16.90
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.020
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.20      0.20     0.500    75
  PUBLIC PARK                D        1.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.624
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    5.80
  EFFECTIVE AREA(ACRES) =     22.70   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       22.7       PEAK FLOW RATE(CFS) =      39.00

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    59.00  DOWNSTREAM(FEET) =    16.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.00
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   17.01
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    201.00 =    1950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.00  DOWNSTREAM(FEET) =    13.00
  FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.00
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   17.69
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    202.00 =    2305.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.69
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.968
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.60      0.20     0.850    75
  COMMERCIAL                 D        4.90      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.182
  SUBAREA AREA(ACRES) =    5.50      SUBAREA RUNOFF(CFS) =    9.56
  EFFECTIVE AREA(ACRES) =     28.20   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       28.2       PEAK FLOW RATE(CFS) =      47.49

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    191.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.00  DOWNSTREAM(FEET) =     5.50
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.1 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.26
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.49
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   17.77
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    191.00 =    2400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    191.00 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.) =   17.77
  RAINFALL INTENSITY(INCH/HR) =   1.96
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      28.20
  TOTAL STREAM AREA(ACRES) =      28.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      47.49

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   225.00
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     95.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.025
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.894
  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        0.70      0.20     0.850    75    9.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.72
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.72

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     95.00  DOWNSTREAM(FEET) =     90.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   155.00   CHANNEL SLOPE =  0.0323
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.823
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               D        1.10      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.43
  AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   0.40
  Tc(MIN.) =    9.43
  SUBAREA AREA(ACRES) =     1.10       SUBAREA RUNOFF(CFS) =    2.63
  EFFECTIVE AREA(ACRES) =      1.80     AREA-AVERAGED Fm(INCH/HR) =   0.17
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.85
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       4.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   7.00
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    205.00 =     380.00 FEET.
```

```
**************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     90.00  DOWNSTREAM(FEET) =     28.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   345.00   CHANNEL SLOPE =  0.1797
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.757
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               D        1.50      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.60
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =    9.82
  SUBAREA AREA(ACRES) =     1.50       SUBAREA RUNOFF(CFS) =    3.49
  EFFECTIVE AREA(ACRES) =      3.30     AREA-AVERAGED Fm(INCH/HR) =   0.17
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.85
  TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =       7.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =  15.44
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    206.00 =     725.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    18.00  DOWNSTREAM(FEET) =    13.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.91
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.68
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    9.91
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    207.00 =     795.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.91
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.743
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        1.90      0.20     0.100    75
  PUBLIC PARK               D        0.60      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.280
  SUBAREA AREA(ACRES) =    2.50      SUBAREA RUNOFF(CFS) =    6.05
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      13.69

**************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    191.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.00  DOWNSTREAM(FEET) =     5.50
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.7 INCHES
```

PIPE-FLOW VELOCITY(FEET/SEC.) = 16.29
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.69
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 10.00
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 191.00 = 880.00 FEET.

****
FLOW PROCESS FROM NODE 191.00 TO NODE 191.00 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.) = 10.00
RAINFALL INTENSITY(INCH/HR) = 2.73
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.60
EFFECTIVE STREAM AREA(ACRES) = 5.80
TOTAL STREAM AREA(ACRES) = 5.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.69

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	289.91	7.46	3.229	0.20(0.07)	0.33	93.3	300.00
1	313.48	8.89	2.918	0.20(0.07)	0.33	113.0	181.00
1	313.88	8.92	2.913	0.20(0.07)	0.33	113.3	170.00
1	318.35	9.32	2.841	0.20(0.07)	0.33	118.4	186.00
1	323.65	9.88	2.748	0.20(0.07)	0.34	125.0	176.00
1	344.44	12.36	2.416	0.20(0.07)	0.34	153.1	107.00
1	346.61	12.76	2.373	0.20(0.07)	0.34	157.5	160.00
1	347.61	13.08	2.340	0.20(0.07)	0.34	160.5	151.00
1	345.33	15.90	2.092	0.20(0.07)	0.35	182.0	101.00
1	344.15	16.93	2.018	0.20(0.07)	0.35	188.9	118.00
1	343.78	17.03	2.011	0.20(0.07)	0.35	189.5	136.00
1	339.78	17.58	1.975	0.20(0.07)	0.35	191.0	146.00
1	307.16	21.81	1.745	0.20(0.07)	0.35	197.7	112.00
1	290.25	24.27	1.642	0.20(0.07)	0.36	199.6	126.00
2	47.49	17.77	1.963	0.20(0.10)	0.48	28.2	192.00
3	13.69	10.00	2.729	0.20(0.12)	0.60	5.8	203.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	335.51	7.46	3.229	0.20(0.07)	0.36	109.4	300.00
2	362.48	8.89	2.918	0.20(0.07)	0.36	132.3	181.00
3	362.95	8.92	2.913	0.20(0.07)	0.36	132.7	170.00
4	368.28	9.32	2.841	0.20(0.07)	0.36	138.6	186.00
5	374.78	9.88	2.748	0.20(0.07)	0.36	146.4	176.00
6	376.04	10.00	2.729	0.20(0.07)	0.36	148.1	203.00
7	397.56	12.36	2.416	0.20(0.07)	0.36	178.6	107.00
8	400.03	12.76	2.373	0.20(0.07)	0.36	183.5	160.00
9	401.26	13.08	2.340	0.20(0.07)	0.36	187.1	151.00
10	401.11	15.90	2.092	0.20(0.07)	0.37	213.1	101.00
11	400.69	16.93	2.018	0.20(0.07)	0.37	221.6	118.00
12	400.40	17.03	2.011	0.20(0.07)	0.37	222.3	136.00
13	396.80	17.58	1.975	0.20(0.07)	0.37	224.7	146.00
14	395.48	17.77	1.963	0.20(0.07)	0.37	225.3	192.00
15	357.63	21.81	1.745	0.20(0.08)	0.38	231.7	112.00
16	337.54	24.27	1.642	0.20(0.08)	0.38	233.6	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 401.26 Tc(MIN.) = 13.08
EFFECTIVE AREA(ACRES) = 187.10 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 233.6
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 191.00 = 8355.00 FEET.

```
****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    207.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     5.50  DOWNSTREAM(FEET) =     3.30
  FLOW LENGTH(FEET) =   485.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  67.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.09
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     401.26
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   13.75
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    207.00 =    8840.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     3.30  DOWNSTREAM(FEET) =     2.30
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  57.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.61
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     401.26
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   13.84
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    208.00 =    8935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    213.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     2.30  DOWNSTREAM(FEET) =     0.10
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  58.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.59
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     401.26
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   14.11
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    213.00 =    9185.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      233.6  TC(MIN.) =     14.11
  EFFECTIVE AREA(ACRES) =    187.10  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.365
  PEAK FLOW RATE(CFS)   =     401.26

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      335.51    8.53    2.990  0.20( 0.07) 0.36     109.4     300.00
      2      362.48    9.95    2.736  0.20( 0.07) 0.36     132.3     181.00
      3      362.95    9.98    2.732  0.20( 0.07) 0.36     132.7     170.00
      4      368.28   10.37    2.672  0.20( 0.07) 0.36     138.6     186.00
      5      374.78   10.92    2.595  0.20( 0.07) 0.36     146.4     176.00
      6      376.04   11.04    2.578  0.20( 0.07) 0.36     148.1     203.00
      7      397.56   13.40    2.308  0.20( 0.07) 0.36     178.6     107.00
      8      400.03   13.80    2.269  0.20( 0.07) 0.36     183.5     160.00
      9      401.26   14.11    2.240  0.20( 0.07) 0.36     187.1     151.00
     10      401.11   16.93    2.018  0.20( 0.07) 0.37     213.1     101.00
     11      400.69   17.96    1.951  0.20( 0.07) 0.37     221.6     118.00
     12      400.40   18.06    1.945  0.20( 0.07) 0.37     222.3     136.00
     13      396.80   18.61    1.912  0.20( 0.07) 0.37     224.7     146.00
     14      395.48   18.80    1.901  0.20( 0.07) 0.37     225.3     192.00
     15      357.63   22.87    1.699  0.20( 0.08) 0.38     231.7     112.00
     16      337.54   25.33    1.602  0.20( 0.08) 0.38     233.6     126.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

B.2

Existing Condition
60" Conduit (Loop 1)
10-Year Hydrology
w/ 3.8 Ac Harbor
+ 0.7 Ac Harbor
Tributary Included


```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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           Ver. 19.0  Release Date: 06/01/2012  License ID 1355

                        Analysis prepared by:

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                          16795 Von Karman
                             Suite 100
                          Irvine, CA 92606

------------------------------------------------------------------------
  FILE NAME: DPHOSR.DAT
  TIME/DATE OF STUDY: 10:35 04/29/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *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
  2   18.0      5.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.67 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (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    101.00 TO NODE    102.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   280.00
  ELEVATION DATA: UPSTREAM(FEET) =    295.00  DOWNSTREAM(FEET) =    290.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.288
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20      0.500    75    8.29
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.44
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.44

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  290.00  DOWNSTREAM ELEVATION(FEET) =  285.00
```

```
  STREET LENGTH(FEET) =   135.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.66
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.65
  STREET FLOW TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =    8.77
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.942
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.50      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.50      SUBAREA RUNOFF(CFS) =    6.39
  EFFECTIVE AREA(ACRES) =      3.80    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       9.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.35
  FLOW VELOCITY(FEET/SEC.) =  5.11   DEPTH*VELOCITY(FT*FT/SEC.) =   2.01
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =     415.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  285.00  DOWNSTREAM ELEVATION(FEET) =  253.00
  STREET LENGTH(FEET) =   345.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.11
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.13
  STREET FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    9.51
  *  10 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
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.60      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    8.78
  EFFECTIVE AREA(ACRES) =      7.40    AREA-AVERAGED Fm(INCH/HR) =  0.10
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        7.4        PEAK FLOW RATE(CFS) =      18.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.96
  FLOW VELOCITY(FEET/SEC.) =  8.23   DEPTH*VELOCITY(FT*FT/SEC.) =   3.54
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    104.00 =     760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  253.00  DOWNSTREAM ELEVATION(FEET) =  225.00
  STREET LENGTH(FEET) =   630.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.24
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.11
  STREET FLOW TRAVEL TIME(MIN.) =   1.65   Tc(MIN.) =   11.16
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.563
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.70      0.20     0.500    75
  PUBLIC PARK                D        0.10      0.20     0.850    75
  COMMERCIAL                 D        1.10      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.287
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    4.28
  EFFECTIVE AREA(ACRES) =      9.30    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        9.3        PEAK FLOW RATE(CFS) =      20.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.40
  FLOW VELOCITY(FEET/SEC.) =  6.43   DEPTH*VELOCITY(FT*FT/SEC.) =   3.16
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    105.00 =    1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   204.30  DOWNSTREAM(FEET) =   202.30
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.69
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   11.18
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    106.00 =    1415.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =   11.18
  RAINFALL INTENSITY(INCH/HR) =   2.56
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.46
  EFFECTIVE STREAM AREA(ACRES) =       9.30
  TOTAL STREAM AREA(ACRES) =       9.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.69

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 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) =    330.00  DOWNSTREAM(FEET) =    320.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.880
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.699
  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
  "11+ DWELLINGS/ACRE"       D        1.00      0.20     0.200    75    5.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      3.29
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.29

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   310.00  DOWNSTREAM(FEET) =   265.00
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.15
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.29
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    6.14
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    109.00 =     505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.14
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.609
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        3.90      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =   12.53
  EFFECTIVE AREA(ACRES) =      4.90   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      15.74

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   265.00  DOWNSTREAM(FEET) =   258.00
  FLOW LENGTH(FEET) =   560.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.74
  PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =    7.31
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    110.00 =    1065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.31
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.265
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.30      0.20     0.500    75
  PUBLIC PARK                D        2.10      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.716
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    9.55
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      23.77

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   258.00  DOWNSTREAM(FEET) =   238.00
  FLOW LENGTH(FEET) =   175.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.77
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    7.45
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    111.00 =    1240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.229
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        5.50      0.20     0.500    75
  PUBLIC PARK                D        0.80      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.544
  SUBAREA AREA(ACRES) =    6.30      SUBAREA RUNOFF(CFS) =   17.69
  EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      41.20

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   238.00  DOWNSTREAM(FEET) =   202.30
```

```
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.38
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.20
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    7.60
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    106.00 =    1475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =    7.60
  RAINFALL INTENSITY(INCH/HR) =   3.19
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.47
  EFFECTIVE STREAM AREA(ACRES) =      14.60
  TOTAL STREAM AREA(ACRES) =      14.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.20

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       20.69   11.18    2.560  0.20( 0.09) 0.46       9.3     101.00
      2       41.20    7.60    3.193  0.20( 0.09) 0.47      14.6     107.00

  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       58.87    7.60    3.193  0.20( 0.09) 0.47      20.9     107.00
      2       53.47   11.18    2.560  0.20( 0.09) 0.46      23.9     101.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      58.87    Tc(MIN.) =     7.60
  EFFECTIVE AREA(ACRES) =      20.92   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.9
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    106.00 =    1475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    330.00  DOWNSTREAM(FEET) =    328.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.309
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.543
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.10      0.20     0.500    75   11.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.42
```

```
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.70  DOWNSTREAM ELEVATION(FEET) =  327.40
  STREET LENGTH(FEET) =   225.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.00
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.17
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
  STREET FLOW TRAVEL TIME(MIN.) =   2.16   Tc(MIN.) =   13.47
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.301
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.60      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    3.17
  EFFECTIVE AREA(ACRES) =      2.70    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.7        PEAK FLOW RATE(CFS) =       5.35

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.52
  FLOW VELOCITY(FEET/SEC.) =  1.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.66
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    114.00 =     525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   312.40  DOWNSTREAM(FEET) =   310.80
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.34
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.35
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   14.03
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    115.00 =     705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.03
  *  10 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
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.30      0.20     0.500    75
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    2.51
  EFFECTIVE AREA(ACRES) =      4.00   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.0       PEAK FLOW RATE(CFS) =       7.73

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   310.80  DOWNSTREAM(FEET) =   247.20
  FLOW LENGTH(FEET) =   825.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.35
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.73
  PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =   15.06
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    116.00 =    1530.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.06
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.158
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        4.60      0.20     0.500    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.461
  SUBAREA AREA(ACRES) =    5.10      SUBAREA RUNOFF(CFS) =    9.48
  EFFECTIVE AREA(ACRES) =      9.10   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.1       PEAK FLOW RATE(CFS) =      16.89

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   247.20  DOWNSTREAM(FEET) =   234.20
  FLOW LENGTH(FEET) =   765.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.16
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.89
  PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =   16.45
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    117.00 =    2295.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.00      0.20     0.500    75
  COMMERCIAL                 D        0.40      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.386
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    2.49
```

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  EFFECTIVE AREA(ACRES) =     10.50   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       10.5       PEAK FLOW RATE(CFS) =      18.51

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.10      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.10      SUBAREA RUNOFF(CFS) =    5.44
  EFFECTIVE AREA(ACRES) =     13.60   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       13.6       PEAK FLOW RATE(CFS) =      23.95

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   234.20  DOWNSTREAM(FEET) =   228.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.99
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.95
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   16.56
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    125.00 =    2395.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.56
  RAINFALL INTENSITY(INCH/HR) =   2.04
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.47
  EFFECTIVE STREAM AREA(ACRES) =      13.60
  TOTAL STREAM AREA(ACRES) =      13.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      23.95

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    336.00  DOWNSTREAM(FEET) =    328.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.463
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.227
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.70      0.20     0.500    75    7.46
  PUBLIC PARK                D        0.20      0.20     0.850    75    9.27
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

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  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.537
  SUBAREA RUNOFF(CFS) =      5.33
  TOTAL AREA(ACRES) =      1.90   PEAK FLOW RATE(CFS) =      5.33

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  307.00
  STREET LENGTH(FEET) =   675.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.08
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.00
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.31
  STREET FLOW TRAVEL TIME(MIN.) =   2.81   Tc(MIN.) =   10.28
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.20      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.20      SUBAREA RUNOFF(CFS) =    7.45
  EFFECTIVE AREA(ACRES) =      5.10    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.1        PEAK FLOW RATE(CFS) =      11.86

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.34
  FLOW VELOCITY(FEET/SEC.) =  4.22   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    120.00 =     950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  307.00  DOWNSTREAM ELEVATION(FEET) =  301.00
  STREET LENGTH(FEET) =   115.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.99
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.06
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.10
```

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  STREET FLOW TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =   10.61
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.638
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.70      0.20     0.500    75
  PUBLIC PARK                D        1.90      0.20     0.850    75
  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 =  0.564
  SUBAREA AREA(ACRES) =    5.40      SUBAREA RUNOFF(CFS) =   12.27
  EFFECTIVE AREA(ACRES) =     10.50    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       10.5        PEAK FLOW RATE(CFS) =      23.91

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.59
  FLOW VELOCITY(FEET/SEC.) =  6.09   DEPTH*VELOCITY(FT*FT/SEC.) =   2.42
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    121.00 =    1065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   296.00  DOWNSTREAM(FEET) =   280.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.89
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.91
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   10.80
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    122.00 =    1265.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  280.00  DOWNSTREAM ELEVATION(FEET) =  262.00
  STREET LENGTH(FEET) =   270.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.22
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.53
    HALFSTREET FLOOD WIDTH(FEET) =   20.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.50
  STREET FLOW TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =   11.33
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.540
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        7.90      0.20     0.500    75
  PUBLIC PARK                D        0.90      0.20     0.850    75
  COMMERCIAL                 D        0.60      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.508
  SUBAREA AREA(ACRES) =    9.40      SUBAREA RUNOFF(CFS) =   20.63
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  EFFECTIVE AREA(ACRES) =     19.90    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       19.9        PEAK FLOW RATE(CFS) =      43.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.57   HALFSTREET FLOOD WIDTH(FEET) =  22.85
  FLOW VELOCITY(FEET/SEC.) =  8.98   DEPTH*VELOCITY(FT*FT/SEC.) =   5.12
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    123.00 =    1535.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  262.00  DOWNSTREAM ELEVATION(FEET) =  239.00
  STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      44.16
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.55
    HALFSTREET FLOOD WIDTH(FEET) =   21.60
    AVERAGE FLOW VELOCITY(FEET/SEC.) =   10.13
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.55
  STREET FLOW TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   11.74
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.489
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.20      0.20     0.850    75
  COMMERCIAL                 D        0.30      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.08
  EFFECTIVE AREA(ACRES) =     20.40    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       20.4        PEAK FLOW RATE(CFS) =      43.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  21.52
  FLOW VELOCITY(FEET/SEC.) = 10.11   DEPTH*VELOCITY(FT*FT/SEC.) =   5.53
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    124.00 =    1785.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   232.60  DOWNSTREAM(FEET) =   228.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.44
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      43.78
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    125.00 =    1855.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 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.) =   11.80
  RAINFALL INTENSITY(INCH/HR) =   2.48
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.52
  EFFECTIVE STREAM AREA(ACRES) =      20.40
  TOTAL STREAM AREA(ACRES) =      20.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      43.78

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       23.95   16.56    2.044  0.20( 0.09) 0.47      13.6     112.00
      2       43.78   11.80    2.481  0.20( 0.10) 0.52      20.4     118.00

  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       64.69   11.80    2.481  0.20( 0.10) 0.51      30.1     118.00
      2       59.68   16.56    2.044  0.20( 0.10) 0.50      34.0     112.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      64.69    Tc(MIN.) =    11.80
  EFFECTIVE AREA(ACRES) =      30.10   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =       34.0
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    125.00 =    2395.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   228.00  DOWNSTREAM(FEET) =   224.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.69
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   11.84
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    132.00 =    2445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 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.) =   11.84
  RAINFALL INTENSITY(INCH/HR) =   2.48
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =      30.10
  TOTAL STREAM AREA(ACRES) =      34.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      64.69

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    322.00  DOWNSTREAM(FEET) =    320.50
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.589
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.977
  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
  "11+ DWELLINGS/ACRE"       D        0.40      0.20     0.200    75    9.15
  COMMERCIAL                 D        0.20      0.20     0.100    75    8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.167
  SUBAREA RUNOFF(CFS) =      1.59
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.59

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  320.50  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   600.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   12.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.60
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   6.23   Tc(MIN.) =   14.82
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.178
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.40      0.20     0.500    75
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.20      0.20     0.200    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.264
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    2.10
  EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       3.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.02
  FLOW VELOCITY(FEET/SEC.) =  1.67   DEPTH*VELOCITY(FT*FT/SEC.) =   0.69
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    128.00 =     900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    129.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  318.00  DOWNSTREAM ELEVATION(FEET) =  302.00
  STREET LENGTH(FEET) =   640.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
```

```
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   14.57
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.77
  STREET FLOW TRAVEL TIME(MIN.) =   2.55   Tc(MIN.) =   17.37
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.989
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        5.50      0.20     0.500    75
  COMMERCIAL                 D        0.90      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.444
  SUBAREA AREA(ACRES) =    6.40      SUBAREA RUNOFF(CFS) =   10.94
  EFFECTIVE AREA(ACRES) =      8.10    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        8.1        PEAK FLOW RATE(CFS) =      13.92

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.62
  FLOW VELOCITY(FEET/SEC.) =  4.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.24
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    129.00 =    1540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    130.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  302.00  DOWNSTREAM ELEVATION(FEET) =  264.00
  STREET LENGTH(FEET) =   450.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.54
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.58
  STREET FLOW TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =   18.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.930
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        6.10      0.20     0.500    75
  COMMERCIAL                 D        0.70      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.459
  SUBAREA AREA(ACRES) =    6.80      SUBAREA RUNOFF(CFS) =   11.25
  EFFECTIVE AREA(ACRES) =     14.90    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =       14.9        PEAK FLOW RATE(CFS) =      24.74
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  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.38
  FLOW VELOCITY(FEET/SEC.) =  8.55   DEPTH*VELOCITY(FT*FT/SEC.) =   4.05
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    130.00 =    1990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  264.00  DOWNSTREAM ELEVATION(FEET) =  242.00
  STREET LENGTH(FEET) =   310.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.09
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.91
  STREET FLOW TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   18.95
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.892
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.40      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) =    0.40      SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =     15.30    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       15.3        PEAK FLOW RATE(CFS) =      24.91

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.09
  FLOW VELOCITY(FEET/SEC.) =  8.00   DEPTH*VELOCITY(FT*FT/SEC.) =   3.88
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    131.00 =    2300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   237.10  DOWNSTREAM(FEET) =   224.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.36
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.91
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   18.97
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    132.00 =    2350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 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.) =   18.97
```

```
  RAINFALL INTENSITY(INCH/HR) =   1.89
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.42
  EFFECTIVE STREAM AREA(ACRES) =      15.30
  TOTAL STREAM AREA(ACRES) =      15.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      24.91

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       64.69   11.84    2.477  0.20( 0.10) 0.51      30.1     118.00
      1       59.68   16.59    2.042  0.20( 0.10) 0.50      34.0     112.00
      2       24.91   18.97    1.891  0.20( 0.08) 0.42      15.3     126.00

  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       85.27   11.84    2.477  0.20( 0.10) 0.48      39.6     118.00
      2       83.28   16.59    2.042  0.20( 0.10) 0.48      47.4     112.00
      3       79.94   18.97    1.891  0.20( 0.10) 0.48      49.3     126.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      85.27    Tc(MIN.) =    11.84
  EFFECTIVE AREA(ACRES) =      39.64   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       49.3
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    132.00 =    2445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   224.00  DOWNSTREAM(FEET) =   202.30
  FLOW LENGTH(FEET) =   445.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.96
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      85.27
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.21
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    106.00 =    2890.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       85.27   12.21    2.434  0.20( 0.10) 0.48      39.6     118.00
      2       83.28   16.97    2.016  0.20( 0.10) 0.48      47.4     112.00
      3       79.94   19.35    1.870  0.20( 0.10) 0.48      49.3     126.00
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    106.00 =    2890.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       58.87    7.60    3.193  0.20( 0.09) 0.47      20.9     107.00
      2       53.47   11.18    2.560  0.20( 0.09) 0.46      23.9     101.00
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    106.00 =    1475.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      129.21    7.60    3.193  0.20( 0.10) 0.48      45.6     107.00
      2      135.76   11.18    2.560  0.20( 0.10) 0.48      60.2     101.00
```

3	136.01	12.21	2.434	0.20(0.10)	0.48	63.5	118.00
4	124.96	16.97	2.016	0.20(0.09)	0.47	71.3	112.00
5	118.45	19.35	1.870	0.20(0.09)	0.47	73.2	126.00

TOTAL AREA(ACRES) = 73.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 136.01 Tc(MIN.) = 12.212
EFFECTIVE AREA(ACRES) = 63.54 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 73.2
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 106.00 = 2890.00 FEET.

****
FLOW PROCESS FROM NODE 106.00 TO NODE 135.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 202.30 DOWNSTREAM(FEET) = 141.50
FLOW LENGTH(FEET) = 1090.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.96
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 136.01
PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 12.97
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 135.00 = 3980.00 FEET.

****
FLOW PROCESS FROM NODE 135.00 TO NODE 135.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 12.97
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.351
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "8-10 DWELLINGS/ACRE"	D	5.70	0.20	0.400	75
COMMERCIAL	D	0.60	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.371
SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 12.91
EFFECTIVE AREA(ACRES) = 69.84 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.47
TOTAL AREA(ACRES) = 79.5 PEAK FLOW RATE(CFS) = 141.91

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	136.87	8.37	3.023	0.20(0.09)	0.46	51.9	107.00
2	141.96	11.94	2.465	0.20(0.09)	0.47	66.5	101.00
3	141.91	12.97	2.351	0.20(0.09)	0.47	69.8	118.00
4	130.72	17.73	1.965	0.20(0.09)	0.47	77.6	112.00
5	124.06	20.15	1.827	0.20(0.09)	0.46	79.5	126.00

NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) = 141.96 Tc(MIN.) = 11.94
AREA-AVERAGED Fm(INCH/HR) = 0.09 AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.47 EFFECTIVE AREA(ACRES) = 66.50

****
FLOW PROCESS FROM NODE 135.00 TO NODE 144.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 141.50 DOWNSTREAM(FEET) = 141.00
FLOW LENGTH(FEET) = 15.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.65
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 141.96
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 11.95

```
 LONGEST FLOWPATH FROM NODE    112.00 TO NODE    144.00 =    3995.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    144.00 TO NODE    144.00 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.) =   11.95
 RAINFALL INTENSITY(INCH/HR) =   2.46
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.47
 EFFECTIVE STREAM AREA(ACRES) =      66.50
 TOTAL STREAM AREA(ACRES) =      79.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     141.96

****************************************************************************
 FLOW PROCESS FROM NODE    136.00 TO NODE    137.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
 ELEVATION DATA: UPSTREAM(FEET) =    335.00  DOWNSTREAM(FEET) =    332.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.794
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.405
 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
 "11+ DWELLINGS/ACRE"       D        3.20      0.20     0.200    75    6.79
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      9.69
 TOTAL AREA(ACRES) =      3.20   PEAK FLOW RATE(CFS) =      9.69

****************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    138.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  332.00  DOWNSTREAM ELEVATION(FEET) =  308.00
 STREET LENGTH(FEET) =   575.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.16
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.42
   HALFSTREET FLOOD WIDTH(FEET) =   14.76
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.73
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.42
 STREET FLOW TRAVEL TIME(MIN.) =   1.67   Tc(MIN.) =    8.47
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.002
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        2.60      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
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  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    6.93
  EFFECTIVE AREA(ACRES) =      5.80    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        5.8        PEAK FLOW RATE(CFS) =      15.46

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.70
  FLOW VELOCITY(FEET/SEC.) =  5.99   DEPTH*VELOCITY(FT*FT/SEC.) =   2.64
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    138.00 =     805.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    138.00 TO NODE    139.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  308.00  DOWNSTREAM ELEVATION(FEET) =  280.00
  STREET LENGTH(FEET) =   440.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.35
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.48
    HALFSTREET FLOOD WIDTH(FEET) =   17.70
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.47
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.58
  STREET FLOW TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =    9.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.819
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        4.80      0.20     0.200    75
  COMMERCIAL                 D        0.70      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.187
  SUBAREA AREA(ACRES) =    5.50      SUBAREA RUNOFF(CFS) =   13.77
  EFFECTIVE AREA(ACRES) =     11.30    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       11.3        PEAK FLOW RATE(CFS) =      28.28

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  19.41
  FLOW VELOCITY(FEET/SEC.) =  7.94   DEPTH*VELOCITY(FT*FT/SEC.) =   4.05
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    139.00 =    1245.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    139.00 TO NODE    140.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  280.00  DOWNSTREAM ELEVATION(FEET) =  255.00
  STREET LENGTH(FEET) =   425.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
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  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      29.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   20.12
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.07
  STREET FLOW TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =   10.36
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.675
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.50      0.20     0.500    75
  COMMERCIAL                 D        0.70      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.267
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.83
  EFFECTIVE AREA(ACRES) =     12.50    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       12.5        PEAK FLOW RATE(CFS) =      29.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.12
  FLOW VELOCITY(FEET/SEC.) =  7.78   DEPTH*VELOCITY(FT*FT/SEC.) =   4.06
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    140.00 =    1670.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    141.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   257.00  DOWNSTREAM(FEET) =   250.00
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.50
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.64
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   10.44
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    141.00 =    1765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    142.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  250.00  DOWNSTREAM ELEVATION(FEET) =  160.00
  STREET LENGTH(FEET) =  1225.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.56
    HALFSTREET FLOOD WIDTH(FEET) =   21.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    9.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.22   Tc(MIN.) =   12.66
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.384
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D       11.20      0.20     0.400    75
  COMMERCIAL                 D        0.30      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.392
  SUBAREA AREA(ACRES) =   11.50      SUBAREA RUNOFF(CFS) =   23.86
  EFFECTIVE AREA(ACRES) =     24.00    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =       24.0        PEAK FLOW RATE(CFS) =      50.23

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.59   HALFSTREET FLOOD WIDTH(FEET) =  23.71
  FLOW VELOCITY(FEET/SEC.) =  9.63   DEPTH*VELOCITY(FT*FT/SEC.) =   5.65
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    142.00 =    2990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    143.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.00  DOWNSTREAM(FEET) =   145.00
  FLOW LENGTH(FEET) =   285.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.97
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.23
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   13.05
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    143.00 =    3275.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    143.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.05
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.342
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        5.60      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    5.60      SUBAREA RUNOFF(CFS) =   11.40
  EFFECTIVE AREA(ACRES) =     29.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =       29.6       PEAK FLOW RATE(CFS) =      60.73

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    144.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   145.00  DOWNSTREAM(FEET) =   141.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.17
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.73
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.09
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    144.00 =    3320.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    144.00 TO NODE    144.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.09
```

RAINFALL INTENSITY(INCH/HR) = 2.34
AREA-AVERAGED Fm(INCH/HR) = 0.06
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.31
EFFECTIVE STREAM AREA(ACRES) = 29.60
TOTAL STREAM AREA(ACRES) = 29.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 60.73

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	136.87	8.38	3.020	0.20(0.09)	0.46	51.9	107.00
1	141.96	11.95	2.464	0.20(0.09)	0.47	66.5	101.00
1	141.91	12.98	2.350	0.20(0.09)	0.47	69.8	118.00
1	130.72	17.75	1.964	0.20(0.09)	0.47	77.6	112.00
1	124.06	20.16	1.826	0.20(0.09)	0.46	79.5	126.00
2	60.73	13.09	2.339	0.20(0.06)	0.31	29.6	136.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	187.38	8.38	3.020	0.20(0.08)	0.42	70.9	107.00
2	200.47	11.95	2.464	0.20(0.08)	0.42	93.5	101.00
3	202.44	12.98	2.350	0.20(0.08)	0.42	99.2	118.00
4	202.40	13.09	2.339	0.20(0.08)	0.42	99.6	136.00
5	181.46	17.75	1.964	0.20(0.08)	0.42	107.2	112.00
6	171.11	20.16	1.826	0.20(0.08)	0.42	109.1	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 202.44 Tc(MIN.) = 12.98
EFFECTIVE AREA(ACRES) = 99.21 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.42
TOTAL AREA(ACRES) = 109.1
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 144.00 = 3995.00 FEET.

****
FLOW PROCESS FROM NODE 144.00 TO NODE 145.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 141.00 DOWNSTREAM(FEET) = 139.00
FLOW LENGTH(FEET) = 325.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 47.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.57
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 202.44
PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 13.45
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 145.00 = 4320.00 FEET.

****
FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 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.) = 13.45
RAINFALL INTENSITY(INCH/HR) = 2.30
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA(ACRES) = 99.21
TOTAL STREAM AREA(ACRES) = 109.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 202.44

****
FLOW PROCESS FROM NODE 146.00 TO NODE 147.00 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) =    218.00  DOWNSTREAM(FEET) =    216.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.364
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.833
  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        1.20      0.20     0.400    75    9.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.97
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      2.97

********************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    148.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  216.00  DOWNSTREAM ELEVATION(FEET) =  210.00
  STREET LENGTH(FEET) =   405.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.14
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.20
  STREET FLOW TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   11.51
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.517
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        2.30      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    5.05
  EFFECTIVE AREA(ACRES) =      3.50    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.5        PEAK FLOW RATE(CFS) =       7.68

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.60
  FLOW VELOCITY(FEET/SEC.) =  3.41   DEPTH*VELOCITY(FT*FT/SEC.) =   1.43
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    148.00 =     675.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    148.00 TO NODE    149.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  210.00  DOWNSTREAM ELEVATION(FEET) =  175.00
  STREET LENGTH(FEET) =   475.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
```

```
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.36
  STREET FLOW TRAVEL TIME(MIN.) =   1.20   Tc(MIN.) =   12.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.378
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        1.90      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    3.93
  EFFECTIVE AREA(ACRES) =      5.40    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        5.4        PEAK FLOW RATE(CFS) =      11.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.33
  FLOW VELOCITY(FEET/SEC.) =  6.82   DEPTH*VELOCITY(FT*FT/SEC.) =   2.54
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    149.00 =    1150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    149.00 TO NODE    149.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.378
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        1.50      0.20     0.400    75
  COMMERCIAL                 D        1.40      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.255
  SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    6.07
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      17.24

****************************************************************************
  FLOW PROCESS FROM NODE    149.00 TO NODE    145.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  175.00  DOWNSTREAM ELEVATION(FEET) =  146.00
  STREET LENGTH(FEET) =   580.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.63
```

```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.51
    HALFSTREET FLOOD WIDTH(FEET) =   19.65
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.61
  STREET FLOW TRAVEL TIME(MIN.) =   1.37   Tc(MIN.) =   14.09
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.242
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        7.90      0.20     0.400    75
  COMMERCIAL                 D        0.70      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.376
  SUBAREA AREA(ACRES) =    8.60      SUBAREA RUNOFF(CFS) =   16.77
  EFFECTIVE AREA(ACRES) =     16.90    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =       16.9        PEAK FLOW RATE(CFS) =      33.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  21.68
  FLOW VELOCITY(FEET/SEC.) =  7.52   DEPTH*VELOCITY(FT*FT/SEC.) =   4.13
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    145.00 =    1730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 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.) =   14.09
  RAINFALL INTENSITY(INCH/HR) =   2.24
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.36
  EFFECTIVE STREAM AREA(ACRES) =      16.90
  TOTAL STREAM AREA(ACRES) =      16.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      33.00

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      187.38    8.86    2.925  0.20( 0.08) 0.42      70.9     107.00
      1      200.47   12.42    2.410  0.20( 0.08) 0.42      93.5     101.00
      1      202.44   13.45    2.302  0.20( 0.08) 0.42      99.2     118.00
      1      202.40   13.56    2.292  0.20( 0.08) 0.42      99.6     136.00
      1      181.46   18.23    1.934  0.20( 0.08) 0.42     107.2     112.00
      1      171.11   20.65    1.801  0.20( 0.08) 0.42     109.1     126.00
      2       33.00   14.09    2.242  0.20( 0.07) 0.36      16.9     146.00

  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      214.67    8.86    2.925  0.20( 0.08) 0.42      81.5     107.00
      2      231.81   12.42    2.410  0.20( 0.08) 0.41     108.4     101.00
      3      234.82   13.45    2.302  0.20( 0.08) 0.41     115.3     118.00
      4      234.88   13.56    2.292  0.20( 0.08) 0.41     115.9     136.00
      5      233.01   14.09    2.242  0.20( 0.08) 0.41     117.4     146.00
      6      209.78   18.23    1.934  0.20( 0.08) 0.41     124.1     112.00
      7      197.40   20.65    1.801  0.20( 0.08) 0.41     126.0     126.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     234.88    Tc(MIN.) =    13.56
  EFFECTIVE AREA(ACRES) =     115.87   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =      126.0
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    145.00 =    4320.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   139.00  DOWNSTREAM(FEET) =   125.00
  FLOW LENGTH(FEET) =   780.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  41.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.87
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     234.88
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   14.28
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    150.00 =    5100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.28
  RAINFALL INTENSITY(INCH/HR) =   2.22
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =     115.87
  TOTAL STREAM AREA(ACRES) =     126.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     234.88

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    152.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    235.00  DOWNSTREAM(FEET) =    230.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.751
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.418
  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        0.30      0.20     0.850    75   10.73
  COMMERCIAL                 D        0.30      0.20     0.100    75    6.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA RUNOFF(CFS) =      1.79
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.79

****************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    153.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  230.00  DOWNSTREAM ELEVATION(FEET) =  195.00
  STREET LENGTH(FEET) =   390.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.61
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.53
  STREET FLOW TRAVEL TIME(MIN.) =   1.16   Tc(MIN.) =    7.91
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.121
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.40      0.20     0.850    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.433
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.46
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.09

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.47
  FLOW VELOCITY(FEET/SEC.) =  5.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    153.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  195.00  DOWNSTREAM ELEVATION(FEET) =  180.00
  STREET LENGTH(FEET) =   275.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.88
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.11
  STREET FLOW TRAVEL TIME(MIN.) =   0.79   Tc(MIN.) =    8.70
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.956
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        3.70      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    3.70      SUBAREA RUNOFF(CFS) =    9.58
  EFFECTIVE AREA(ACRES) =      5.20    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        5.2        PEAK FLOW RATE(CFS) =      13.45

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.13
  FLOW VELOCITY(FEET/SEC.) =  6.36   DEPTH*VELOCITY(FT*FT/SEC.) =   2.60
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    154.00 =     965.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    155.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  180.00  DOWNSTREAM ELEVATION(FEET) =  175.00
  STREET LENGTH(FEET) =   125.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.48
    HALFSTREET FLOOD WIDTH(FEET) =   17.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.07
  STREET FLOW TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =    9.03
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.894
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        6.00      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    6.00      SUBAREA RUNOFF(CFS) =   15.19
  EFFECTIVE AREA(ACRES) =     11.20    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       11.2        PEAK FLOW RATE(CFS) =      28.35

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  6.35   DEPTH*VELOCITY(FT*FT/SEC.) =   3.09
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    155.00 =    1090.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    156.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  175.00  DOWNSTREAM ELEVATION(FEET) =  139.00
  STREET LENGTH(FEET) =   570.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.26
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   16.24
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.48
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.38
  STREET FLOW TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =   10.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        3.90      0.20     0.400    75
  RESIDENTIAL
```

```
  "11+ DWELLINGS/ACRE"       D        6.20      0.20     0.200    75
  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 =  0.264
  SUBAREA AREA(ACRES) =   10.90      SUBAREA RUNOFF(CFS) =   25.81
  EFFECTIVE AREA(ACRES) =     22.10    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       22.1        PEAK FLOW RATE(CFS) =      52.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.80
  FLOW VELOCITY(FEET/SEC.) =  7.91   DEPTH*VELOCITY(FT*FT/SEC.) =   3.82
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    156.00 =    1660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   133.50  DOWNSTREAM(FEET) =   125.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.62
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.04
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   10.32
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    150.00 =    1700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.32
  RAINFALL INTENSITY(INCH/HR) =   2.68
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.34
  EFFECTIVE STREAM AREA(ACRES) =      22.10
  TOTAL STREAM AREA(ACRES) =      22.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      52.04

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      214.67    9.60    2.794  0.20( 0.08) 0.42      81.5     107.00
      1      231.81   13.15    2.333  0.20( 0.08) 0.41     108.4     101.00
      1      234.82   14.18    2.234  0.20( 0.08) 0.41     115.3     118.00
      1      234.88   14.28    2.225  0.20( 0.08) 0.41     115.9     136.00
      1      233.01   14.82    2.178  0.20( 0.08) 0.41     117.4     146.00
      1      209.78   18.98    1.890  0.20( 0.08) 0.41     124.1     112.00
      1      197.40   21.40    1.765  0.20( 0.08) 0.41     126.0     126.00
      2       52.04   10.32    2.680  0.20( 0.07) 0.34      22.1     151.00

  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      265.17    9.60    2.794  0.20( 0.08) 0.40     102.0     107.00
      2      270.18   10.32    2.680  0.20( 0.08) 0.40     109.0     151.00
      3      276.92   13.15    2.333  0.20( 0.08) 0.40     130.5     101.00
      4      277.97   14.18    2.234  0.20( 0.08) 0.40     137.4     118.00
      5      277.84   14.28    2.225  0.20( 0.08) 0.40     138.0     136.00
      6      275.04   14.82    2.178  0.20( 0.08) 0.40     139.5     146.00
      7      246.08   18.98    1.890  0.20( 0.08) 0.40     146.2     112.00
      8      231.20   21.40    1.765  0.20( 0.08) 0.40     148.1     126.00
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     277.97    Tc(MIN.) =    14.18
  EFFECTIVE AREA(ACRES) =     137.44   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =      148.1
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    150.00 =    5100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    159.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   125.00  DOWNSTREAM(FEET) =   102.00
  FLOW LENGTH(FEET) =   610.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.79
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     277.97
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   14.59
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    159.00 =    5710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    159.00 TO NODE    159.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.59
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.198
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        5.10      0.20     0.400    75
  COMMERCIAL                 D        3.30      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.282
  SUBAREA AREA(ACRES) =    8.40      SUBAREA RUNOFF(CFS) =   16.19
  EFFECTIVE AREA(ACRES) =    145.84   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =      156.5       PEAK FLOW RATE(CFS) =     278.14

****************************************************************************
  FLOW PROCESS FROM NODE    159.00 TO NODE    159.00 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.) =   14.59
  RAINFALL INTENSITY(INCH/HR) =   2.20
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.39
  EFFECTIVE STREAM AREA(ACRES) =     145.84
  TOTAL STREAM AREA(ACRES) =     156.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     278.14

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    161.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   260.00
  ELEVATION DATA: UPSTREAM(FEET) =    145.00  DOWNSTREAM(FEET) =    143.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.441
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.232
  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        0.50      0.20     0.100    75    7.44
  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) =      0.50   PEAK FLOW RATE(CFS) =      1.45

****************************************************************************
  FLOW PROCESS FROM NODE    161.00 TO NODE    162.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  143.00  DOWNSTREAM ELEVATION(FEET) =  138.00
  STREET LENGTH(FEET) =   345.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   2.06   Tc(MIN.) =    9.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.810
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.70      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) =    1.70      SUBAREA RUNOFF(CFS) =    4.27
  EFFECTIVE AREA(ACRES) =      2.20    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.2        PEAK FLOW RATE(CFS) =       5.52

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.40
  FLOW VELOCITY(FEET/SEC.) =  3.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    162.00 =     605.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    162.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.810
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.50      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) =    2.50      SUBAREA RUNOFF(CFS) =    6.28
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      11.80

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    163.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   132.00  DOWNSTREAM(FEET) =   127.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.77
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.80
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    9.60
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    163.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    163.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.60
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.793
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.70      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) =    1.70      SUBAREA RUNOFF(CFS) =    4.24
  EFFECTIVE AREA(ACRES) =      6.40   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.4       PEAK FLOW RATE(CFS) =      15.97

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    164.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   127.00  DOWNSTREAM(FEET) =   117.50
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.59
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.97
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   10.15
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    164.00 =    1035.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    164.00 TO NODE    164.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.15
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.706
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        1.40      0.20     0.400    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.321
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    4.52
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      19.99

****************************************************************************
  FLOW PROCESS FROM NODE    164.00 TO NODE    165.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   117.50  DOWNSTREAM(FEET) =   114.50
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.78
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      19.99
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   10.18
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    165.00 =    1070.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.18
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.701
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.20      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) =    2.20      SUBAREA RUNOFF(CFS) =    5.31
  EFFECTIVE AREA(ACRES) =     10.50   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =       10.5       PEAK FLOW RATE(CFS) =      25.26

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    159.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   114.50  DOWNSTREAM(FEET) =   102.00
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.14
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.26
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   10.41
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    159.00 =    1290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    159.00 TO NODE    159.00 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.) =   10.41
  RAINFALL INTENSITY(INCH/HR) =   2.67
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.14
  EFFECTIVE STREAM AREA(ACRES) =      10.50
  TOTAL STREAM AREA(ACRES) =      10.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      265.17   10.01    2.727  0.20( 0.08) 0.39     110.4     107.00
      1      270.18   10.73    2.621  0.20( 0.08) 0.39     117.4     151.00
      1      276.92   13.56    2.292  0.20( 0.08) 0.39     138.9     101.00
      1      278.14   14.59    2.198  0.20( 0.08) 0.39     145.8     118.00
      1      277.97   14.69    2.189  0.20( 0.08) 0.39     146.4     136.00
      1      275.04   15.23    2.144  0.20( 0.08) 0.39     147.9     146.00
      1      248.60   19.41    1.866  0.20( 0.08) 0.40     154.6     112.00
      1      234.55   21.83    1.745  0.20( 0.08) 0.40     156.5     126.00
      2       25.26   10.41    2.667  0.20( 0.03) 0.14      10.5     160.00

  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
```

```
                                                  DPHOSR
      1      290.01   10.01    2.727  0.20( 0.07) 0.37     120.5     107.00
      2      293.22   10.41    2.667  0.20( 0.07) 0.37     124.9     160.00
      3      295.00   10.73    2.621  0.20( 0.07) 0.37     127.9     151.00
      4      298.59   13.56    2.292  0.20( 0.08) 0.38     149.4     101.00
      5      298.90   14.59    2.198  0.20( 0.08) 0.38     156.3     118.00
      6      298.65   14.69    2.189  0.20( 0.08) 0.38     156.9     136.00
      7      295.30   15.23    2.144  0.20( 0.08) 0.38     158.4     146.00
      8      266.20   19.41    1.866  0.20( 0.08) 0.38     165.1     112.00
      9      250.98   21.83    1.745  0.20( 0.08) 0.38     167.0     126.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     298.90    Tc(MIN.) =    14.59
  EFFECTIVE AREA(ACRES) =     156.34   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =      167.0
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    159.00 =    5710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    159.00 TO NODE    168.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   102.00  DOWNSTREAM(FEET) =    94.30
  FLOW LENGTH(FEET) =  1005.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  53.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.76
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     298.90
  PIPE TRAVEL TIME(MIN.) =   1.22    Tc(MIN.) =   15.81
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    168.00 =    6715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    168.00 TO NODE    168.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.81
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.099
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        7.50      0.20     0.100    75
  PUBLIC PARK                D        0.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.119
  SUBAREA AREA(ACRES) =    7.70      SUBAREA RUNOFF(CFS) =   14.38
  EFFECTIVE AREA(ACRES) =    164.04   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =      174.7       PEAK FLOW RATE(CFS) =     299.14

****************************************************************************
  FLOW PROCESS FROM NODE    168.00 TO NODE    169.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    94.30  DOWNSTREAM(FEET) =    93.50
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.09
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     299.14
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   16.01
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    169.00 =    6865.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    169.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   16.01
  RAINFALL INTENSITY(INCH/HR) =   2.08
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.37
  EFFECTIVE STREAM AREA(ACRES) =     164.04
  TOTAL STREAM AREA(ACRES) =     174.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     299.14

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    171.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    145.00  DOWNSTREAM(FEET) =    140.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.751
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.418
  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        0.90      0.20     0.100    75    6.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.75
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.75

****************************************************************************
  FLOW PROCESS FROM NODE    171.00 TO NODE    172.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   128.00
  FLOW LENGTH(FEET) =   265.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.24
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.75
  PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =    7.79
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    172.00 =     565.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    172.00 TO NODE    172.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.148
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        3.10      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) =    3.10      SUBAREA RUNOFF(CFS) =    8.73
  EFFECTIVE AREA(ACRES) =      4.00   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.0       PEAK FLOW RATE(CFS) =      11.26

****************************************************************************
  FLOW PROCESS FROM NODE    172.00 TO NODE    169.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   128.00  DOWNSTREAM(FEET) =    93.50
  FLOW LENGTH(FEET) =   215.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.28
```

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.26
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 7.98
LONGEST FLOWPATH FROM NODE 170.00 TO NODE 169.00 = 780.00 FEET.

****
FLOW PROCESS FROM NODE 169.00 TO NODE 169.00 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.) = 7.98
RAINFALL INTENSITY(INCH/HR) = 3.11
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 4.00
TOTAL STREAM AREA(ACRES) = 4.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 11.26

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	290.01	11.44	2.526	0.20(0.07)	0.35	128.2	107.00
1	293.22	11.84	2.477	0.20(0.07)	0.35	132.6	160.00
1	295.00	12.15	2.440	0.20(0.07)	0.36	135.6	151.00
1	298.59	14.98	2.164	0.20(0.07)	0.36	157.1	101.00
1	299.14	16.01	2.084	0.20(0.07)	0.37	164.0	118.00
1	298.94	16.12	2.076	0.20(0.07)	0.37	164.6	136.00
1	295.78	16.65	2.037	0.20(0.07)	0.37	166.1	146.00
1	268.52	20.87	1.790	0.20(0.07)	0.37	172.8	112.00
1	254.01	23.31	1.680	0.20(0.07)	0.37	174.7	126.00
2	11.26	7.98	3.106	0.20(0.02)	0.10	4.0	170.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	261.23	7.98	3.106	0.20(0.07)	0.34	93.4	170.00
2	299.16	11.44	2.526	0.20(0.07)	0.35	132.2	107.00
3	302.19	11.84	2.477	0.20(0.07)	0.35	136.6	160.00
4	303.83	12.15	2.440	0.20(0.07)	0.35	139.6	151.00
5	306.41	14.98	2.164	0.20(0.07)	0.36	161.1	101.00
6	306.67	16.01	2.084	0.20(0.07)	0.36	168.0	118.00
7	306.44	16.12	2.076	0.20(0.07)	0.36	168.6	136.00
8	303.14	16.65	2.037	0.20(0.07)	0.36	170.1	146.00
9	274.98	20.87	1.790	0.20(0.07)	0.36	176.8	112.00
10	260.07	23.31	1.680	0.20(0.07)	0.36	178.7	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 306.67 Tc(MIN.) = 16.01
EFFECTIVE AREA(ACRES) = 168.04 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 178.7
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 169.00 = 6865.00 FEET.

****
FLOW PROCESS FROM NODE 169.00 TO NODE 173.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 93.50 DOWNSTREAM(FEET) = 91.80
FLOW LENGTH(FEET) = 180.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 66.0 INCH PIPE IS 53.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.86
ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 306.67
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 16.22

 LONGEST FLOWPATH FROM NODE 112.00 TO NODE 173.00 = 7045.00 FEET.

****
 FLOW PROCESS FROM NODE 173.00 TO NODE 173.00 IS CODE = 1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 16.22
 RAINFALL INTENSITY(INCH/HR) = 2.07
 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.36
 EFFECTIVE STREAM AREA(ACRES) = 168.04
 TOTAL STREAM AREA(ACRES) = 178.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 306.67

****
 FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 500.00
 ELEVATION DATA: UPSTREAM(FEET) = 140.00 DOWNSTREAM(FEET) = 115.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.648
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.448
 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 0.70 0.20 0.100 75 6.65
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" D 0.60 0.20 0.500 75 8.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.285
 SUBAREA RUNOFF(CFS) = 3.97
 TOTAL AREA(ACRES) = 1.30 PEAK FLOW RATE(CFS) = 3.97

****
 FLOW PROCESS FROM NODE 301.00 TO NODE 173.00 IS CODE = 31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
 ELEVATION DATA: UPSTREAM(FEET) = 100.00 DOWNSTREAM(FEET) = 91.80
 FLOW LENGTH(FEET) = 50.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.10
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.97
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 6.70
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 173.00 = 550.00 FEET.

****
 FLOW PROCESS FROM NODE 173.00 TO NODE 173.00 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.) = 6.70
 RAINFALL INTENSITY(INCH/HR) = 3.43
 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.28
 EFFECTIVE STREAM AREA(ACRES) = 1.30
 TOTAL STREAM AREA(ACRES) = 1.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.97

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	261.23	8.19	3.060	0.20(0.07)	0.34	93.4	170.00
1	299.16	11.64	2.501	0.20(0.07)	0.35	132.2	107.00
1	302.19	12.04	2.453	0.20(0.07)	0.35	136.6	160.00
1	303.83	12.36	2.417	0.20(0.07)	0.35	139.6	151.00
1	306.41	15.19	2.148	0.20(0.07)	0.36	161.1	101.00
1	306.67	16.22	2.069	0.20(0.07)	0.36	168.0	118.00
1	306.44	16.32	2.061	0.20(0.07)	0.36	168.6	136.00
1	303.14	16.86	2.023	0.20(0.07)	0.36	170.1	146.00
1	274.98	21.08	1.780	0.20(0.07)	0.36	176.8	112.00
1	260.07	23.52	1.672	0.20(0.07)	0.36	178.7	126.00
2	3.97	6.70	3.432	0.20(0.06)	0.28	1.3	300.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	244.42	6.70	3.432	0.20(0.07)	0.34	77.8	300.00
2	264.76	8.19	3.060	0.20(0.07)	0.34	94.7	170.00
3	302.03	11.64	2.501	0.20(0.07)	0.35	133.5	107.00
4	305.01	12.04	2.453	0.20(0.07)	0.35	137.9	160.00
5	306.61	12.36	2.417	0.20(0.07)	0.35	140.9	151.00
6	308.87	15.19	2.148	0.20(0.07)	0.36	162.4	101.00
7	309.04	16.22	2.069	0.20(0.07)	0.36	169.3	118.00
8	308.80	16.32	2.061	0.20(0.07)	0.36	169.9	136.00
9	305.45	16.86	2.023	0.20(0.07)	0.36	171.4	146.00
10	277.00	21.08	1.780	0.20(0.07)	0.36	178.1	112.00
11	261.96	23.52	1.672	0.20(0.07)	0.36	180.0	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 309.04 Tc(MIN.) = 16.22
EFFECTIVE AREA(ACRES) = 169.34 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 180.0
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 173.00 = 7045.00 FEET.

****
FLOW PROCESS FROM NODE 173.00 TO NODE 175.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 91.80 DOWNSTREAM(FEET) = 74.40
FLOW LENGTH(FEET) = 470.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 38.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.38
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 309.04
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 16.52
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 175.00 = 7515.00 FEET.

****
FLOW PROCESS FROM NODE 175.00 TO NODE 175.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 16.52
RAINFALL INTENSITY(INCH/HR) = 2.05
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.36
EFFECTIVE STREAM AREA(ACRES) = 169.34
TOTAL STREAM AREA(ACRES) = 180.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 309.04

****

```
 FLOW PROCESS FROM NODE    176.00 TO NODE    177.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    120.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.994
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.102
 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.)
 CONDOMINIUMS               D        0.90      0.20     0.350    75    7.99
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA RUNOFF(CFS) =      2.46
 TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.46

****************************************************************************
 FLOW PROCESS FROM NODE    177.00 TO NODE    178.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   110.00  DOWNSTREAM(FEET) =   105.00
 FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.79
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.46
 PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =    8.83
 LONGEST FLOWPATH FROM NODE    176.00 TO NODE    178.00 =     590.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    178.00 TO NODE    178.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.83
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.931
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        1.50      0.20     0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    3.86
 EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       6.18

****************************************************************************
 FLOW PROCESS FROM NODE    178.00 TO NODE    179.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   105.00  DOWNSTREAM(FEET) =    80.00
 FLOW LENGTH(FEET) =   390.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.86
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.18
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =    9.38
 LONGEST FLOWPATH FROM NODE    176.00 TO NODE    179.00 =     980.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    179.00 TO NODE    179.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =    9.38
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.831
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               D        3.00      0.20     0.350    75
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.20      0.20     0.200    75
  PUBLIC PARK                D        0.40      0.20     0.850    75
  COMMERCIAL                 D        0.90      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.338
  SUBAREA AREA(ACRES) =    4.50      SUBAREA RUNOFF(CFS) =   11.19
  EFFECTIVE AREA(ACRES) =      6.90   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      17.16

****************************************************************************
  FLOW PROCESS FROM NODE    179.00 TO NODE    175.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    80.00  DOWNSTREAM(FEET) =    74.40
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.89
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.16
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    9.46
  LONGEST FLOWPATH FROM NODE    176.00 TO NODE    175.00 =    1060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    175.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.46
  RAINFALL INTENSITY(INCH/HR) =   2.82
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.34
  EFFECTIVE STREAM AREA(ACRES) =       6.90
  TOTAL STREAM AREA(ACRES) =       6.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.16

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      244.42    7.03    3.339  0.20( 0.07) 0.34      77.8     300.00
      1      264.76    8.51    2.994  0.20( 0.07) 0.34      94.7     170.00
      1      302.03   11.96    2.463  0.20( 0.07) 0.35     133.5     107.00
      1      305.01   12.36    2.417  0.20( 0.07) 0.35     137.9     160.00
      1      306.61   12.67    2.383  0.20( 0.07) 0.35     140.9     151.00
      1      308.87   15.50    2.123  0.20( 0.07) 0.36     162.4     101.00
      1      309.04   16.52    2.046  0.20( 0.07) 0.36     169.3     118.00
      1      308.80   16.63    2.039  0.20( 0.07) 0.36     169.9     136.00
      1      305.45   17.17    2.002  0.20( 0.07) 0.36     171.4     146.00
      1      277.00   21.40    1.765  0.20( 0.07) 0.36     178.1     112.00
      1      261.96   23.85    1.658  0.20( 0.07) 0.36     180.0     126.00
      2       17.16    9.46    2.817  0.20( 0.07) 0.34       6.9     176.00

  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      259.59    7.03    3.339  0.20( 0.07) 0.34      82.9     300.00
      2      281.18    8.51    2.994  0.20( 0.07) 0.34     100.9     170.00
```

3	292.22	9.46	2.817	0.20(0.07)	0.34	112.3	176.00
4	316.98	11.96	2.463	0.20(0.07)	0.35	140.4	107.00
5	319.67	12.36	2.417	0.20(0.07)	0.35	144.8	160.00
6	321.05	12.67	2.383	0.20(0.07)	0.35	147.8	151.00
7	321.70	15.50	2.123	0.20(0.07)	0.36	169.3	101.00
8	321.39	16.52	2.046	0.20(0.07)	0.36	176.2	118.00
9	321.10	16.63	2.039	0.20(0.07)	0.36	176.8	136.00
10	317.52	17.17	2.002	0.20(0.07)	0.36	178.3	146.00
11	287.59	21.40	1.765	0.20(0.07)	0.36	185.0	112.00
12	271.89	23.85	1.658	0.20(0.07)	0.36	186.9	126.00

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     321.70    Tc(MIN.) =    15.50
  EFFECTIVE AREA(ACRES) =     169.33   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =      186.9
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    175.00 =    7515.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    180.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    74.40  DOWNSTREAM(FEET) =    51.60
  FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.38
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     321.70
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   15.63
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    180.00 =    7785.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 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.) =   15.63
  RAINFALL INTENSITY(INCH/HR) =   2.11
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.36
  EFFECTIVE STREAM AREA(ACRES) =     169.33
  TOTAL STREAM AREA(ACRES) =     186.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     321.70

****************************************************************************
  FLOW PROCESS FROM NODE    181.00 TO NODE    182.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    120.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.994
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.102
  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.)
  CONDOMINIUMS               D        1.10      0.20     0.350    75    7.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      3.00
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      3.00

****************************************************************************
  FLOW PROCESS FROM NODE    182.00 TO NODE    183.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   110.00  DOWNSTREAM(FEET) =   105.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.34
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.00
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    8.11
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    183.00 =     370.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    183.00 TO NODE    183.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.11
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.078
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               D        2.00      0.20     0.350    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    5.41
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       8.39

****************************************************************************
  FLOW PROCESS FROM NODE    183.00 TO NODE    184.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   105.00  DOWNSTREAM(FEET) =    60.00
  FLOW LENGTH(FEET) =   415.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.57
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.39
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    8.55
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    184.00 =     785.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.55
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.985
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               D        3.10      0.20     0.350    75
  COMMERCIAL                 D        0.40      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.321
  SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =    9.20
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.33
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      17.33

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    180.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    60.00  DOWNSTREAM(FEET) =    51.60
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.29
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.33
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.61
 LONGEST FLOWPATH FROM NODE    181.00 TO NODE    180.00 =     855.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 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.) =    8.61
 RAINFALL INTENSITY(INCH/HR) =   2.97
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.33
 EFFECTIVE STREAM AREA(ACRES) =       6.60
 TOTAL STREAM AREA(ACRES) =       6.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.33

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      259.59    7.17    3.302  0.20( 0.07) 0.34      82.9     300.00
     1      281.18    8.64    2.967  0.20( 0.07) 0.34     100.9     170.00
     1      292.22    9.59    2.795  0.20( 0.07) 0.34     112.3     176.00
     1      316.98   12.09    2.448  0.20( 0.07) 0.35     140.4     107.00
     1      319.67   12.49    2.402  0.20( 0.07) 0.35     144.8     160.00
     1      321.05   12.80    2.369  0.20( 0.07) 0.35     147.8     151.00
     1      321.70   15.63    2.113  0.20( 0.07) 0.36     169.3     101.00
     1      321.39   16.65    2.037  0.20( 0.07) 0.36     176.2     118.00
     1      321.10   16.76    2.030  0.20( 0.07) 0.36     176.8     136.00
     1      317.52   17.30    1.993  0.20( 0.07) 0.36     178.3     146.00
     1      287.59   21.53    1.759  0.20( 0.07) 0.36     185.0     112.00
     1      271.89   23.98    1.653  0.20( 0.07) 0.36     186.9     126.00
     2       17.33    8.61    2.973  0.20( 0.07) 0.33       6.6     181.00

 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      275.66    7.17    3.302  0.20( 0.07) 0.34      88.4     300.00
     2      298.10    8.61    2.973  0.20( 0.07) 0.34     107.2     181.00
     3      298.48    8.64    2.967  0.20( 0.07) 0.34     107.5     170.00
     4      308.49    9.59    2.795  0.20( 0.07) 0.34     118.9     176.00
     5      331.18   12.09    2.448  0.20( 0.07) 0.35     147.0     107.00
     6      333.60   12.49    2.402  0.20( 0.07) 0.35     151.4     160.00
     7      334.78   12.80    2.369  0.20( 0.07) 0.35     154.4     151.00
     8      333.90   15.63    2.113  0.20( 0.07) 0.35     175.9     101.00
     9      333.14   16.65    2.037  0.20( 0.07) 0.36     182.8     118.00
    10      332.81   16.76    2.030  0.20( 0.07) 0.36     183.4     136.00
    11      329.01   17.30    1.993  0.20( 0.07) 0.36     184.9     146.00
    12      297.68   21.53    1.759  0.20( 0.07) 0.36     191.6     112.00
    13      281.35   23.98    1.653  0.20( 0.07) 0.36     193.5     126.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     334.78    Tc(MIN.) =    12.80
 EFFECTIVE AREA(ACRES) =     154.45   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =      193.5
 LONGEST FLOWPATH FROM NODE    112.00 TO NODE    180.00 =    7785.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    180.00 TO NODE    185.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.60  DOWNSTREAM(FEET) =    46.80
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.98
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     334.78
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   12.83
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    185.00 =    7840.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.83
  RAINFALL INTENSITY(INCH/HR) =   2.37
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =     154.45
  TOTAL STREAM AREA(ACRES) =     193.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     334.78

****************************************************************************
  FLOW PROCESS FROM NODE    186.00 TO NODE    187.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   260.00
  ELEVATION DATA: UPSTREAM(FEET) =    120.00  DOWNSTREAM(FEET) =    115.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.195
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.590
  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        0.60      0.20     0.100    75    6.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.93
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.93

****************************************************************************
  FLOW PROCESS FROM NODE    187.00 TO NODE    188.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  115.00  DOWNSTREAM ELEVATION(FEET) =  105.00
  STREET LENGTH(FEET) =   365.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.56
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.20
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.89
  STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    8.10
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.080
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.80      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) =    1.80      SUBAREA RUNOFF(CFS) =    4.96
  EFFECTIVE AREA(ACRES) =      2.40    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =       6.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.09
  FLOW VELOCITY(FEET/SEC.) =  3.50   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
  LONGEST FLOWPATH FROM NODE    186.00 TO NODE    188.00 =     625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    188.00 TO NODE    189.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  105.00  DOWNSTREAM ELEVATION(FEET) =   70.00
  STREET LENGTH(FEET) =   360.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.35
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.96
  STREET FLOW TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =    9.01
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.896
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.70      0.20     0.850    75
  COMMERCIAL                 D        3.00      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.242
  SUBAREA AREA(ACRES) =    3.70      SUBAREA RUNOFF(CFS) =    9.48
  EFFECTIVE AREA(ACRES) =      6.10    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =        6.1        PEAK FLOW RATE(CFS) =      15.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   9.99
  FLOW VELOCITY(FEET/SEC.) =  7.03   DEPTH*VELOCITY(FT*FT/SEC.) =   2.29
  LONGEST FLOWPATH FROM NODE    186.00 TO NODE    189.00 =     985.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    189.00 TO NODE    185.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    60.00  DOWNSTREAM(FEET) =    46.80
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.58
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.70
```

PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 9.06
LONGEST FLOWPATH FROM NODE 186.00 TO NODE 185.00 = 1055.00 FEET.

****
FLOW PROCESS FROM NODE 185.00 TO NODE 185.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.06
RAINFALL INTENSITY(INCH/HR) = 2.89
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.19
EFFECTIVE STREAM AREA(ACRES) = 6.10
TOTAL STREAM AREA(ACRES) = 6.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.70

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	275.66	7.20	3.295	0.20(0.07)	0.34	88.4	300.00
1	298.10	8.64	2.968	0.20(0.07)	0.34	107.2	181.00
1	298.48	8.67	2.962	0.20(0.07)	0.34	107.5	170.00
1	308.49	9.62	2.790	0.20(0.07)	0.34	118.9	176.00
1	331.18	12.12	2.445	0.20(0.07)	0.35	147.0	107.00
1	333.60	12.52	2.399	0.20(0.07)	0.35	151.4	160.00
1	334.78	12.83	2.366	0.20(0.07)	0.35	154.4	151.00
1	333.90	15.65	2.111	0.20(0.07)	0.35	175.9	101.00
1	333.14	16.68	2.035	0.20(0.07)	0.36	182.8	118.00
1	332.81	16.79	2.028	0.20(0.07)	0.36	183.4	136.00
1	329.01	17.33	1.991	0.20(0.07)	0.36	184.9	146.00
1	297.68	21.56	1.757	0.20(0.07)	0.36	191.6	112.00
1	281.35	24.01	1.652	0.20(0.07)	0.36	193.5	126.00
2	15.70	9.06	2.887	0.20(0.04)	0.19	6.1	186.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	289.91	7.20	3.295	0.20(0.07)	0.33	93.3	300.00
2	313.48	8.64	2.968	0.20(0.07)	0.33	113.0	181.00
3	313.88	8.67	2.962	0.20(0.07)	0.33	113.3	170.00
4	318.35	9.06	2.887	0.20(0.07)	0.33	118.4	186.00
5	323.65	9.62	2.790	0.20(0.07)	0.34	125.0	176.00
6	344.44	12.12	2.445	0.20(0.07)	0.34	153.1	107.00
7	346.61	12.52	2.399	0.20(0.07)	0.34	157.5	160.00
8	347.61	12.83	2.366	0.20(0.07)	0.34	160.5	151.00
9	345.33	15.65	2.111	0.20(0.07)	0.35	182.0	101.00
10	344.15	16.68	2.035	0.20(0.07)	0.35	188.9	118.00
11	343.78	16.79	2.028	0.20(0.07)	0.35	189.5	136.00
12	339.78	17.33	1.991	0.20(0.07)	0.35	191.0	146.00
13	307.16	21.56	1.757	0.20(0.07)	0.35	197.7	112.00
14	290.25	24.01	1.652	0.20(0.07)	0.36	199.6	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 347.61 Tc(MIN.) = 12.83
EFFECTIVE AREA(ACRES) = 160.55 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 199.6
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 185.00 = 7840.00 FEET.

****
FLOW PROCESS FROM NODE 185.00 TO NODE 191.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 46.80 DOWNSTREAM(FEET) = 5.50

```
  FLOW LENGTH(FEET) =   515.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.76
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     347.61
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   13.08
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    191.00 =    8355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    191.00 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.) =   13.08
  RAINFALL INTENSITY(INCH/HR) =   2.34
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.34
  EFFECTIVE STREAM AREA(ACRES) =     160.55
  TOTAL STREAM AREA(ACRES) =     199.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     347.61

****************************************************************************
  FLOW PROCESS FROM NODE    192.00 TO NODE    193.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   280.00
  ELEVATION DATA: UPSTREAM(FEET) =    142.00  DOWNSTREAM(FEET) =    140.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.955
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.70      0.20     0.500    75    9.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.66
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.66

****************************************************************************
  FLOW PROCESS FROM NODE    193.00 TO NODE    194.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  140.00  DOWNSTREAM ELEVATION(FEET) =  138.00
  STREET LENGTH(FEET) =   320.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =   13.12
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.335
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.40      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    2.82
  EFFECTIVE AREA(ACRES) =      2.10    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.1        PEAK FLOW RATE(CFS) =       4.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.26
  FLOW VELOCITY(FEET/SEC.) =  1.80   DEPTH*VELOCITY(FT*FT/SEC.) =   0.60
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    194.00 =     600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    194.00 TO NODE    195.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  138.00  DOWNSTREAM ELEVATION(FEET) =  135.00
  STREET LENGTH(FEET) =   415.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.87
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
  STREET FLOW TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   16.25
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.066
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        4.10      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.10      SUBAREA RUNOFF(CFS) =    7.26
  EFFECTIVE AREA(ACRES) =      6.20    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.2        PEAK FLOW RATE(CFS) =      10.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.76
  FLOW VELOCITY(FEET/SEC.) =  2.39   DEPTH*VELOCITY(FT*FT/SEC.) =   1.01
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    195.00 =    1015.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    195.00 TO NODE    196.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   120.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.98
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.97
```

```
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   16.29
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    196.00 =    1065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    196.00 TO NODE    196.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.064
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.50      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =    6.19
  EFFECTIVE AREA(ACRES) =      9.70   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        9.7       PEAK FLOW RATE(CFS) =      17.14

****************************************************************************
  FLOW PROCESS FROM NODE    196.00 TO NODE    197.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   120.00  DOWNSTREAM(FEET) =   110.00
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.24
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.14
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   16.42
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    197.00 =    1200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    197.00 TO NODE    197.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.42
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.054
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.80      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.80      SUBAREA RUNOFF(CFS) =    4.92
  EFFECTIVE AREA(ACRES) =     12.50   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      21.98

****************************************************************************
  FLOW PROCESS FROM NODE    197.00 TO NODE    198.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   110.00  DOWNSTREAM(FEET) =   100.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.82
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.98
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   16.46
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    198.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    198.00 TO NODE    198.00 IS CODE =  81
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   16.46
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.051
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.70      0.20     0.500    75
  PUBLIC PARK                D        1.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
  SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    5.02
  EFFECTIVE AREA(ACRES) =     15.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =       15.4       PEAK FLOW RATE(CFS) =      26.97

**************************************************************************
  FLOW PROCESS FROM NODE    198.00 TO NODE    199.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    73.00
  FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.15
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.97
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   16.72
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    199.00 =    1550.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   16.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.033
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.60      0.20     0.500    75
  PUBLIC PARK                D        1.30      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.617
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =    6.70
  EFFECTIVE AREA(ACRES) =     19.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      33.41

**************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    200.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    73.00  DOWNSTREAM(FEET) =    59.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.53
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.41
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   16.90
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    200.00 =    1750.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    200.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

```
  MAINLINE Tc(MIN.) =   16.90
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.020
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.20      0.20     0.500    75
  PUBLIC PARK                D        1.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.624
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    5.80
  EFFECTIVE AREA(ACRES) =     22.70   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       22.7       PEAK FLOW RATE(CFS) =      39.00

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    59.00  DOWNSTREAM(FEET) =    16.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.00
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   17.01
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    201.00 =    1950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.00  DOWNSTREAM(FEET) =    13.00
  FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.00
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   17.69
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    202.00 =    2305.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.69
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.968
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.60      0.20     0.850    75
  COMMERCIAL                 D        4.90      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.182
  SUBAREA AREA(ACRES) =    5.50      SUBAREA RUNOFF(CFS) =    9.56
  EFFECTIVE AREA(ACRES) =     28.20   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       28.2       PEAK FLOW RATE(CFS) =      47.49

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    191.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.00  DOWNSTREAM(FEET) =     5.50
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.1 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.26
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.49
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   17.77
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    191.00 =    2400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    191.00 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.) =   17.77
  RAINFALL INTENSITY(INCH/HR) =   1.96
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      28.20
  TOTAL STREAM AREA(ACRES) =      28.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      47.49

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   225.00
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     95.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.025
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.894
  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        0.70      0.20     0.850    75    9.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.72
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.72

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     95.00  DOWNSTREAM(FEET) =     90.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   155.00   CHANNEL SLOPE =  0.0323
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.823
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               D        1.10      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.43
  AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   0.40
  Tc(MIN.) =    9.43
  SUBAREA AREA(ACRES) =     1.10       SUBAREA RUNOFF(CFS) =    2.63
  EFFECTIVE AREA(ACRES) =      1.80     AREA-AVERAGED Fm(INCH/HR) =   0.17
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.85
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       4.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   7.00
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    205.00 =     380.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     90.00  DOWNSTREAM(FEET) =     28.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   345.00   CHANNEL SLOPE =  0.1797
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.757
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               D        1.50      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.60
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =    9.82
  SUBAREA AREA(ACRES) =     1.50       SUBAREA RUNOFF(CFS) =    3.49
  EFFECTIVE AREA(ACRES) =      3.30     AREA-AVERAGED Fm(INCH/HR) =   0.17
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.85
  TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =       7.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =  15.44
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    206.00 =     725.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    18.00  DOWNSTREAM(FEET) =    13.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.91
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.68
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    9.91
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    207.00 =     795.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.91
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.743
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        1.90      0.20     0.100    75
  PUBLIC PARK               D        0.60      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.280
  SUBAREA AREA(ACRES) =    2.50      SUBAREA RUNOFF(CFS) =    6.05
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      13.69

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    191.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.00  DOWNSTREAM(FEET) =     5.50
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.7 INCHES
```

PIPE-FLOW VELOCITY(FEET/SEC.) = 16.29
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.69
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 10.00
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 191.00 = 880.00 FEET.

****
FLOW PROCESS FROM NODE 191.00 TO NODE 191.00 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.) = 10.00
RAINFALL INTENSITY(INCH/HR) = 2.73
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.60
EFFECTIVE STREAM AREA(ACRES) = 5.80
TOTAL STREAM AREA(ACRES) = 5.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.69

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	289.91	7.46	3.229	0.20(0.07)	0.33	93.3	300.00
1	313.48	8.89	2.918	0.20(0.07)	0.33	113.0	181.00
1	313.88	8.92	2.913	0.20(0.07)	0.33	113.3	170.00
1	318.35	9.32	2.841	0.20(0.07)	0.33	118.4	186.00
1	323.65	9.88	2.748	0.20(0.07)	0.34	125.0	176.00
1	344.44	12.36	2.416	0.20(0.07)	0.34	153.1	107.00
1	346.61	12.76	2.373	0.20(0.07)	0.34	157.5	160.00
1	347.61	13.08	2.340	0.20(0.07)	0.34	160.5	151.00
1	345.33	15.90	2.092	0.20(0.07)	0.35	182.0	101.00
1	344.15	16.93	2.018	0.20(0.07)	0.35	188.9	118.00
1	343.78	17.03	2.011	0.20(0.07)	0.35	189.5	136.00
1	339.78	17.58	1.975	0.20(0.07)	0.35	191.0	146.00
1	307.16	21.81	1.745	0.20(0.07)	0.35	197.7	112.00
1	290.25	24.27	1.642	0.20(0.07)	0.36	199.6	126.00
2	47.49	17.77	1.963	0.20(0.10)	0.48	28.2	192.00
3	13.69	10.00	2.729	0.20(0.12)	0.60	5.8	203.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	335.51	7.46	3.229	0.20(0.07)	0.36	109.4	300.00
2	362.48	8.89	2.918	0.20(0.07)	0.36	132.3	181.00
3	362.95	8.92	2.913	0.20(0.07)	0.36	132.7	170.00
4	368.28	9.32	2.841	0.20(0.07)	0.36	138.6	186.00
5	374.78	9.88	2.748	0.20(0.07)	0.36	146.4	176.00
6	376.04	10.00	2.729	0.20(0.07)	0.36	148.1	203.00
7	397.56	12.36	2.416	0.20(0.07)	0.36	178.6	107.00
8	400.03	12.76	2.373	0.20(0.07)	0.36	183.5	160.00
9	401.26	13.08	2.340	0.20(0.07)	0.36	187.1	151.00
10	401.11	15.90	2.092	0.20(0.07)	0.37	213.1	101.00
11	400.69	16.93	2.018	0.20(0.07)	0.37	221.6	118.00
12	400.40	17.03	2.011	0.20(0.07)	0.37	222.3	136.00
13	396.80	17.58	1.975	0.20(0.07)	0.37	224.7	146.00
14	395.48	17.77	1.963	0.20(0.07)	0.37	225.3	192.00
15	357.63	21.81	1.745	0.20(0.08)	0.38	231.7	112.00
16	337.54	24.27	1.642	0.20(0.08)	0.38	233.6	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 401.26 Tc(MIN.) = 13.08
EFFECTIVE AREA(ACRES) = 187.10 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 233.6
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 191.00 = 8355.00 FEET.

```
****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    207.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     5.50  DOWNSTREAM(FEET) =     3.30
  FLOW LENGTH(FEET) =   485.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  67.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.09
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     401.26
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   13.75
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    207.20 =    8840.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.20 TO NODE    208.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     3.30  DOWNSTREAM(FEET) =     2.20
  FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  58.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.20
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     401.26
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   13.86
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    208.00 =    8950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 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.) =   13.86
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.36
  EFFECTIVE STREAM AREA(ACRES) =     187.10
  TOTAL STREAM AREA(ACRES) =     233.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     401.26

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    210.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =     26.00  DOWNSTREAM(FEET) =     17.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.002
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.656
  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        1.40      0.20     0.100    75    6.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      4.58
  TOTAL AREA(ACRES) =      1.40   PEAK FLOW RATE(CFS) =      4.58

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =   17.00  DOWNSTREAM ELEVATION(FEET) =   14.00
  STREET LENGTH(FEET) =   270.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.16
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   14.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.18
  STREET FLOW TRAVEL TIME(MIN.) =   1.56   Tc(MIN.) =    7.56
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.202
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.10      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) =    1.10      SUBAREA RUNOFF(CFS) =    3.15
  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) =        2.5        PEAK FLOW RATE(CFS) =       7.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.07
  FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.28
  LONGEST FLOWPATH FROM NODE    209.00 TO NODE    211.00 =     570.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    208.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     9.00  DOWNSTREAM(FEET) =     2.20
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.50
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.16
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    7.70
  LONGEST FLOWPATH FROM NODE    209.00 TO NODE    208.00 =     670.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 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.) =    7.70
  RAINFALL INTENSITY(INCH/HR) =   3.17
  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) =       2.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.16

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      335.51    8.26    3.044  0.20( 0.07) 0.36     109.4     300.00
```

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                                                    DPHOSR
      1      362.48    9.69    2.778  0.20( 0.07) 0.36     132.3     181.00
      1      362.95    9.72    2.773  0.20( 0.07) 0.36     132.7     170.00
      1      368.28   10.12    2.711  0.20( 0.07) 0.36     138.6     186.00
      1      374.78   10.66    2.631  0.20( 0.07) 0.36     146.4     176.00
      1      376.04   10.78    2.613  0.20( 0.07) 0.36     148.1     203.00
      1      397.56   13.15    2.333  0.20( 0.07) 0.36     178.6     107.00
      1      400.03   13.55    2.293  0.20( 0.07) 0.36     183.5     160.00
      1      401.26   13.86    2.263  0.20( 0.07) 0.36     187.1     151.00
      1      401.11   16.68    2.035  0.20( 0.07) 0.37     213.1     101.00
      1      400.69   17.71    1.967  0.20( 0.07) 0.37     221.6     118.00
      1      400.40   17.81    1.960  0.20( 0.07) 0.37     222.3     136.00
      1      396.80   18.36    1.927  0.20( 0.07) 0.37     224.7     146.00
      1      395.48   18.55    1.915  0.20( 0.07) 0.37     225.3     192.00
      1      357.63   22.61    1.710  0.20( 0.08) 0.38     231.7     112.00
      1      337.54   25.08    1.611  0.20( 0.08) 0.38     233.6     126.00
      2        7.16    7.70    3.170  0.20( 0.02) 0.10       2.5     209.00

  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      332.99    7.70    3.170  0.20( 0.07) 0.35     104.4     209.00
      2      342.39    8.26    3.044  0.20( 0.07) 0.35     111.9     300.00
      3      368.75    9.69    2.778  0.20( 0.07) 0.36     134.8     181.00
      4      369.20    9.72    2.773  0.20( 0.07) 0.36     135.2     170.00
      5      374.40   10.12    2.711  0.20( 0.07) 0.36     141.1     186.00
      6      380.71   10.66    2.631  0.20( 0.07) 0.36     148.9     176.00
      7      381.94   10.78    2.613  0.20( 0.07) 0.36     150.6     203.00
      8      402.82   13.15    2.333  0.20( 0.07) 0.36     181.1     107.00
      9      405.20   13.55    2.293  0.20( 0.07) 0.36     186.0     160.00
     10      406.36   13.86    2.263  0.20( 0.07) 0.36     189.6     151.00
     11      405.69   16.68    2.035  0.20( 0.07) 0.37     215.6     101.00
     12      405.11   17.71    1.967  0.20( 0.07) 0.37     224.1     118.00
     13      404.80   17.81    1.960  0.20( 0.07) 0.37     224.8     136.00
     14      401.13   18.36    1.927  0.20( 0.07) 0.37     227.2     146.00
     15      399.78   18.55    1.915  0.20( 0.07) 0.37     227.8     192.00
     16      361.47   22.61    1.710  0.20( 0.07) 0.37     234.2     112.00
     17      341.16   25.08    1.611  0.20( 0.07) 0.37     236.1     126.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     406.36    Tc(MIN.) =    13.86
  EFFECTIVE AREA(ACRES) =     189.60   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =      236.1
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    208.00 =    8950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     2.20  DOWNSTREAM(FEET) =     0.70
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.54
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     406.36
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   14.01
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    212.00 =    9100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 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.) =   14.01
  RAINFALL INTENSITY(INCH/HR) =   2.25
  AREA-AVERAGED Fm(INCH/HR) =  0.07
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.36
  EFFECTIVE STREAM AREA(ACRES) =     189.60
  TOTAL STREAM AREA(ACRES) =     236.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     406.36

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    214.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =     27.00  DOWNSTREAM(FEET) =     20.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.311
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.552
  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        0.50      0.20     0.100    75    6.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.59
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.59

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    215.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   20.00  DOWNSTREAM ELEVATION(FEET) =   11.50
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.72
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.19
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.44
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   1.45   Tc(MIN.) =    7.76
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.155
  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
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.26
  EFFECTIVE AREA(ACRES) =      1.30    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       3.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.36
  FLOW VELOCITY(FEET/SEC.) =  3.69   DEPTH*VELOCITY(FT*FT/SEC.) =   1.16
  LONGEST FLOWPATH FROM NODE    213.00 TO NODE    215.00 =     600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
```

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 6.50 DOWNSTREAM(FEET) = 0.70
FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.67
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.67
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 8.05
LONGEST FLOWPATH FROM NODE 213.00 TO NODE 212.00 = 750.00 FEET.

****

FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 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.) = 8.05
RAINFALL INTENSITY(INCH/HR) = 3.09
AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.30
TOTAL STREAM AREA(ACRES) = 1.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.67

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	332.99	7.86	3.133	0.20(0.07)	0.35	104.4	209.00
1	342.39	8.42	3.011	0.20(0.07)	0.35	111.9	300.00
1	368.75	9.85	2.753	0.20(0.07)	0.36	134.8	181.00
1	369.20	9.88	2.748	0.20(0.07)	0.36	135.2	170.00
1	374.40	10.27	2.687	0.20(0.07)	0.36	141.1	186.00
1	380.71	10.82	2.609	0.20(0.07)	0.36	148.9	176.00
1	381.94	10.94	2.592	0.20(0.07)	0.36	150.6	203.00
1	402.82	13.30	2.318	0.20(0.07)	0.36	181.1	107.00
1	405.20	13.70	2.279	0.20(0.07)	0.36	186.0	160.00
1	406.36	14.01	2.249	0.20(0.07)	0.36	189.6	151.00
1	405.69	16.83	2.025	0.20(0.07)	0.37	215.6	101.00
1	405.11	17.86	1.957	0.20(0.07)	0.37	224.1	118.00
1	404.80	17.97	1.951	0.20(0.07)	0.37	224.8	136.00
1	401.13	18.51	1.917	0.20(0.07)	0.37	227.2	146.00
1	399.78	18.70	1.906	0.20(0.07)	0.37	227.8	192.00
1	361.47	22.77	1.703	0.20(0.07)	0.37	234.2	112.00
1	341.16	25.24	1.606	0.20(0.07)	0.37	236.1	126.00
2	3.67	8.05	3.090	0.20(0.02)	0.10	1.3	213.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	336.61	7.86	3.133	0.20(0.07)	0.35	105.7	209.00
2	339.91	8.05	3.090	0.20(0.07)	0.35	108.3	213.00
3	345.96	8.42	3.011	0.20(0.07)	0.35	113.2	300.00
4	372.02	9.85	2.753	0.20(0.07)	0.35	136.1	181.00
5	372.46	9.88	2.748	0.20(0.07)	0.35	136.5	170.00
6	377.59	10.27	2.687	0.20(0.07)	0.35	142.4	186.00
7	383.80	10.82	2.609	0.20(0.07)	0.36	150.2	176.00
8	385.01	10.94	2.592	0.20(0.07)	0.36	151.9	203.00
9	405.56	13.30	2.318	0.20(0.07)	0.36	182.4	107.00
10	407.90	13.70	2.279	0.20(0.07)	0.36	187.3	160.00
11	409.03	14.01	2.249	0.20(0.07)	0.36	190.9	151.00
12	408.08	16.83	2.025	0.20(0.07)	0.37	216.9	101.00
13	407.43	17.86	1.957	0.20(0.07)	0.37	225.4	118.00
14	407.11	17.97	1.951	0.20(0.07)	0.37	226.1	136.00
15	403.40	18.51	1.917	0.20(0.07)	0.37	228.5	146.00
16	402.04	18.70	1.906	0.20(0.07)	0.37	229.1	192.00

17	363.48	22.77	1.703	0.20(0.07)	0.37	235.5	112.00
18	343.05	25.24	1.606	0.20(0.07)	0.37	237.4	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 409.03 Tc(MIN.) = 14.01
EFFECTIVE AREA(ACRES) = 190.90 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 237.4
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 212.00 = 9100.00 FEET.

****
FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 0.70 DOWNSTREAM(FEET) = 0.20
FLOW LENGTH(FEET) = 5.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 39.02
ESTIMATED PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 409.03
PIPE TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 14.01
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 213.00 = 9105.00 FEET.

****
FLOW PROCESS FROM NODE 213.00 TO NODE 213.20 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 0.20 DOWNSTREAM(FEET) = 0.10
FLOW LENGTH(FEET) = 25.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 87.0 INCH PIPE IS 69.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.62
ESTIMATED PIPE DIAMETER(INCH) = 87.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 409.03
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 14.05
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 213.20 = 9130.00 FEET.

****
FLOW PROCESS FROM NODE 213.20 TO NODE 213.20 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.) = 14.05
RAINFALL INTENSITY(INCH/HR) = 2.25
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.36
EFFECTIVE STREAM AREA(ACRES) = 190.90
TOTAL STREAM AREA(ACRES) = 237.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 409.03

****
FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========
INITIAL SUBAREA FLOW-LENGTH(FEET) = 200.00
ELEVATION DATA: UPSTREAM(FEET) = 11.80 DOWNSTREAM(FEET) = 8.90

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.902
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.691
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	D	0.20	0.20	0.100	75	5.90

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.66
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.66

****************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    217.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     3.90  DOWNSTREAM(FEET) =     2.90
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.14
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.66
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.00
  LONGEST FLOWPATH FROM NODE    215.00 TO NODE    217.00 =     230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.657
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.50      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) =    0.50      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      0.70   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.7       PEAK FLOW RATE(CFS) =       2.29

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    213.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     2.90  DOWNSTREAM(FEET) =     0.10
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.23
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.29
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    6.12
  LONGEST FLOWPATH FROM NODE    215.00 TO NODE    213.20 =     290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    213.20 TO NODE    213.20 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.) =    6.12
  RAINFALL INTENSITY(INCH/HR) =   3.62
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.70
  TOTAL STREAM AREA(ACRES) =       0.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.29

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

DPHOSR

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)		(ACRES)	NODE
1	336.61	7.90	3.124	0.20(0.07)	0.35	105.7	209.00
1	339.91	8.09	3.081	0.20(0.07)	0.35	108.3	213.00
1	345.96	8.46	3.003	0.20(0.07)	0.35	113.2	300.00
1	372.02	9.89	2.747	0.20(0.07)	0.35	136.1	181.00
1	372.46	9.92	2.742	0.20(0.07)	0.35	136.5	170.00
1	377.59	10.31	2.681	0.20(0.07)	0.35	142.4	186.00
1	383.80	10.85	2.604	0.20(0.07)	0.36	150.2	176.00
1	385.01	10.98	2.587	0.20(0.07)	0.36	151.9	203.00
1	405.56	13.34	2.314	0.20(0.07)	0.36	182.4	107.00
1	407.90	13.74	2.275	0.20(0.07)	0.36	187.3	160.00
1	409.03	14.05	2.246	0.20(0.07)	0.36	190.9	151.00
1	408.08	16.87	2.022	0.20(0.07)	0.37	216.9	101.00
1	407.43	17.90	1.955	0.20(0.07)	0.37	225.4	118.00
1	407.11	18.00	1.948	0.20(0.07)	0.37	226.1	136.00
1	403.40	18.55	1.915	0.20(0.07)	0.37	228.5	146.00
1	402.04	18.74	1.904	0.20(0.07)	0.37	229.1	192.00
1	363.48	22.81	1.701	0.20(0.07)	0.37	235.5	112.00
1	343.05	25.27	1.604	0.20(0.07)	0.37	237.4	126.00
2	2.29	6.12	3.615	0.20(0.02)	0.10	0.7	215.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	305.16	6.12	3.615	0.20(0.07)	0.35	82.6	215.00
2	338.59	7.90	3.124	0.20(0.07)	0.35	106.4	209.00
3	341.86	8.09	3.081	0.20(0.07)	0.35	109.0	213.00
4	347.86	8.46	3.003	0.20(0.07)	0.35	113.9	300.00
5	373.75	9.89	2.747	0.20(0.07)	0.35	136.8	181.00
6	374.20	9.92	2.742	0.20(0.07)	0.35	137.2	170.00
7	379.28	10.31	2.681	0.20(0.07)	0.35	143.1	186.00
8	385.45	10.85	2.604	0.20(0.07)	0.35	150.9	176.00
9	386.65	10.98	2.587	0.20(0.07)	0.35	152.6	203.00
10	407.03	13.34	2.314	0.20(0.07)	0.36	183.1	107.00
11	409.33	13.74	2.275	0.20(0.07)	0.36	188.0	160.00
12	410.45	14.05	2.246	0.20(0.07)	0.36	191.6	151.00
13	409.36	16.87	2.022	0.20(0.07)	0.37	217.6	101.00
14	408.66	17.90	1.955	0.20(0.07)	0.37	226.1	118.00
15	408.34	18.00	1.948	0.20(0.07)	0.37	226.8	136.00
16	404.60	18.55	1.915	0.20(0.07)	0.37	229.2	146.00
17	403.24	18.74	1.904	0.20(0.07)	0.37	229.8	192.00
18	364.56	22.81	1.701	0.20(0.07)	0.37	236.2	112.00
19	344.06	25.27	1.604	0.20(0.07)	0.37	238.1	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 410.45 Tc(MIN.) = 14.05
EFFECTIVE AREA(ACRES) = 191.60 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 238.1
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 213.20 = 9130.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 238.1 TC(MIN.) = 14.05
EFFECTIVE AREA(ACRES) = 191.60 AREA-AVERAGED Fm(INCH/HR)= 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.359
PEAK FLOW RATE(CFS) = 410.45

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	305.16	6.12	3.615	0.20(0.07)	0.35	82.6	215.00
2	338.59	7.90	3.124	0.20(0.07)	0.35	106.4	209.00
3	341.86	8.09	3.081	0.20(0.07)	0.35	109.0	213.00
4	347.86	8.46	3.003	0.20(0.07)	0.35	113.9	300.00
5	373.75	9.89	2.747	0.20(0.07)	0.35	136.8	181.00
6	374.20	9.92	2.742	0.20(0.07)	0.35	137.2	170.00
7	379.28	10.31	2.681	0.20(0.07)	0.35	143.1	186.00
8	385.45	10.85	2.604	0.20(0.07)	0.35	150.9	176.00
9	386.65	10.98	2.587	0.20(0.07)	0.35	152.6	203.00
10	407.03	13.34	2.314	0.20(0.07)	0.36	183.1	107.00

```
                                                          DPHOSR
     11      409.33   13.74    2.275  0.20( 0.07) 0.36     188.0     160.00
     12      410.45   14.05    2.246  0.20( 0.07) 0.36     191.6     151.00
     13      409.36   16.87    2.022  0.20( 0.07) 0.37     217.6     101.00
     14      408.66   17.90    1.955  0.20( 0.07) 0.37     226.1     118.00
     15      408.34   18.00    1.948  0.20( 0.07) 0.37     226.8     136.00
     16      404.60   18.55    1.915  0.20( 0.07) 0.37     229.2     146.00
     17      403.24   18.74    1.904  0.20( 0.07) 0.37     229.8     192.00
     18      364.56   22.81    1.701  0.20( 0.07) 0.37     236.2     112.00
     19      344.06   25.27    1.604  0.20( 0.07) 0.37     238.1     126.00
=============================================================================
=============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

B.3

Proposed 10-Year 60" Hydrology W/ Harbor


```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 19.0  Release Date: 06/01/2012  License ID 1355

                        Analysis prepared by:

                      Fuscoe Engineering, Inc.
                          16795 Von Karman
                            Suite 100
                          Irvine, CA 92606

------------------------------------------------------------------------
  FILE NAME: DPHOSP2.DAT
  TIME/DATE OF STUDY: 08:56 04/29/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *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
  2   18.0      5.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.67 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint = 10.0 (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     101.00 TO NODE     102.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   280.00
  ELEVATION DATA: UPSTREAM(FEET) =     295.00  DOWNSTREAM(FEET) =    290.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.288
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20       0.500    75    8.29
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.44
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.44

************************************************************************
  FLOW PROCESS FROM NODE     102.00 TO NODE     103.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  290.00  DOWNSTREAM ELEVATION(FEET) =  285.00
```

```
  STREET LENGTH(FEET) =   135.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.66
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.65
  STREET FLOW TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =    8.77
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.942
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.50      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.50      SUBAREA RUNOFF(CFS) =    6.39
  EFFECTIVE AREA(ACRES) =      3.80    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       9.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.35
  FLOW VELOCITY(FEET/SEC.) =  5.11   DEPTH*VELOCITY(FT*FT/SEC.) =   2.01
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =     415.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  285.00  DOWNSTREAM ELEVATION(FEET) =  253.00
  STREET LENGTH(FEET) =   345.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.11
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.13
  STREET FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    9.51
  *  10 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
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.60      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    8.78
  EFFECTIVE AREA(ACRES) =      7.40    AREA-AVERAGED Fm(INCH/HR) =  0.10
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        7.4        PEAK FLOW RATE(CFS) =      18.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.96
  FLOW VELOCITY(FEET/SEC.) =  8.23   DEPTH*VELOCITY(FT*FT/SEC.) =   3.54
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    104.00 =     760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  253.00  DOWNSTREAM ELEVATION(FEET) =  225.00
  STREET LENGTH(FEET) =   630.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.24
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.11
  STREET FLOW TRAVEL TIME(MIN.) =   1.65   Tc(MIN.) =   11.16
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.563
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.70      0.20     0.500    75
  PUBLIC PARK                D        0.10      0.20     0.850    75
  COMMERCIAL                 D        1.10      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.287
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    4.28
  EFFECTIVE AREA(ACRES) =      9.30    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        9.3        PEAK FLOW RATE(CFS) =      20.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.40
  FLOW VELOCITY(FEET/SEC.) =  6.43   DEPTH*VELOCITY(FT*FT/SEC.) =   3.16
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    105.00 =    1390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   204.30  DOWNSTREAM(FEET) =   202.30
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.69
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   11.18
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    106.00 =    1415.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =   11.18
  RAINFALL INTENSITY(INCH/HR) =   2.56
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.46
  EFFECTIVE STREAM AREA(ACRES) =       9.30
  TOTAL STREAM AREA(ACRES) =       9.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.69

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 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) =    330.00  DOWNSTREAM(FEET) =    320.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.880
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.699
  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
  "11+ DWELLINGS/ACRE"       D        1.00      0.20     0.200    75    5.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      3.29
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.29

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   310.00  DOWNSTREAM(FEET) =   265.00
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.15
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.29
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    6.14
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    109.00 =     505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.14
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.609
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        3.90      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =   12.53
  EFFECTIVE AREA(ACRES) =      4.90   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      15.74

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   265.00  DOWNSTREAM(FEET) =   258.00
  FLOW LENGTH(FEET) =   560.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.74
  PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =    7.31
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    110.00 =    1065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.31
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.265
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.30      0.20     0.500    75
  PUBLIC PARK                D        2.10      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.716
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    9.55
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      23.77

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   258.00  DOWNSTREAM(FEET) =   238.00
  FLOW LENGTH(FEET) =   175.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.77
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    7.45
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    111.00 =    1240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.229
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        5.50      0.20     0.500    75
  PUBLIC PARK                D        0.80      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.544
  SUBAREA AREA(ACRES) =    6.30      SUBAREA RUNOFF(CFS) =   17.69
  EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      41.20

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   238.00  DOWNSTREAM(FEET) =   202.30
```

```
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.38
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.20
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    7.60
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    106.00 =    1475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =    7.60
  RAINFALL INTENSITY(INCH/HR) =   3.19
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.47
  EFFECTIVE STREAM AREA(ACRES) =      14.60
  TOTAL STREAM AREA(ACRES) =      14.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.20

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       20.69   11.18    2.560  0.20( 0.09) 0.46       9.3     101.00
      2       41.20    7.60    3.193  0.20( 0.09) 0.47      14.6     107.00

  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       58.87    7.60    3.193  0.20( 0.09) 0.47      20.9     107.00
      2       53.47   11.18    2.560  0.20( 0.09) 0.46      23.9     101.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      58.87    Tc(MIN.) =     7.60
  EFFECTIVE AREA(ACRES) =      20.92   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.9
  LONGEST FLOWPATH FROM NODE    107.00 TO NODE    106.00 =    1475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    330.00  DOWNSTREAM(FEET) =    328.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.309
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.543
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.10      0.20     0.500    75   11.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.42
```

```
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.70  DOWNSTREAM ELEVATION(FEET) =  327.40
  STREET LENGTH(FEET) =   225.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.00
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.17
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
  STREET FLOW TRAVEL TIME(MIN.) =   2.16   Tc(MIN.) =   13.47
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.301
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.60      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    3.17
  EFFECTIVE AREA(ACRES) =      2.70    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.7        PEAK FLOW RATE(CFS) =       5.35

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.52
  FLOW VELOCITY(FEET/SEC.) =  1.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.66
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    114.00 =     525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   312.40  DOWNSTREAM(FEET) =   310.80
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.34
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.35
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   14.03
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    115.00 =     705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.03
  *  10 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
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.30      0.20     0.500    75
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    2.51
  EFFECTIVE AREA(ACRES) =      4.00   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.0       PEAK FLOW RATE(CFS) =       7.73

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   310.80  DOWNSTREAM(FEET) =   247.20
  FLOW LENGTH(FEET) =   825.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.35
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.73
  PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =   15.06
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    116.00 =    1530.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.06
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.158
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        4.60      0.20     0.500    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.461
  SUBAREA AREA(ACRES) =    5.10      SUBAREA RUNOFF(CFS) =    9.48
  EFFECTIVE AREA(ACRES) =      9.10   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.1       PEAK FLOW RATE(CFS) =      16.89

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   247.20  DOWNSTREAM(FEET) =   234.20
  FLOW LENGTH(FEET) =   765.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.16
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.89
  PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =   16.45
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    117.00 =    2295.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.00      0.20     0.500    75
  COMMERCIAL                 D        0.40      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.386
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    2.49
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```
  EFFECTIVE AREA(ACRES) =     10.50   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       10.5       PEAK FLOW RATE(CFS) =      18.51

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.10      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.10      SUBAREA RUNOFF(CFS) =    5.44
  EFFECTIVE AREA(ACRES) =     13.60   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       13.6       PEAK FLOW RATE(CFS) =      23.95

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   234.20  DOWNSTREAM(FEET) =   228.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.99
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.95
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   16.56
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    125.00 =    2395.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.56
  RAINFALL INTENSITY(INCH/HR) =   2.04
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.47
  EFFECTIVE STREAM AREA(ACRES) =      13.60
  TOTAL STREAM AREA(ACRES) =      13.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      23.95

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    336.00  DOWNSTREAM(FEET) =    328.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.463
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.227
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.70      0.20     0.500    75    7.46
  PUBLIC PARK                D        0.20      0.20     0.850    75    9.27
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

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  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.537
  SUBAREA RUNOFF(CFS) =      5.33
  TOTAL AREA(ACRES) =      1.90   PEAK FLOW RATE(CFS) =      5.33

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  307.00
  STREET LENGTH(FEET) =   675.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.08
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.00
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.31
  STREET FLOW TRAVEL TIME(MIN.) =   2.81   Tc(MIN.) =   10.28
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.20      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.20      SUBAREA RUNOFF(CFS) =    7.45
  EFFECTIVE AREA(ACRES) =      5.10    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.1        PEAK FLOW RATE(CFS) =      11.86

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.34
  FLOW VELOCITY(FEET/SEC.) =  4.22   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    120.00 =     950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  307.00  DOWNSTREAM ELEVATION(FEET) =  301.00
  STREET LENGTH(FEET) =   115.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.99
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.06
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.10
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  STREET FLOW TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =   10.61
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.638
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.70      0.20     0.500    75
  PUBLIC PARK                D        1.90      0.20     0.850    75
  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 =  0.564
  SUBAREA AREA(ACRES) =    5.40      SUBAREA RUNOFF(CFS) =   12.27
  EFFECTIVE AREA(ACRES) =     10.50    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       10.5        PEAK FLOW RATE(CFS) =      23.91

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.59
  FLOW VELOCITY(FEET/SEC.) =  6.09   DEPTH*VELOCITY(FT*FT/SEC.) =   2.42
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    121.00 =    1065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   296.00  DOWNSTREAM(FEET) =   280.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.89
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.91
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   10.80
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    122.00 =    1265.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  280.00  DOWNSTREAM ELEVATION(FEET) =  262.00
  STREET LENGTH(FEET) =   270.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.22
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.53
    HALFSTREET FLOOD WIDTH(FEET) =   20.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.50
  STREET FLOW TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =   11.33
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.540
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        7.90      0.20     0.500    75
  PUBLIC PARK                D        0.90      0.20     0.850    75
  COMMERCIAL                 D        0.60      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.508
  SUBAREA AREA(ACRES) =    9.40      SUBAREA RUNOFF(CFS) =   20.63
```

```
  EFFECTIVE AREA(ACRES) =     19.90    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       19.9        PEAK FLOW RATE(CFS) =      43.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.57   HALFSTREET FLOOD WIDTH(FEET) =  22.85
  FLOW VELOCITY(FEET/SEC.) =  8.98   DEPTH*VELOCITY(FT*FT/SEC.) =   5.12
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    123.00 =    1535.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  262.00  DOWNSTREAM ELEVATION(FEET) =  239.00
  STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      44.16
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.55
    HALFSTREET FLOOD WIDTH(FEET) =   21.60
    AVERAGE FLOW VELOCITY(FEET/SEC.) =   10.13
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.55
  STREET FLOW TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   11.74
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.489
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.20      0.20     0.850    75
  COMMERCIAL                 D        0.30      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.08
  EFFECTIVE AREA(ACRES) =     20.40    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       20.4        PEAK FLOW RATE(CFS) =      43.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  21.52
  FLOW VELOCITY(FEET/SEC.) = 10.11   DEPTH*VELOCITY(FT*FT/SEC.) =   5.53
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    124.00 =    1785.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   232.60  DOWNSTREAM(FEET) =   228.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.44
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      43.78
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    125.00 =    1855.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 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.) =   11.80
  RAINFALL INTENSITY(INCH/HR) =   2.48
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.52
  EFFECTIVE STREAM AREA(ACRES) =      20.40
  TOTAL STREAM AREA(ACRES) =      20.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      43.78

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       23.95   16.56    2.044  0.20( 0.09) 0.47      13.6     112.00
      2       43.78   11.80    2.481  0.20( 0.10) 0.52      20.4     118.00

  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       64.69   11.80    2.481  0.20( 0.10) 0.51      30.1     118.00
      2       59.68   16.56    2.044  0.20( 0.10) 0.50      34.0     112.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      64.69    Tc(MIN.) =    11.80
  EFFECTIVE AREA(ACRES) =      30.10   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =       34.0
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    125.00 =    2395.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   228.00  DOWNSTREAM(FEET) =   224.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.69
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   11.84
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    132.00 =    2445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 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.) =   11.84
  RAINFALL INTENSITY(INCH/HR) =   2.48
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =      30.10
  TOTAL STREAM AREA(ACRES) =      34.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      64.69

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    322.00  DOWNSTREAM(FEET) =    320.50
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.589
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.977
  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
  "11+ DWELLINGS/ACRE"       D        0.40      0.20     0.200    75    9.15
  COMMERCIAL                 D        0.20      0.20     0.100    75    8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.167
  SUBAREA RUNOFF(CFS) =      1.59
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.59

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  320.50  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   600.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   12.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.60
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   6.23   Tc(MIN.) =   14.82
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.178
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.40      0.20     0.500    75
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.20      0.20     0.200    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.264
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    2.10
  EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       3.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.02
  FLOW VELOCITY(FEET/SEC.) =  1.67   DEPTH*VELOCITY(FT*FT/SEC.) =   0.69
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    128.00 =     900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    129.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  318.00  DOWNSTREAM ELEVATION(FEET) =  302.00
  STREET LENGTH(FEET) =   640.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
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  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   14.57
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.77
  STREET FLOW TRAVEL TIME(MIN.) =   2.55   Tc(MIN.) =   17.37
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.989
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        5.50      0.20     0.500    75
  COMMERCIAL                 D        0.90      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.444
  SUBAREA AREA(ACRES) =    6.40      SUBAREA RUNOFF(CFS) =   10.94
  EFFECTIVE AREA(ACRES) =      8.10    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        8.1        PEAK FLOW RATE(CFS) =      13.92

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.62
  FLOW VELOCITY(FEET/SEC.) =  4.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.24
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    129.00 =    1540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    130.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  302.00  DOWNSTREAM ELEVATION(FEET) =  264.00
  STREET LENGTH(FEET) =   450.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.54
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.58
  STREET FLOW TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =   18.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.930
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        6.10      0.20     0.500    75
  COMMERCIAL                 D        0.70      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.459
  SUBAREA AREA(ACRES) =    6.80      SUBAREA RUNOFF(CFS) =   11.25
  EFFECTIVE AREA(ACRES) =     14.90    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =       14.9        PEAK FLOW RATE(CFS) =      24.74
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  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.38
  FLOW VELOCITY(FEET/SEC.) =  8.55   DEPTH*VELOCITY(FT*FT/SEC.) =   4.05
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    130.00 =    1990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  264.00  DOWNSTREAM ELEVATION(FEET) =  242.00
  STREET LENGTH(FEET) =   310.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.09
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.91
  STREET FLOW TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   18.95
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.892
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.40      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) =    0.40      SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =     15.30    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       15.3        PEAK FLOW RATE(CFS) =      24.91

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.09
  FLOW VELOCITY(FEET/SEC.) =  8.00   DEPTH*VELOCITY(FT*FT/SEC.) =   3.88
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    131.00 =    2300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   237.10  DOWNSTREAM(FEET) =   224.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.36
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.91
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   18.97
  LONGEST FLOWPATH FROM NODE    126.00 TO NODE    132.00 =    2350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 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.) =   18.97
```

RAINFALL INTENSITY(INCH/HR) = 1.89
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.42
EFFECTIVE STREAM AREA(ACRES) = 15.30
TOTAL STREAM AREA(ACRES) = 15.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 24.91

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	64.69	11.84	2.477	0.20(0.10)	0.51	30.1	118.00
1	59.68	16.59	2.042	0.20(0.10)	0.50	34.0	112.00
2	24.91	18.97	1.891	0.20(0.08)	0.42	15.3	126.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	85.27	11.84	2.477	0.20(0.10)	0.48	39.6	118.00
2	83.28	16.59	2.042	0.20(0.10)	0.48	47.4	112.00
3	79.94	18.97	1.891	0.20(0.10)	0.48	49.3	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 85.27 Tc(MIN.) = 11.84
EFFECTIVE AREA(ACRES) = 39.64 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.48
TOTAL AREA(ACRES) = 49.3
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 132.00 = 2445.00 FEET.

****
FLOW PROCESS FROM NODE 132.00 TO NODE 106.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 224.00 DOWNSTREAM(FEET) = 202.30
FLOW LENGTH(FEET) = 445.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.96
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 85.27
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 12.21
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 106.00 = 2890.00 FEET.

****
FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	85.27	12.21	2.434	0.20(0.10)	0.48	39.6	118.00
2	83.28	16.97	2.016	0.20(0.10)	0.48	47.4	112.00
3	79.94	19.35	1.870	0.20(0.10)	0.48	49.3	126.00

LONGEST FLOWPATH FROM NODE 112.00 TO NODE 106.00 = 2890.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	58.87	7.60	3.193	0.20(0.09)	0.47	20.9	107.00
2	53.47	11.18	2.560	0.20(0.09)	0.46	23.9	101.00

LONGEST FLOWPATH FROM NODE 107.00 TO NODE 106.00 = 1475.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	129.21	7.60	3.193	0.20(0.10)	0.48	45.6	107.00
2	135.76	11.18	2.560	0.20(0.10)	0.48	60.2	101.00

```
     3      136.01   12.21    2.434  0.20( 0.10) 0.48      63.5     118.00
     4      124.96   16.97    2.016  0.20( 0.09) 0.47      71.3     112.00
     5      118.45   19.35    1.870  0.20( 0.09) 0.47      73.2     126.00
   TOTAL AREA(ACRES) =        73.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      136.01  Tc(MIN.) =   12.212
  EFFECTIVE AREA(ACRES) =     63.54  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       73.2
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    106.00 =    2890.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   202.30  DOWNSTREAM(FEET) =   141.50
  FLOW LENGTH(FEET) =  1090.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.96
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     136.01
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   12.97
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    135.00 =    3980.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.97
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.351
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        5.70      0.20     0.400    75
  COMMERCIAL                 D        0.60      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.371
  SUBAREA AREA(ACRES) =    6.30      SUBAREA RUNOFF(CFS) =   12.91
  EFFECTIVE AREA(ACRES) =     69.84   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       79.5       PEAK FLOW RATE(CFS) =     141.91

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      136.87    8.37    3.023  0.20( 0.09) 0.46      51.9     107.00
      2      141.96   11.94    2.465  0.20( 0.09) 0.47      66.5     101.00
      3      141.91   12.97    2.351  0.20( 0.09) 0.47      69.8     118.00
      4      130.72   17.73    1.965  0.20( 0.09) 0.47      77.6     112.00
      5      124.06   20.15    1.827  0.20( 0.09) 0.46      79.5     126.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     141.96  Tc(MIN.) =   11.94
  AREA-AVERAGED Fm(INCH/HR) =  0.09  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.47  EFFECTIVE AREA(ACRES) =      66.50

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    144.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   141.50  DOWNSTREAM(FEET) =   141.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.65
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     141.96
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.95
```

```
 LONGEST FLOWPATH FROM NODE    112.00 TO NODE    144.00 =    3995.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    144.00 TO NODE    144.00 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.) =   11.95
 RAINFALL INTENSITY(INCH/HR) =   2.46
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.47
 EFFECTIVE STREAM AREA(ACRES) =      66.50
 TOTAL STREAM AREA(ACRES) =      79.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     141.96

****************************************************************************
 FLOW PROCESS FROM NODE    136.00 TO NODE    137.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
 ELEVATION DATA: UPSTREAM(FEET) =    335.00  DOWNSTREAM(FEET) =    332.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.794
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.405
 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
 "11+ DWELLINGS/ACRE"       D        3.20      0.20     0.200    75    6.79
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      9.69
 TOTAL AREA(ACRES) =      3.20   PEAK FLOW RATE(CFS) =      9.69

****************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    138.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  332.00  DOWNSTREAM ELEVATION(FEET) =  308.00
 STREET LENGTH(FEET) =   575.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.16
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.42
   HALFSTREET FLOOD WIDTH(FEET) =   14.76
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.73
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.42
 STREET FLOW TRAVEL TIME(MIN.) =   1.67   Tc(MIN.) =    8.47
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.002
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        2.60      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 6.93
EFFECTIVE AREA(ACRES) = 5.80 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.20
TOTAL AREA(ACRES) = 5.8 PEAK FLOW RATE(CFS) = 15.46

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.44 HALFSTREET FLOOD WIDTH(FEET) = 15.70
FLOW VELOCITY(FEET/SEC.) = 5.99 DEPTH*VELOCITY(FT*FT/SEC.) = 2.64
LONGEST FLOWPATH FROM NODE 136.00 TO NODE 138.00 = 805.00 FEET.

****
FLOW PROCESS FROM NODE 138.00 TO NODE 139.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
==
UPSTREAM ELEVATION(FEET) = 308.00 DOWNSTREAM ELEVATION(FEET) = 280.00
STREET LENGTH(FEET) = 440.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 22.35
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.48
HALFSTREET FLOOD WIDTH(FEET) = 17.70
AVERAGE FLOW VELOCITY(FEET/SEC.) = 7.47
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.58
STREET FLOW TRAVEL TIME(MIN.) = 0.98 Tc(MIN.) = 9.45
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.819
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "11+ DWELLINGS/ACRE"	D	4.80	0.20	0.200	75
COMMERCIAL	D	0.70	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.187
SUBAREA AREA(ACRES) = 5.50 SUBAREA RUNOFF(CFS) = 13.77
EFFECTIVE AREA(ACRES) = 11.30 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.19
TOTAL AREA(ACRES) = 11.3 PEAK FLOW RATE(CFS) = 28.28

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.51 HALFSTREET FLOOD WIDTH(FEET) = 19.41
FLOW VELOCITY(FEET/SEC.) = 7.94 DEPTH*VELOCITY(FT*FT/SEC.) = 4.05
LONGEST FLOWPATH FROM NODE 136.00 TO NODE 139.00 = 1245.00 FEET.

****
FLOW PROCESS FROM NODE 139.00 TO NODE 140.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
==
UPSTREAM ELEVATION(FEET) = 280.00 DOWNSTREAM ELEVATION(FEET) = 255.00
STREET LENGTH(FEET) = 425.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.018
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150

```
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      29.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   20.12
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.07
  STREET FLOW TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =   10.36
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.675
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.50      0.20     0.500    75
  COMMERCIAL                 D        0.70      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.267
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.83
  EFFECTIVE AREA(ACRES) =     12.50    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       12.5        PEAK FLOW RATE(CFS) =      29.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.12
  FLOW VELOCITY(FEET/SEC.) =  7.78   DEPTH*VELOCITY(FT*FT/SEC.) =   4.06
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    140.00 =    1670.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    141.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   257.00  DOWNSTREAM(FEET) =   250.00
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.50
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.64
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   10.44
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    141.00 =    1765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    142.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  250.00  DOWNSTREAM ELEVATION(FEET) =  160.00
  STREET LENGTH(FEET) =  1225.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.56
    HALFSTREET FLOOD WIDTH(FEET) =   21.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    9.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.22   Tc(MIN.) =   12.66
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.384
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D       11.20      0.20     0.400    75
  COMMERCIAL                 D        0.30      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.392
  SUBAREA AREA(ACRES) =   11.50      SUBAREA RUNOFF(CFS) =   23.86
  EFFECTIVE AREA(ACRES) =     24.00    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =       24.0        PEAK FLOW RATE(CFS) =      50.23

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.59   HALFSTREET FLOOD WIDTH(FEET) =  23.71
  FLOW VELOCITY(FEET/SEC.) =  9.63   DEPTH*VELOCITY(FT*FT/SEC.) =   5.65
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    142.00 =    2990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    143.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   150.00  DOWNSTREAM(FEET) =   145.00
  FLOW LENGTH(FEET) =   285.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.97
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.23
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   13.05
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    143.00 =    3275.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    143.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.05
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.342
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        5.60      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    5.60      SUBAREA RUNOFF(CFS) =   11.40
  EFFECTIVE AREA(ACRES) =     29.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =       29.6       PEAK FLOW RATE(CFS) =      60.73

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    144.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   145.00  DOWNSTREAM(FEET) =   141.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.17
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.73
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.09
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    144.00 =    3320.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    144.00 TO NODE    144.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.09
```

```
  RAINFALL INTENSITY(INCH/HR) =   2.34
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.31
  EFFECTIVE STREAM AREA(ACRES) =      29.60
  TOTAL STREAM AREA(ACRES) =      29.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      60.73

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      136.87    8.38    3.020  0.20( 0.09) 0.46      51.9     107.00
      1      141.96   11.95    2.464  0.20( 0.09) 0.47      66.5     101.00
      1      141.91   12.98    2.350  0.20( 0.09) 0.47      69.8     118.00
      1      130.72   17.75    1.964  0.20( 0.09) 0.47      77.6     112.00
      1      124.06   20.16    1.826  0.20( 0.09) 0.46      79.5     126.00
      2       60.73   13.09    2.339  0.20( 0.06) 0.31      29.6     136.00

  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      187.38    8.38    3.020  0.20( 0.08) 0.42      70.9     107.00
      2      200.47   11.95    2.464  0.20( 0.08) 0.42      93.5     101.00
      3      202.44   12.98    2.350  0.20( 0.08) 0.42      99.2     118.00
      4      202.40   13.09    2.339  0.20( 0.08) 0.42      99.6     136.00
      5      181.46   17.75    1.964  0.20( 0.08) 0.42     107.2     112.00
      6      171.11   20.16    1.826  0.20( 0.08) 0.42     109.1     126.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     202.44    Tc(MIN.) =    12.98
  EFFECTIVE AREA(ACRES) =      99.21   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =      109.1
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    144.00 =    3995.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    144.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   141.00  DOWNSTREAM(FEET) =   139.00
  FLOW LENGTH(FEET) =   325.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  47.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.57
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     202.44
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.45
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    145.00 =    4320.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 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.) =   13.45
  RAINFALL INTENSITY(INCH/HR) =   2.30
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.42
  EFFECTIVE STREAM AREA(ACRES) =      99.21
  TOTAL STREAM AREA(ACRES) =     109.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     202.44

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    147.00 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) =    218.00  DOWNSTREAM(FEET) =    216.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.364
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.833
  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        1.20      0.20     0.400    75    9.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.97
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      2.97

********************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    148.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  216.00  DOWNSTREAM ELEVATION(FEET) =  210.00
  STREET LENGTH(FEET) =   405.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.14
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.20
  STREET FLOW TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   11.51
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.517
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        2.30      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    5.05
  EFFECTIVE AREA(ACRES) =      3.50    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.5        PEAK FLOW RATE(CFS) =       7.68

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.60
  FLOW VELOCITY(FEET/SEC.) =  3.41   DEPTH*VELOCITY(FT*FT/SEC.) =   1.43
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    148.00 =     675.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    148.00 TO NODE    149.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  210.00  DOWNSTREAM ELEVATION(FEET) =  175.00
  STREET LENGTH(FEET) =   475.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
```

```
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.36
  STREET FLOW TRAVEL TIME(MIN.) =   1.20   Tc(MIN.) =   12.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.378
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        1.90      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    3.93
  EFFECTIVE AREA(ACRES) =      5.40    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        5.4        PEAK FLOW RATE(CFS) =      11.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.33
  FLOW VELOCITY(FEET/SEC.) =  6.82   DEPTH*VELOCITY(FT*FT/SEC.) =   2.54
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    149.00 =    1150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    149.00 TO NODE    149.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.378
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        1.50      0.20     0.400    75
  COMMERCIAL                 D        1.40      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.255
  SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    6.07
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      17.24

****************************************************************************
  FLOW PROCESS FROM NODE    149.00 TO NODE    145.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  175.00  DOWNSTREAM ELEVATION(FEET) =  146.00
  STREET LENGTH(FEET) =   580.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.63
```

```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.51
    HALFSTREET FLOOD WIDTH(FEET) =   19.65
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.61
  STREET FLOW TRAVEL TIME(MIN.) =   1.37   Tc(MIN.) =   14.09
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.242
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        7.90      0.20     0.400    75
  COMMERCIAL                 D        0.70      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.376
  SUBAREA AREA(ACRES) =    8.60      SUBAREA RUNOFF(CFS) =   16.77
  EFFECTIVE AREA(ACRES) =     16.90    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =       16.9        PEAK FLOW RATE(CFS) =      33.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  21.68
  FLOW VELOCITY(FEET/SEC.) =  7.52   DEPTH*VELOCITY(FT*FT/SEC.) =   4.13
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    145.00 =    1730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 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.) =   14.09
  RAINFALL INTENSITY(INCH/HR) =   2.24
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.36
  EFFECTIVE STREAM AREA(ACRES) =      16.90
  TOTAL STREAM AREA(ACRES) =      16.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      33.00

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      187.38    8.86    2.925  0.20( 0.08) 0.42      70.9     107.00
      1      200.47   12.42    2.410  0.20( 0.08) 0.42      93.5     101.00
      1      202.44   13.45    2.302  0.20( 0.08) 0.42      99.2     118.00
      1      202.40   13.56    2.292  0.20( 0.08) 0.42      99.6     136.00
      1      181.46   18.23    1.934  0.20( 0.08) 0.42     107.2     112.00
      1      171.11   20.65    1.801  0.20( 0.08) 0.42     109.1     126.00
      2       33.00   14.09    2.242  0.20( 0.07) 0.36      16.9     146.00

  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      214.67    8.86    2.925  0.20( 0.08) 0.42      81.5     107.00
      2      231.81   12.42    2.410  0.20( 0.08) 0.41     108.4     101.00
      3      234.82   13.45    2.302  0.20( 0.08) 0.41     115.3     118.00
      4      234.88   13.56    2.292  0.20( 0.08) 0.41     115.9     136.00
      5      233.01   14.09    2.242  0.20( 0.08) 0.41     117.4     146.00
      6      209.78   18.23    1.934  0.20( 0.08) 0.41     124.1     112.00
      7      197.40   20.65    1.801  0.20( 0.08) 0.41     126.0     126.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     234.88    Tc(MIN.) =    13.56
  EFFECTIVE AREA(ACRES) =     115.87   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =      126.0
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    145.00 =    4320.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   139.00  DOWNSTREAM(FEET) =   125.00
  FLOW LENGTH(FEET) =   780.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  41.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.87
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     234.88
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   14.28
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    150.00 =    5100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.28
  RAINFALL INTENSITY(INCH/HR) =   2.22
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =     115.87
  TOTAL STREAM AREA(ACRES) =     126.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     234.88

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    152.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    235.00  DOWNSTREAM(FEET) =    230.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.751
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.418
  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        0.30      0.20     0.850    75   10.73
  COMMERCIAL                 D        0.30      0.20     0.100    75    6.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA RUNOFF(CFS) =      1.79
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.79

****************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    153.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  230.00  DOWNSTREAM ELEVATION(FEET) =  195.00
  STREET LENGTH(FEET) =   390.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.61
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.53
  STREET FLOW TRAVEL TIME(MIN.) =   1.16   Tc(MIN.) =    7.91
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.121
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.40      0.20     0.850    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.433
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.46
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.09

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.47
  FLOW VELOCITY(FEET/SEC.) =  5.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    153.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  195.00  DOWNSTREAM ELEVATION(FEET) =  180.00
  STREET LENGTH(FEET) =   275.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.88
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.11
  STREET FLOW TRAVEL TIME(MIN.) =   0.79   Tc(MIN.) =    8.70
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.956
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        3.70      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    3.70      SUBAREA RUNOFF(CFS) =    9.58
  EFFECTIVE AREA(ACRES) =      5.20    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        5.2        PEAK FLOW RATE(CFS) =      13.45

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.13
  FLOW VELOCITY(FEET/SEC.) =  6.36   DEPTH*VELOCITY(FT*FT/SEC.) =   2.60
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    154.00 =     965.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    155.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  180.00  DOWNSTREAM ELEVATION(FEET) =  175.00
  STREET LENGTH(FEET) =   125.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.48
    HALFSTREET FLOOD WIDTH(FEET) =   17.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.07
  STREET FLOW TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =    9.03
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.894
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        6.00      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    6.00      SUBAREA RUNOFF(CFS) =   15.19
  EFFECTIVE AREA(ACRES) =     11.20    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       11.2        PEAK FLOW RATE(CFS) =      28.35

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  6.35   DEPTH*VELOCITY(FT*FT/SEC.) =   3.09
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    155.00 =    1090.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    156.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  175.00  DOWNSTREAM ELEVATION(FEET) =  139.00
  STREET LENGTH(FEET) =   570.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.26
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   16.24
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.48
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.38
  STREET FLOW TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =   10.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        3.90      0.20     0.400    75
  RESIDENTIAL
```

```
  "11+ DWELLINGS/ACRE"       D        6.20      0.20     0.200    75
  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 =  0.264
  SUBAREA AREA(ACRES) =   10.90      SUBAREA RUNOFF(CFS) =   25.81
  EFFECTIVE AREA(ACRES) =     22.10    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       22.1        PEAK FLOW RATE(CFS) =      52.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.80
  FLOW VELOCITY(FEET/SEC.) =  7.91   DEPTH*VELOCITY(FT*FT/SEC.) =   3.82
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    156.00 =    1660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   133.50  DOWNSTREAM(FEET) =   125.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.62
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.04
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   10.32
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    150.00 =    1700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.32
  RAINFALL INTENSITY(INCH/HR) =   2.68
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.34
  EFFECTIVE STREAM AREA(ACRES) =      22.10
  TOTAL STREAM AREA(ACRES) =      22.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      52.04

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      214.67    9.60    2.794  0.20( 0.08) 0.42      81.5     107.00
      1      231.81   13.15    2.333  0.20( 0.08) 0.41     108.4     101.00
      1      234.82   14.18    2.234  0.20( 0.08) 0.41     115.3     118.00
      1      234.88   14.28    2.225  0.20( 0.08) 0.41     115.9     136.00
      1      233.01   14.82    2.178  0.20( 0.08) 0.41     117.4     146.00
      1      209.78   18.98    1.890  0.20( 0.08) 0.41     124.1     112.00
      1      197.40   21.40    1.765  0.20( 0.08) 0.41     126.0     126.00
      2       52.04   10.32    2.680  0.20( 0.07) 0.34      22.1     151.00

  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      265.17    9.60    2.794  0.20( 0.08) 0.40     102.0     107.00
      2      270.18   10.32    2.680  0.20( 0.08) 0.40     109.0     151.00
      3      276.92   13.15    2.333  0.20( 0.08) 0.40     130.5     101.00
      4      277.97   14.18    2.234  0.20( 0.08) 0.40     137.4     118.00
      5      277.84   14.28    2.225  0.20( 0.08) 0.40     138.0     136.00
      6      275.04   14.82    2.178  0.20( 0.08) 0.40     139.5     146.00
      7      246.08   18.98    1.890  0.20( 0.08) 0.40     146.2     112.00
      8      231.20   21.40    1.765  0.20( 0.08) 0.40     148.1     126.00
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     277.97    Tc(MIN.) =    14.18
  EFFECTIVE AREA(ACRES) =     137.44   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =      148.1
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    150.00 =    5100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    159.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   125.00  DOWNSTREAM(FEET) =   102.00
  FLOW LENGTH(FEET) =   610.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.79
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     277.97
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   14.59
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    159.00 =    5710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    159.00 TO NODE    159.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.59
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.198
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        5.10      0.20     0.400    75
  COMMERCIAL                 D        3.30      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.282
  SUBAREA AREA(ACRES) =    8.40      SUBAREA RUNOFF(CFS) =   16.19
  EFFECTIVE AREA(ACRES) =    145.84   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =      156.5       PEAK FLOW RATE(CFS) =     278.14

****************************************************************************
  FLOW PROCESS FROM NODE    159.00 TO NODE    159.00 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.) =   14.59
  RAINFALL INTENSITY(INCH/HR) =   2.20
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.39
  EFFECTIVE STREAM AREA(ACRES) =     145.84
  TOTAL STREAM AREA(ACRES) =     156.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     278.14

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    161.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   260.00
  ELEVATION DATA: UPSTREAM(FEET) =    145.00  DOWNSTREAM(FEET) =    143.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.441
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.232
  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        0.50      0.20     0.100    75    7.44
  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) =      0.50   PEAK FLOW RATE(CFS) =      1.45

****************************************************************************
  FLOW PROCESS FROM NODE    161.00 TO NODE    162.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  143.00  DOWNSTREAM ELEVATION(FEET) =  138.00
  STREET LENGTH(FEET) =   345.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   2.06   Tc(MIN.) =    9.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.810
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        1.70      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) =    1.70      SUBAREA RUNOFF(CFS) =    4.27
  EFFECTIVE AREA(ACRES) =      2.20    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.2        PEAK FLOW RATE(CFS) =       5.52

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.40
  FLOW VELOCITY(FEET/SEC.) =  3.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    162.00 =     605.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    162.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.810
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        2.50      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) =    2.50      SUBAREA RUNOFF(CFS) =    6.28
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      11.80

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    163.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   132.00  DOWNSTREAM(FEET) =   127.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.77
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.80
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    9.60
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    163.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    163.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.60
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.793
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.70      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) =    1.70      SUBAREA RUNOFF(CFS) =    4.24
  EFFECTIVE AREA(ACRES) =      6.40   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.4       PEAK FLOW RATE(CFS) =      15.97

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    164.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   127.00  DOWNSTREAM(FEET) =   117.50
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.59
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.97
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   10.15
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    164.00 =    1035.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    164.00 TO NODE    164.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.15
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.706
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        1.40      0.20     0.400    75
  COMMERCIAL                 D        0.50      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.321
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    4.52
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      19.99

****************************************************************************
  FLOW PROCESS FROM NODE    164.00 TO NODE    165.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   117.50  DOWNSTREAM(FEET) =   114.50
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.78
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      19.99
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   10.18
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    165.00 =    1070.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.18
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.701
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        2.20      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) =    2.20      SUBAREA RUNOFF(CFS) =    5.31
  EFFECTIVE AREA(ACRES) =     10.50   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =       10.5       PEAK FLOW RATE(CFS) =      25.26

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    159.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   114.50  DOWNSTREAM(FEET) =   102.00
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.14
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.26
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   10.41
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    159.00 =    1290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    159.00 TO NODE    159.00 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.) =   10.41
  RAINFALL INTENSITY(INCH/HR) =   2.67
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.14
  EFFECTIVE STREAM AREA(ACRES) =      10.50
  TOTAL STREAM AREA(ACRES) =      10.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      265.17   10.01    2.727  0.20( 0.08) 0.39     110.4     107.00
      1      270.18   10.73    2.621  0.20( 0.08) 0.39     117.4     151.00
      1      276.92   13.56    2.292  0.20( 0.08) 0.39     138.9     101.00
      1      278.14   14.59    2.198  0.20( 0.08) 0.39     145.8     118.00
      1      277.97   14.69    2.189  0.20( 0.08) 0.39     146.4     136.00
      1      275.04   15.23    2.144  0.20( 0.08) 0.39     147.9     146.00
      1      248.60   19.41    1.866  0.20( 0.08) 0.40     154.6     112.00
      1      234.55   21.83    1.745  0.20( 0.08) 0.40     156.5     126.00
      2       25.26   10.41    2.667  0.20( 0.03) 0.14      10.5     160.00

  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	290.01	10.01	2.727	0.20(0.07)	0.37	120.5	107.00
2	293.22	10.41	2.667	0.20(0.07)	0.37	124.9	160.00
3	295.00	10.73	2.621	0.20(0.07)	0.37	127.9	151.00
4	298.59	13.56	2.292	0.20(0.08)	0.38	149.4	101.00
5	298.90	14.59	2.198	0.20(0.08)	0.38	156.3	118.00
6	298.65	14.69	2.189	0.20(0.08)	0.38	156.9	136.00
7	295.30	15.23	2.144	0.20(0.08)	0.38	158.4	146.00
8	266.20	19.41	1.866	0.20(0.08)	0.38	165.1	112.00
9	250.98	21.83	1.745	0.20(0.08)	0.38	167.0	126.00

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     298.90    Tc(MIN.) =    14.59
  EFFECTIVE AREA(ACRES) =     156.34   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =      167.0
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    159.00 =    5710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    159.00 TO NODE    168.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   102.00  DOWNSTREAM(FEET) =    94.30
  FLOW LENGTH(FEET) =  1005.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  53.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.76
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     298.90
  PIPE TRAVEL TIME(MIN.) =   1.22    Tc(MIN.) =   15.81
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    168.00 =    6715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    168.00 TO NODE    168.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.81
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.099
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        7.50      0.20     0.100    75
  PUBLIC PARK                D        0.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.119
  SUBAREA AREA(ACRES) =    7.70      SUBAREA RUNOFF(CFS) =   14.38
  EFFECTIVE AREA(ACRES) =    164.04   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =      174.7       PEAK FLOW RATE(CFS) =     299.14

****************************************************************************
  FLOW PROCESS FROM NODE    168.00 TO NODE    169.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    94.30  DOWNSTREAM(FEET) =    93.50
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.09
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     299.14
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   16.01
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    169.00 =    6865.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    169.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   16.01
  RAINFALL INTENSITY(INCH/HR) =   2.08
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.37
  EFFECTIVE STREAM AREA(ACRES) =     164.04
  TOTAL STREAM AREA(ACRES) =     174.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     299.14

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    171.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    145.00  DOWNSTREAM(FEET) =    140.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.751
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.418
  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        0.90      0.20     0.100    75    6.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.75
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.75

****************************************************************************
  FLOW PROCESS FROM NODE    171.00 TO NODE    172.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   128.00
  FLOW LENGTH(FEET) =   265.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.24
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.75
  PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =    7.79
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    172.00 =     565.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    172.00 TO NODE    172.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.148
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        3.10      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) =    3.10      SUBAREA RUNOFF(CFS) =    8.73
  EFFECTIVE AREA(ACRES) =      4.00   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.0       PEAK FLOW RATE(CFS) =      11.26

****************************************************************************
  FLOW PROCESS FROM NODE    172.00 TO NODE    169.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   128.00  DOWNSTREAM(FEET) =    93.50
  FLOW LENGTH(FEET) =   215.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.28
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.26
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    7.98
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    169.00 =     780.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    169.00 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.) =    7.98
  RAINFALL INTENSITY(INCH/HR) =   3.11
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       4.00
  TOTAL STREAM AREA(ACRES) =       4.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      290.01   11.44    2.526  0.20( 0.07) 0.35     128.2     107.00
      1      293.22   11.84    2.477  0.20( 0.07) 0.35     132.6     160.00
      1      295.00   12.15    2.440  0.20( 0.07) 0.36     135.6     151.00
      1      298.59   14.98    2.164  0.20( 0.07) 0.36     157.1     101.00
      1      299.14   16.01    2.084  0.20( 0.07) 0.37     164.0     118.00
      1      298.94   16.12    2.076  0.20( 0.07) 0.37     164.6     136.00
      1      295.78   16.65    2.037  0.20( 0.07) 0.37     166.1     146.00
      1      268.52   20.87    1.790  0.20( 0.07) 0.37     172.8     112.00
      1      254.01   23.31    1.680  0.20( 0.07) 0.37     174.7     126.00
      2       11.26    7.98    3.106  0.20( 0.02) 0.10       4.0     170.00

  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      261.23    7.98    3.106  0.20( 0.07) 0.34      93.4     170.00
      2      299.16   11.44    2.526  0.20( 0.07) 0.35     132.2     107.00
      3      302.19   11.84    2.477  0.20( 0.07) 0.35     136.6     160.00
      4      303.83   12.15    2.440  0.20( 0.07) 0.35     139.6     151.00
      5      306.41   14.98    2.164  0.20( 0.07) 0.36     161.1     101.00
      6      306.67   16.01    2.084  0.20( 0.07) 0.36     168.0     118.00
      7      306.44   16.12    2.076  0.20( 0.07) 0.36     168.6     136.00
      8      303.14   16.65    2.037  0.20( 0.07) 0.36     170.1     146.00
      9      274.98   20.87    1.790  0.20( 0.07) 0.36     176.8     112.00
     10      260.07   23.31    1.680  0.20( 0.07) 0.36     178.7     126.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     306.67    Tc(MIN.) =    16.01
  EFFECTIVE AREA(ACRES) =     168.04   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =      178.7
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    169.00 =    6865.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    173.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    93.50  DOWNSTREAM(FEET) =    91.80
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  53.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.86
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     306.67
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   16.22
```

 LONGEST FLOWPATH FROM NODE 112.00 TO NODE 173.00 = 7045.00 FEET.

****
 FLOW PROCESS FROM NODE 173.00 TO NODE 173.00 IS CODE = 1

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 16.22
 RAINFALL INTENSITY(INCH/HR) = 2.07
 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.36
 EFFECTIVE STREAM AREA(ACRES) = 168.04
 TOTAL STREAM AREA(ACRES) = 178.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 306.67

****
 FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 500.00
 ELEVATION DATA: UPSTREAM(FEET) = 140.00 DOWNSTREAM(FEET) = 115.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.648
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.448
 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 0.70 0.20 0.100 75 6.65
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE" D 0.60 0.20 0.500 75 8.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.285
 SUBAREA RUNOFF(CFS) = 3.97
 TOTAL AREA(ACRES) = 1.30 PEAK FLOW RATE(CFS) = 3.97

****
 FLOW PROCESS FROM NODE 301.00 TO NODE 173.00 IS CODE = 31

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
 ELEVATION DATA: UPSTREAM(FEET) = 100.00 DOWNSTREAM(FEET) = 91.80
 FLOW LENGTH(FEET) = 50.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.10
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.97
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 6.70
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 173.00 = 550.00 FEET.

****
 FLOW PROCESS FROM NODE 173.00 TO NODE 173.00 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.) = 6.70
 RAINFALL INTENSITY(INCH/HR) = 3.43
 AREA-AVERAGED Fm(INCH/HR) = 0.06
 AREA-AVERAGED Fp(INCH/HR) = 0.20
 AREA-AVERAGED Ap = 0.28
 EFFECTIVE STREAM AREA(ACRES) = 1.30
 TOTAL STREAM AREA(ACRES) = 1.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.97

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	261.23	8.19	3.060	0.20(0.07)	0.34	93.4	170.00
1	299.16	11.64	2.501	0.20(0.07)	0.35	132.2	107.00
1	302.19	12.04	2.453	0.20(0.07)	0.35	136.6	160.00
1	303.83	12.36	2.417	0.20(0.07)	0.35	139.6	151.00
1	306.41	15.19	2.148	0.20(0.07)	0.36	161.1	101.00
1	306.67	16.22	2.069	0.20(0.07)	0.36	168.0	118.00
1	306.44	16.32	2.061	0.20(0.07)	0.36	168.6	136.00
1	303.14	16.86	2.023	0.20(0.07)	0.36	170.1	146.00
1	274.98	21.08	1.780	0.20(0.07)	0.36	176.8	112.00
1	260.07	23.52	1.672	0.20(0.07)	0.36	178.7	126.00
2	3.97	6.70	3.432	0.20(0.06)	0.28	1.3	300.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	244.42	6.70	3.432	0.20(0.07)	0.34	77.8	300.00
2	264.76	8.19	3.060	0.20(0.07)	0.34	94.7	170.00
3	302.03	11.64	2.501	0.20(0.07)	0.35	133.5	107.00
4	305.01	12.04	2.453	0.20(0.07)	0.35	137.9	160.00
5	306.61	12.36	2.417	0.20(0.07)	0.35	140.9	151.00
6	308.87	15.19	2.148	0.20(0.07)	0.36	162.4	101.00
7	309.04	16.22	2.069	0.20(0.07)	0.36	169.3	118.00
8	308.80	16.32	2.061	0.20(0.07)	0.36	169.9	136.00
9	305.45	16.86	2.023	0.20(0.07)	0.36	171.4	146.00
10	277.00	21.08	1.780	0.20(0.07)	0.36	178.1	112.00
11	261.96	23.52	1.672	0.20(0.07)	0.36	180.0	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 309.04 Tc(MIN.) = 16.22
EFFECTIVE AREA(ACRES) = 169.34 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 180.0
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 173.00 = 7045.00 FEET.

****
FLOW PROCESS FROM NODE 173.00 TO NODE 175.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 91.80 DOWNSTREAM(FEET) = 74.40
FLOW LENGTH(FEET) = 470.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 38.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 25.38
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 309.04
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 16.52
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 175.00 = 7515.00 FEET.

****
FLOW PROCESS FROM NODE 175.00 TO NODE 175.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 16.52
RAINFALL INTENSITY(INCH/HR) = 2.05
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.36
EFFECTIVE STREAM AREA(ACRES) = 169.34
TOTAL STREAM AREA(ACRES) = 180.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 309.04

****

```
 FLOW PROCESS FROM NODE    176.00 TO NODE    177.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    120.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.994
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.102
 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.)
 CONDOMINIUMS               D        0.90      0.20     0.350    75    7.99
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA RUNOFF(CFS) =      2.46
 TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.46

****************************************************************************
 FLOW PROCESS FROM NODE    177.00 TO NODE    178.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   110.00  DOWNSTREAM(FEET) =   105.00
 FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.79
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.46
 PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =    8.83
 LONGEST FLOWPATH FROM NODE    176.00 TO NODE    178.00 =     590.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    178.00 TO NODE    178.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.83
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.931
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        1.50      0.20     0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    3.86
 EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       6.18

****************************************************************************
 FLOW PROCESS FROM NODE    178.00 TO NODE    179.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   105.00  DOWNSTREAM(FEET) =    80.00
 FLOW LENGTH(FEET) =   390.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.86
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.18
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =    9.38
 LONGEST FLOWPATH FROM NODE    176.00 TO NODE    179.00 =     980.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    179.00 TO NODE    179.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

MAINLINE Tc(MIN.) = 9.38
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.831
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	3.00	0.20	0.350	75
RESIDENTIAL					
"11+ DWELLINGS/ACRE"	D	0.20	0.20	0.200	75
PUBLIC PARK	D	0.40	0.20	0.850	75
COMMERCIAL	D	0.90	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.338
SUBAREA AREA(ACRES) = 4.50 SUBAREA RUNOFF(CFS) = 11.19
EFFECTIVE AREA(ACRES) = 6.90 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 6.9 PEAK FLOW RATE(CFS) = 17.16

****
FLOW PROCESS FROM NODE 179.00 TO NODE 175.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 80.00 DOWNSTREAM(FEET) = 74.40
FLOW LENGTH(FEET) = 80.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.89
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.16
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 9.46
LONGEST FLOWPATH FROM NODE 176.00 TO NODE 175.00 = 1060.00 FEET.

****
FLOW PROCESS FROM NODE 175.00 TO NODE 175.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.46
RAINFALL INTENSITY(INCH/HR) = 2.82
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.34
EFFECTIVE STREAM AREA(ACRES) = 6.90
TOTAL STREAM AREA(ACRES) = 6.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.16

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	244.42	7.03	3.339	0.20(0.07)	0.34	77.8	300.00
1	264.76	8.51	2.994	0.20(0.07)	0.34	94.7	170.00
1	302.03	11.96	2.463	0.20(0.07)	0.35	133.5	107.00
1	305.01	12.36	2.417	0.20(0.07)	0.35	137.9	160.00
1	306.61	12.67	2.383	0.20(0.07)	0.35	140.9	151.00
1	308.87	15.50	2.123	0.20(0.07)	0.36	162.4	101.00
1	309.04	16.52	2.046	0.20(0.07)	0.36	169.3	118.00
1	308.80	16.63	2.039	0.20(0.07)	0.36	169.9	136.00
1	305.45	17.17	2.002	0.20(0.07)	0.36	171.4	146.00
1	277.00	21.40	1.765	0.20(0.07)	0.36	178.1	112.00
1	261.96	23.85	1.658	0.20(0.07)	0.36	180.0	126.00
2	17.16	9.46	2.817	0.20(0.07)	0.34	6.9	176.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	259.59	7.03	3.339	0.20(0.07)	0.34	82.9	300.00
2	281.18	8.51	2.994	0.20(0.07)	0.34	100.9	170.00

3	292.22	9.46	2.817	0.20(0.07)	0.34	112.3	176.00
4	316.98	11.96	2.463	0.20(0.07)	0.35	140.4	107.00
5	319.67	12.36	2.417	0.20(0.07)	0.35	144.8	160.00
6	321.05	12.67	2.383	0.20(0.07)	0.35	147.8	151.00
7	321.70	15.50	2.123	0.20(0.07)	0.36	169.3	101.00
8	321.39	16.52	2.046	0.20(0.07)	0.36	176.2	118.00
9	321.10	16.63	2.039	0.20(0.07)	0.36	176.8	136.00
10	317.52	17.17	2.002	0.20(0.07)	0.36	178.3	146.00
11	287.59	21.40	1.765	0.20(0.07)	0.36	185.0	112.00
12	271.89	23.85	1.658	0.20(0.07)	0.36	186.9	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 321.70 Tc(MIN.) = 15.50
EFFECTIVE AREA(ACRES) = 169.33 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 186.9
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 175.00 = 7515.00 FEET.

****
FLOW PROCESS FROM NODE 175.00 TO NODE 180.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 74.40 DOWNSTREAM(FEET) = 51.60
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 35.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 34.38
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 321.70
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 15.63
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 180.00 = 7785.00 FEET.

****
FLOW PROCESS FROM NODE 180.00 TO NODE 180.00 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.) = 15.63
RAINFALL INTENSITY(INCH/HR) = 2.11
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.36
EFFECTIVE STREAM AREA(ACRES) = 169.33
TOTAL STREAM AREA(ACRES) = 186.90
PEAK FLOW RATE(CFS) AT CONFLUENCE = 321.70

****
FLOW PROCESS FROM NODE 181.00 TO NODE 182.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========
INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 125.00 DOWNSTREAM(FEET) = 120.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.994
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.102
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
CONDOMINIUMS	D	1.10	0.20	0.350	75	7.99

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
SUBAREA RUNOFF(CFS) = 3.00
TOTAL AREA(ACRES) = 1.10 PEAK FLOW RATE(CFS) = 3.00

****
FLOW PROCESS FROM NODE 182.00 TO NODE 183.00 IS CODE = 31

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   110.00  DOWNSTREAM(FEET) =   105.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.34
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.00
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    8.11
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    183.00 =     370.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    183.00 TO NODE    183.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.11
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.078
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               D        2.00      0.20     0.350    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    5.41
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       8.39

****************************************************************************
  FLOW PROCESS FROM NODE    183.00 TO NODE    184.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   105.00  DOWNSTREAM(FEET) =    60.00
  FLOW LENGTH(FEET) =   415.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.57
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.39
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    8.55
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    184.00 =     785.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.55
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.985
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               D        3.10      0.20     0.350    75
  COMMERCIAL                 D        0.40      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.321
  SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =    9.20
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.33
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      17.33

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    180.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    60.00  DOWNSTREAM(FEET) =    51.60
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
```

DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.29
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.33
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 8.61
LONGEST FLOWPATH FROM NODE 181.00 TO NODE 180.00 = 855.00 FEET.

****

FLOW PROCESS FROM NODE 180.00 TO NODE 180.00 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.) = 8.61
RAINFALL INTENSITY(INCH/HR) = 2.97
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.33
EFFECTIVE STREAM AREA(ACRES) = 6.60
TOTAL STREAM AREA(ACRES) = 6.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.33

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	259.59	7.17	3.302	0.20(0.07)	0.34	82.9	300.00
1	281.18	8.64	2.967	0.20(0.07)	0.34	100.9	170.00
1	292.22	9.59	2.795	0.20(0.07)	0.34	112.3	176.00
1	316.98	12.09	2.448	0.20(0.07)	0.35	140.4	107.00
1	319.67	12.49	2.402	0.20(0.07)	0.35	144.8	160.00
1	321.05	12.80	2.369	0.20(0.07)	0.35	147.8	151.00
1	321.70	15.63	2.113	0.20(0.07)	0.36	169.3	101.00
1	321.39	16.65	2.037	0.20(0.07)	0.36	176.2	118.00
1	321.10	16.76	2.030	0.20(0.07)	0.36	176.8	136.00
1	317.52	17.30	1.993	0.20(0.07)	0.36	178.3	146.00
1	287.59	21.53	1.759	0.20(0.07)	0.36	185.0	112.00
1	271.89	23.98	1.653	0.20(0.07)	0.36	186.9	126.00
2	17.33	8.61	2.973	0.20(0.07)	0.33	6.6	181.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	275.66	7.17	3.302	0.20(0.07)	0.34	88.4	300.00
2	298.10	8.61	2.973	0.20(0.07)	0.34	107.2	181.00
3	298.48	8.64	2.967	0.20(0.07)	0.34	107.5	170.00
4	308.49	9.59	2.795	0.20(0.07)	0.34	118.9	176.00
5	331.18	12.09	2.448	0.20(0.07)	0.35	147.0	107.00
6	333.60	12.49	2.402	0.20(0.07)	0.35	151.4	160.00
7	334.78	12.80	2.369	0.20(0.07)	0.35	154.4	151.00
8	333.90	15.63	2.113	0.20(0.07)	0.35	175.9	101.00
9	333.14	16.65	2.037	0.20(0.07)	0.36	182.8	118.00
10	332.81	16.76	2.030	0.20(0.07)	0.36	183.4	136.00
11	329.01	17.30	1.993	0.20(0.07)	0.36	184.9	146.00
12	297.68	21.53	1.759	0.20(0.07)	0.36	191.6	112.00
13	281.35	23.98	1.653	0.20(0.07)	0.36	193.5	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 334.78 Tc(MIN.) = 12.80
EFFECTIVE AREA(ACRES) = 154.45 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.35
TOTAL AREA(ACRES) = 193.5
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 180.00 = 7785.00 FEET.

****

FLOW PROCESS FROM NODE 180.00 TO NODE 185.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

```
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.60  DOWNSTREAM(FEET) =    46.80
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.98
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     334.78
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   12.83
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    185.00 =    7840.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.83
  RAINFALL INTENSITY(INCH/HR) =   2.37
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =     154.45
  TOTAL STREAM AREA(ACRES) =     193.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     334.78

****************************************************************************
  FLOW PROCESS FROM NODE    186.00 TO NODE    187.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   260.00
  ELEVATION DATA: UPSTREAM(FEET) =    120.00  DOWNSTREAM(FEET) =    115.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.195
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.590
  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        0.60      0.20     0.100    75    6.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.93
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.93

****************************************************************************
  FLOW PROCESS FROM NODE    187.00 TO NODE    188.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  115.00  DOWNSTREAM ELEVATION(FEET) =  105.00
  STREET LENGTH(FEET) =   365.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.56
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.20
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.89
  STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    8.10
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.080
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.80      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) =    1.80      SUBAREA RUNOFF(CFS) =    4.96
  EFFECTIVE AREA(ACRES) =      2.40    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =       6.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.09
  FLOW VELOCITY(FEET/SEC.) =  3.50   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
  LONGEST FLOWPATH FROM NODE    186.00 TO NODE    188.00 =     625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    188.00 TO NODE    189.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  105.00  DOWNSTREAM ELEVATION(FEET) =   70.00
  STREET LENGTH(FEET) =   360.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.35
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.96
  STREET FLOW TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =    9.01
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.896
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.70      0.20     0.850    75
  COMMERCIAL                 D        3.00      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.242
  SUBAREA AREA(ACRES) =    3.70      SUBAREA RUNOFF(CFS) =    9.48
  EFFECTIVE AREA(ACRES) =      6.10    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =        6.1        PEAK FLOW RATE(CFS) =      15.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   9.99
  FLOW VELOCITY(FEET/SEC.) =  7.03   DEPTH*VELOCITY(FT*FT/SEC.) =   2.29
  LONGEST FLOWPATH FROM NODE    186.00 TO NODE    189.00 =     985.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    189.00 TO NODE    185.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    60.00  DOWNSTREAM(FEET) =    46.80
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.58
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.70
```

PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 9.06
LONGEST FLOWPATH FROM NODE 186.00 TO NODE 185.00 = 1055.00 FEET.

****

FLOW PROCESS FROM NODE 185.00 TO NODE 185.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

==========

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.06
RAINFALL INTENSITY(INCH/HR) = 2.89
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.19
EFFECTIVE STREAM AREA(ACRES) = 6.10
TOTAL STREAM AREA(ACRES) = 6.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.70

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	275.66	7.20	3.295	0.20(0.07)	0.34	88.4	300.00
1	298.10	8.64	2.968	0.20(0.07)	0.34	107.2	181.00
1	298.48	8.67	2.962	0.20(0.07)	0.34	107.5	170.00
1	308.49	9.62	2.790	0.20(0.07)	0.34	118.9	176.00
1	331.18	12.12	2.445	0.20(0.07)	0.35	147.0	107.00
1	333.60	12.52	2.399	0.20(0.07)	0.35	151.4	160.00
1	334.78	12.83	2.366	0.20(0.07)	0.35	154.4	151.00
1	333.90	15.65	2.111	0.20(0.07)	0.35	175.9	101.00
1	333.14	16.68	2.035	0.20(0.07)	0.36	182.8	118.00
1	332.81	16.79	2.028	0.20(0.07)	0.36	183.4	136.00
1	329.01	17.33	1.991	0.20(0.07)	0.36	184.9	146.00
1	297.68	21.56	1.757	0.20(0.07)	0.36	191.6	112.00
1	281.35	24.01	1.652	0.20(0.07)	0.36	193.5	126.00
2	15.70	9.06	2.887	0.20(0.04)	0.19	6.1	186.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	289.91	7.20	3.295	0.20(0.07)	0.33	93.3	300.00
2	313.48	8.64	2.968	0.20(0.07)	0.33	113.0	181.00
3	313.88	8.67	2.962	0.20(0.07)	0.33	113.3	170.00
4	318.35	9.06	2.887	0.20(0.07)	0.33	118.4	186.00
5	323.65	9.62	2.790	0.20(0.07)	0.34	125.0	176.00
6	344.44	12.12	2.445	0.20(0.07)	0.34	153.1	107.00
7	346.61	12.52	2.399	0.20(0.07)	0.34	157.5	160.00
8	347.61	12.83	2.366	0.20(0.07)	0.34	160.5	151.00
9	345.33	15.65	2.111	0.20(0.07)	0.35	182.0	101.00
10	344.15	16.68	2.035	0.20(0.07)	0.35	188.9	118.00
11	343.78	16.79	2.028	0.20(0.07)	0.35	189.5	136.00
12	339.78	17.33	1.991	0.20(0.07)	0.35	191.0	146.00
13	307.16	21.56	1.757	0.20(0.07)	0.35	197.7	112.00
14	290.25	24.01	1.652	0.20(0.07)	0.36	199.6	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 347.61 Tc(MIN.) = 12.83
EFFECTIVE AREA(ACRES) = 160.55 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.34
TOTAL AREA(ACRES) = 199.6
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 185.00 = 7840.00 FEET.

****

FLOW PROCESS FROM NODE 185.00 TO NODE 191.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

==========

ELEVATION DATA: UPSTREAM(FEET) = 46.80 DOWNSTREAM(FEET) = 5.50

```
  FLOW LENGTH(FEET) =   515.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.76
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     347.61
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   13.08
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    191.00 =    8355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    191.00 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.) =   13.08
  RAINFALL INTENSITY(INCH/HR) =   2.34
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.34
  EFFECTIVE STREAM AREA(ACRES) =     160.55
  TOTAL STREAM AREA(ACRES) =     199.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     347.61

****************************************************************************
  FLOW PROCESS FROM NODE    192.00 TO NODE    193.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   280.00
  ELEVATION DATA: UPSTREAM(FEET) =    142.00  DOWNSTREAM(FEET) =    140.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.955
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.70      0.20     0.500    75    9.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.66
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.66

****************************************************************************
  FLOW PROCESS FROM NODE    193.00 TO NODE    194.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  140.00  DOWNSTREAM ELEVATION(FEET) =  138.00
  STREET LENGTH(FEET) =   320.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =   13.12
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.335
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.40      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    2.82
  EFFECTIVE AREA(ACRES) =      2.10    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.1        PEAK FLOW RATE(CFS) =       4.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.26
  FLOW VELOCITY(FEET/SEC.) =  1.80   DEPTH*VELOCITY(FT*FT/SEC.) =   0.60
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    194.00 =     600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    194.00 TO NODE    195.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  138.00  DOWNSTREAM ELEVATION(FEET) =  135.00
  STREET LENGTH(FEET) =   415.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.87
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
  STREET FLOW TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   16.25
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.066
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        4.10      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.10      SUBAREA RUNOFF(CFS) =    7.26
  EFFECTIVE AREA(ACRES) =      6.20    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.2        PEAK FLOW RATE(CFS) =      10.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.76
  FLOW VELOCITY(FEET/SEC.) =  2.39   DEPTH*VELOCITY(FT*FT/SEC.) =   1.01
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    195.00 =    1015.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    195.00 TO NODE    196.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   120.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.98
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.97
```

```
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   16.29
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    196.00 =    1065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    196.00 TO NODE    196.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.064
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.50      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =    6.19
  EFFECTIVE AREA(ACRES) =      9.70   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        9.7       PEAK FLOW RATE(CFS) =      17.14

****************************************************************************
  FLOW PROCESS FROM NODE    196.00 TO NODE    197.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   120.00  DOWNSTREAM(FEET) =   110.00
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.24
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.14
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   16.42
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    197.00 =    1200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    197.00 TO NODE    197.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.42
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.054
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.80      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.80      SUBAREA RUNOFF(CFS) =    4.92
  EFFECTIVE AREA(ACRES) =     12.50   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      21.98

****************************************************************************
  FLOW PROCESS FROM NODE    197.00 TO NODE    198.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   110.00  DOWNSTREAM(FEET) =   100.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.82
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.98
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   16.46
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    198.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    198.00 TO NODE    198.00 IS CODE =  81
```

```
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.46
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.051
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.70      0.20     0.500    75
  PUBLIC PARK                D        1.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
  SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    5.02
  EFFECTIVE AREA(ACRES) =     15.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =       15.4       PEAK FLOW RATE(CFS) =      26.97

********************************************************************************
  FLOW PROCESS FROM NODE    198.00 TO NODE    199.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    73.00
  FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.15
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.97
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   16.72
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    199.00 =    1550.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.033
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.60      0.20     0.500    75
  PUBLIC PARK                D        1.30      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.617
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =    6.70
  EFFECTIVE AREA(ACRES) =     19.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      33.41

********************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    200.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    73.00  DOWNSTREAM(FEET) =    59.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.53
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.41
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   16.90
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    200.00 =    1750.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    200.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
```

```
  MAINLINE Tc(MIN.) =   16.90
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.020
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        2.20      0.20     0.500    75
  PUBLIC PARK                D        1.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.624
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    5.80
  EFFECTIVE AREA(ACRES) =     22.70   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       22.7       PEAK FLOW RATE(CFS) =      39.00

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    59.00  DOWNSTREAM(FEET) =    16.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.00
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   17.01
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    201.00 =    1950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.00  DOWNSTREAM(FEET) =    13.00
  FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.00
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   17.69
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    202.00 =    2305.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.69
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.968
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.60      0.20     0.850    75
  COMMERCIAL                 D        4.90      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.182
  SUBAREA AREA(ACRES) =    5.50      SUBAREA RUNOFF(CFS) =    9.56
  EFFECTIVE AREA(ACRES) =     28.20   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       28.2       PEAK FLOW RATE(CFS) =      47.49

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    191.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.00  DOWNSTREAM(FEET) =     5.50
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.1 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.26
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.49
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   17.77
  LONGEST FLOWPATH FROM NODE    192.00 TO NODE    191.00 =    2400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    191.00 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.) =   17.77
  RAINFALL INTENSITY(INCH/HR) =   1.96
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      28.20
  TOTAL STREAM AREA(ACRES) =      28.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      47.49

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   225.00
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     95.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.025
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.894
  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        0.70      0.20     0.850    75    9.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.72
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.72

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     95.00  DOWNSTREAM(FEET) =     90.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   155.00   CHANNEL SLOPE =  0.0323
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.823
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               D        1.10      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.43
  AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   0.40
  Tc(MIN.) =    9.43
  SUBAREA AREA(ACRES) =     1.10       SUBAREA RUNOFF(CFS) =    2.63
  EFFECTIVE AREA(ACRES) =      1.80     AREA-AVERAGED Fm(INCH/HR) =   0.17
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.85
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       4.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   7.00
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    205.00 =     380.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     90.00  DOWNSTREAM(FEET) =     28.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   345.00   CHANNEL SLOPE =  0.1797
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.757
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               D        1.50      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.60
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =    9.82
  SUBAREA AREA(ACRES) =     1.50       SUBAREA RUNOFF(CFS) =    3.49
  EFFECTIVE AREA(ACRES) =      3.30     AREA-AVERAGED Fm(INCH/HR) =   0.17
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.85
  TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =       7.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =  15.44
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    206.00 =     725.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    18.00  DOWNSTREAM(FEET) =    13.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.91
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.68
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    9.91
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    207.00 =     795.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.91
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.743
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        1.90      0.20     0.100    75
  PUBLIC PARK               D        0.60      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.280
  SUBAREA AREA(ACRES) =    2.50      SUBAREA RUNOFF(CFS) =    6.05
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      13.69

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    191.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.00  DOWNSTREAM(FEET) =     5.50
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.7 INCHES
```

PIPE-FLOW VELOCITY(FEET/SEC.) = 16.29
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.69
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 10.00
LONGEST FLOWPATH FROM NODE 203.00 TO NODE 191.00 = 880.00 FEET.

****
FLOW PROCESS FROM NODE 191.00 TO NODE 191.00 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.) = 10.00
RAINFALL INTENSITY(INCH/HR) = 2.73
AREA-AVERAGED Fm(INCH/HR) = 0.12
AREA-AVERAGED Fp(INCH/HR) = 0.20
AREA-AVERAGED Ap = 0.60
EFFECTIVE STREAM AREA(ACRES) = 5.80
TOTAL STREAM AREA(ACRES) = 5.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.69

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	289.91	7.46	3.229	0.20(0.07)	0.33	93.3	300.00
1	313.48	8.89	2.918	0.20(0.07)	0.33	113.0	181.00
1	313.88	8.92	2.913	0.20(0.07)	0.33	113.3	170.00
1	318.35	9.32	2.841	0.20(0.07)	0.33	118.4	186.00
1	323.65	9.88	2.748	0.20(0.07)	0.34	125.0	176.00
1	344.44	12.36	2.416	0.20(0.07)	0.34	153.1	107.00
1	346.61	12.76	2.373	0.20(0.07)	0.34	157.5	160.00
1	347.61	13.08	2.340	0.20(0.07)	0.34	160.5	151.00
1	345.33	15.90	2.092	0.20(0.07)	0.35	182.0	101.00
1	344.15	16.93	2.018	0.20(0.07)	0.35	188.9	118.00
1	343.78	17.03	2.011	0.20(0.07)	0.35	189.5	136.00
1	339.78	17.58	1.975	0.20(0.07)	0.35	191.0	146.00
1	307.16	21.81	1.745	0.20(0.07)	0.35	197.7	112.00
1	290.25	24.27	1.642	0.20(0.07)	0.36	199.6	126.00
2	47.49	17.77	1.963	0.20(0.10)	0.48	28.2	192.00
3	13.69	10.00	2.729	0.20(0.12)	0.60	5.8	203.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	335.51	7.46	3.229	0.20(0.07)	0.36	109.4	300.00
2	362.48	8.89	2.918	0.20(0.07)	0.36	132.3	181.00
3	362.95	8.92	2.913	0.20(0.07)	0.36	132.7	170.00
4	368.28	9.32	2.841	0.20(0.07)	0.36	138.6	186.00
5	374.78	9.88	2.748	0.20(0.07)	0.36	146.4	176.00
6	376.04	10.00	2.729	0.20(0.07)	0.36	148.1	203.00
7	397.56	12.36	2.416	0.20(0.07)	0.36	178.6	107.00
8	400.03	12.76	2.373	0.20(0.07)	0.36	183.5	160.00
9	401.26	13.08	2.340	0.20(0.07)	0.36	187.1	151.00
10	401.11	15.90	2.092	0.20(0.07)	0.37	213.1	101.00
11	400.69	16.93	2.018	0.20(0.07)	0.37	221.6	118.00
12	400.40	17.03	2.011	0.20(0.07)	0.37	222.3	136.00
13	396.80	17.58	1.975	0.20(0.07)	0.37	224.7	146.00
14	395.48	17.77	1.963	0.20(0.07)	0.37	225.3	192.00
15	357.63	21.81	1.745	0.20(0.08)	0.38	231.7	112.00
16	337.54	24.27	1.642	0.20(0.08)	0.38	233.6	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 401.26 Tc(MIN.) = 13.08
EFFECTIVE AREA(ACRES) = 187.10 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 233.6
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 191.00 = 8355.00 FEET.

```
****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    207.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     5.50  DOWNSTREAM(FEET) =     3.30
  FLOW LENGTH(FEET) =   485.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  67.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.09
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     401.26
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   13.75
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    207.20 =    8840.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.20 TO NODE    208.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     3.30  DOWNSTREAM(FEET) =     1.38
  FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  58.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.28
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     401.26
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.94
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    208.00 =    9030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 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.) =   13.94
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.36
  EFFECTIVE STREAM AREA(ACRES) =     187.10
  TOTAL STREAM AREA(ACRES) =     233.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     401.26

****************************************************************************
  FLOW PROCESS FROM NODE   2001.00 TO NODE   2002.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   323.00
  ELEVATION DATA: UPSTREAM(FEET) =     24.30  DOWNSTREAM(FEET) =     14.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.194
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.591
  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    6.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.83
  TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      2.83

****************************************************************************
  FLOW PROCESS FROM NODE   2002.00 TO NODE   2003.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    10.70  DOWNSTREAM(FEET) =     8.50
  FLOW LENGTH(FEET) =   279.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.34
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.83
  PIPE TRAVEL TIME(MIN.) =   1.07    Tc(MIN.) =    7.27
  LONGEST FLOWPATH FROM NODE   2001.00 TO NODE   2003.00 =     602.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.27
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.277
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.29      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) =    1.29      SUBAREA RUNOFF(CFS) =    3.78
  EFFECTIVE AREA(ACRES) =      2.17   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       6.36

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE    208.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     8.50  DOWNSTREAM(FEET) =     1.38
  FLOW LENGTH(FEET) =   206.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.54
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.36
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    7.62
  LONGEST FLOWPATH FROM NODE   2001.00 TO NODE    208.00 =     808.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 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.) =    7.62
  RAINFALL INTENSITY(INCH/HR) =   3.19
  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) =       2.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.36

****************************************************************************
  FLOW PROCESS FROM NODE   2011.00 TO NODE   2012.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   293.00
  ELEVATION DATA: UPSTREAM(FEET) =     23.00  DOWNSTREAM(FEET) =      9.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.473
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.855
  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        0.29      0.20     0.100    75    5.47
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.00
  TOTAL AREA(ACRES) =      0.29   PEAK FLOW RATE(CFS) =      1.00

****************************************************************************
  FLOW PROCESS FROM NODE   2012.00 TO NODE   2013.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     5.70  DOWNSTREAM(FEET) =     4.00
  FLOW LENGTH(FEET) =   153.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.90
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.00
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =    6.13
  LONGEST FLOWPATH FROM NODE   2011.00 TO NODE   2013.00 =     446.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2013.00 TO NODE   2013.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.13
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.613
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.56      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) =    0.56      SUBAREA RUNOFF(CFS) =    1.81
  EFFECTIVE AREA(ACRES) =      0.85   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       2.75

****************************************************************************
  FLOW PROCESS FROM NODE   2013.00 TO NODE    208.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     4.00  DOWNSTREAM(FEET) =     1.38
  FLOW LENGTH(FEET) =    18.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.05
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.75
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.15
  LONGEST FLOWPATH FROM NODE   2011.00 TO NODE    208.00 =     464.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    208.00 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.) =    6.15
  RAINFALL INTENSITY(INCH/HR) =   3.61
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.85
  TOTAL STREAM AREA(ACRES) =       0.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.75
```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	335.51	8.35	3.027	0.20(0.07)	0.36	109.4	300.00
1	362.48	9.78	2.765	0.20(0.07)	0.36	132.3	181.00
1	362.95	9.80	2.760	0.20(0.07)	0.36	132.7	170.00
1	368.28	10.20	2.698	0.20(0.07)	0.36	138.6	186.00
1	374.78	10.74	2.619	0.20(0.07)	0.36	146.4	176.00
1	376.04	10.87	2.602	0.20(0.07)	0.36	148.1	203.00
1	397.56	13.23	2.325	0.20(0.07)	0.36	178.6	107.00
1	400.03	13.63	2.285	0.20(0.07)	0.36	183.5	160.00
1	401.26	13.94	2.256	0.20(0.07)	0.36	187.1	151.00
1	401.11	16.76	2.030	0.20(0.07)	0.37	213.1	101.00
1	400.69	17.79	1.962	0.20(0.07)	0.37	221.6	118.00
1	400.40	17.90	1.955	0.20(0.07)	0.37	222.3	136.00
1	396.80	18.44	1.922	0.20(0.07)	0.37	224.7	146.00
1	395.48	18.63	1.911	0.20(0.07)	0.37	225.3	192.00
1	357.63	22.70	1.706	0.20(0.08)	0.38	231.7	112.00
1	337.54	25.16	1.608	0.20(0.08)	0.38	233.6	126.00
2	6.36	7.62	3.188	0.20(0.02)	0.10	2.2	2001.00
3	2.75	6.15	3.606	0.20(0.02)	0.10	0.9	2011.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	304.20	6.15	3.606	0.20(0.07)	0.35	83.2	2011.00
2	332.00	7.62	3.188	0.20(0.07)	0.35	103.0	2001.00
3	343.86	8.35	3.027	0.20(0.07)	0.35	112.4	300.00
4	370.10	9.78	2.765	0.20(0.07)	0.35	135.3	181.00
5	370.55	9.80	2.760	0.20(0.07)	0.35	135.7	170.00
6	375.72	10.20	2.698	0.20(0.07)	0.36	141.6	186.00
7	381.99	10.74	2.619	0.20(0.07)	0.36	149.5	176.00
8	383.21	10.87	2.602	0.20(0.07)	0.36	151.1	203.00
9	403.96	13.23	2.325	0.20(0.07)	0.36	181.6	107.00
10	406.32	13.63	2.285	0.20(0.07)	0.36	186.5	160.00
11	407.47	13.94	2.256	0.20(0.07)	0.36	190.1	151.00
12	406.68	16.76	2.030	0.20(0.07)	0.37	216.1	101.00
13	406.08	17.79	1.962	0.20(0.07)	0.37	224.6	118.00
14	405.76	17.90	1.955	0.20(0.07)	0.37	225.3	136.00
15	402.07	18.44	1.922	0.20(0.07)	0.37	227.7	146.00
16	400.72	18.63	1.911	0.20(0.07)	0.37	228.3	192.00
17	362.31	22.70	1.706	0.20(0.07)	0.37	234.7	112.00
18	341.95	25.16	1.608	0.20(0.07)	0.37	236.6	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 407.47 Tc(MIN.) = 13.94
EFFECTIVE AREA(ACRES) = 190.12 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 236.6
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 208.00 = 9030.00 FEET.

****
FLOW PROCESS FROM NODE 208.00 TO NODE 209.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 1.38 DOWNSTREAM(FEET) = 0.20
FLOW LENGTH(FEET) = 160.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 60.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.65
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 407.47
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 14.12
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 209.00 = 9190.00 FEET.

****
FLOW PROCESS FROM NODE 209.00 TO NODE 209.00 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.) =   14.12
  RAINFALL INTENSITY(INCH/HR) =   2.24
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.36
  EFFECTIVE STREAM AREA(ACRES) =     190.12
  TOTAL STREAM AREA(ACRES) =     236.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     407.47

****************************************************************************
  FLOW PROCESS FROM NODE   2021.00 TO NODE   2022.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   155.00
  ELEVATION DATA: UPSTREAM(FEET) =     10.30  DOWNSTREAM(FEET) =      9.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.553
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.477
  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        0.15      0.20     0.100    75    6.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.15   PEAK FLOW RATE(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE   2022.00 TO NODE   2023.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     6.50  DOWNSTREAM(FEET) =     5.20
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.40
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.47
  PIPE TRAVEL TIME(MIN.) =   1.73    Tc(MIN.) =    8.29
  LONGEST FLOWPATH FROM NODE   2021.00 TO NODE   2023.00 =     405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2023.00 TO NODE   2023.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.11      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) =    0.11      SUBAREA RUNOFF(CFS) =    0.30
  EFFECTIVE AREA(ACRES) =      0.26   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.71

****************************************************************************
  FLOW PROCESS FROM NODE   2023.00 TO NODE   2024.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =     5.20  DOWNSTREAM(FEET) =     4.00
  FLOW LENGTH(FEET) =   207.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.80
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.71
  PIPE TRAVEL TIME(MIN.) =   1.23    Tc(MIN.) =    9.52
  LONGEST FLOWPATH FROM NODE   2021.00 TO NODE   2024.00 =     612.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2024.00 TO NODE   2024.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.52
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.807
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.21      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) =    0.21      SUBAREA RUNOFF(CFS) =    0.53
  EFFECTIVE AREA(ACRES) =      0.47   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       1.18

****************************************************************************
  FLOW PROCESS FROM NODE   2024.00 TO NODE    209.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     4.00  DOWNSTREAM(FEET) =     0.20
  FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.12
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.18
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    9.54
  LONGEST FLOWPATH FROM NODE   2021.00 TO NODE    209.00 =     628.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.54
  RAINFALL INTENSITY(INCH/HR) =   2.80
  AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.47
  TOTAL STREAM AREA(ACRES) =       0.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.18

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      304.20    6.35    3.541  0.20( 0.07) 0.35      83.2    2011.00
      1      332.00    7.82    3.143  0.20( 0.07) 0.35     103.0    2001.00
      1      343.86    8.54    2.988  0.20( 0.07) 0.35     112.4     300.00
      1      370.10    9.96    2.735  0.20( 0.07) 0.35     135.3     181.00
      1      370.55    9.99    2.730  0.20( 0.07) 0.35     135.7     170.00
      1      375.72   10.39    2.670  0.20( 0.07) 0.36     141.6     186.00
      1      381.99   10.93    2.593  0.20( 0.07) 0.36     149.5     176.00
      1      383.21   11.05    2.577  0.20( 0.07) 0.36     151.1     203.00
      1      403.96   13.41    2.307  0.20( 0.07) 0.36     181.6     107.00
```

1	406.32	13.81	2.268	0.20(0.07)	0.36	186.5	160.00
1	407.47	14.12	2.239	0.20(0.07)	0.36	190.1	151.00
1	406.68	16.94	2.017	0.20(0.07)	0.37	216.1	101.00
1	406.08	17.97	1.950	0.20(0.07)	0.37	224.6	118.00
1	405.76	18.08	1.944	0.20(0.07)	0.37	225.3	136.00
1	402.07	18.62	1.911	0.20(0.07)	0.37	227.7	146.00
1	400.72	18.81	1.900	0.20(0.07)	0.37	228.3	192.00
1	362.31	22.88	1.698	0.20(0.07)	0.37	234.7	112.00
1	341.95	25.35	1.601	0.20(0.07)	0.37	236.6	126.00
2	1.18	9.54	2.803	0.20(0.02)	0.10	0.5	2021.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	305.19	6.35	3.541	0.20(0.07)	0.35	83.5	2011.00
2	333.08	7.82	3.143	0.20(0.07)	0.35	103.4	2001.00
3	344.98	8.54	2.988	0.20(0.07)	0.35	112.9	300.00
4	363.55	9.54	2.803	0.20(0.07)	0.35	129.0	2021.00
5	371.25	9.96	2.735	0.20(0.07)	0.35	135.8	181.00
6	371.70	9.99	2.730	0.20(0.07)	0.35	136.2	170.00
7	376.84	10.39	2.670	0.20(0.07)	0.35	142.1	186.00
8	383.08	10.93	2.593	0.20(0.07)	0.36	149.9	176.00
9	384.29	11.05	2.577	0.20(0.07)	0.36	151.6	203.00
10	404.93	13.41	2.307	0.20(0.07)	0.36	182.1	107.00
11	407.27	13.81	2.268	0.20(0.07)	0.36	187.0	160.00
12	408.41	14.12	2.239	0.20(0.07)	0.36	190.6	151.00
13	407.53	16.94	2.017	0.20(0.07)	0.37	216.6	101.00
14	406.89	17.97	1.950	0.20(0.07)	0.37	225.1	118.00
15	406.58	18.08	1.944	0.20(0.07)	0.37	225.8	136.00
16	402.87	18.62	1.911	0.20(0.07)	0.37	228.2	146.00
17	401.52	18.81	1.900	0.20(0.07)	0.37	228.8	192.00
18	363.02	22.88	1.698	0.20(0.07)	0.37	235.2	112.00
19	342.62	25.35	1.601	0.20(0.07)	0.37	237.1	126.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 408.41 Tc(MIN.) = 14.12
EFFECTIVE AREA(ACRES) = 190.59 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 237.1
LONGEST FLOWPATH FROM NODE 112.00 TO NODE 209.00 = 9190.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 237.1 TC(MIN.) = 14.12
EFFECTIVE AREA(ACRES) = 190.59 AREA-AVERAGED Fm(INCH/HR)= 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.360
PEAK FLOW RATE(CFS) = 408.41

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	305.19	6.35	3.541	0.20(0.07)	0.35	83.5	2011.00
2	333.08	7.82	3.143	0.20(0.07)	0.35	103.4	2001.00
3	344.98	8.54	2.988	0.20(0.07)	0.35	112.9	300.00
4	363.55	9.54	2.803	0.20(0.07)	0.35	129.0	2021.00
5	371.25	9.96	2.735	0.20(0.07)	0.35	135.8	181.00
6	371.70	9.99	2.730	0.20(0.07)	0.35	136.2	170.00
7	376.84	10.39	2.670	0.20(0.07)	0.35	142.1	186.00
8	383.08	10.93	2.593	0.20(0.07)	0.36	149.9	176.00
9	384.29	11.05	2.577	0.20(0.07)	0.36	151.6	203.00
10	404.93	13.41	2.307	0.20(0.07)	0.36	182.1	107.00
11	407.27	13.81	2.268	0.20(0.07)	0.36	187.0	160.00
12	408.41	14.12	2.239	0.20(0.07)	0.36	190.6	151.00
13	407.53	16.94	2.017	0.20(0.07)	0.37	216.6	101.00
14	406.89	17.97	1.950	0.20(0.07)	0.37	225.1	118.00
15	406.58	18.08	1.944	0.20(0.07)	0.37	225.8	136.00
16	402.87	18.62	1.911	0.20(0.07)	0.37	228.2	146.00
17	401.52	18.81	1.900	0.20(0.07)	0.37	228.8	192.00
18	363.02	22.88	1.698	0.20(0.07)	0.37	235.2	112.00
19	342.62	25.35	1.601	0.20(0.07)	0.37	237.1	126.00

==========

END OF RATIONAL METHOD ANALYSIS

♀

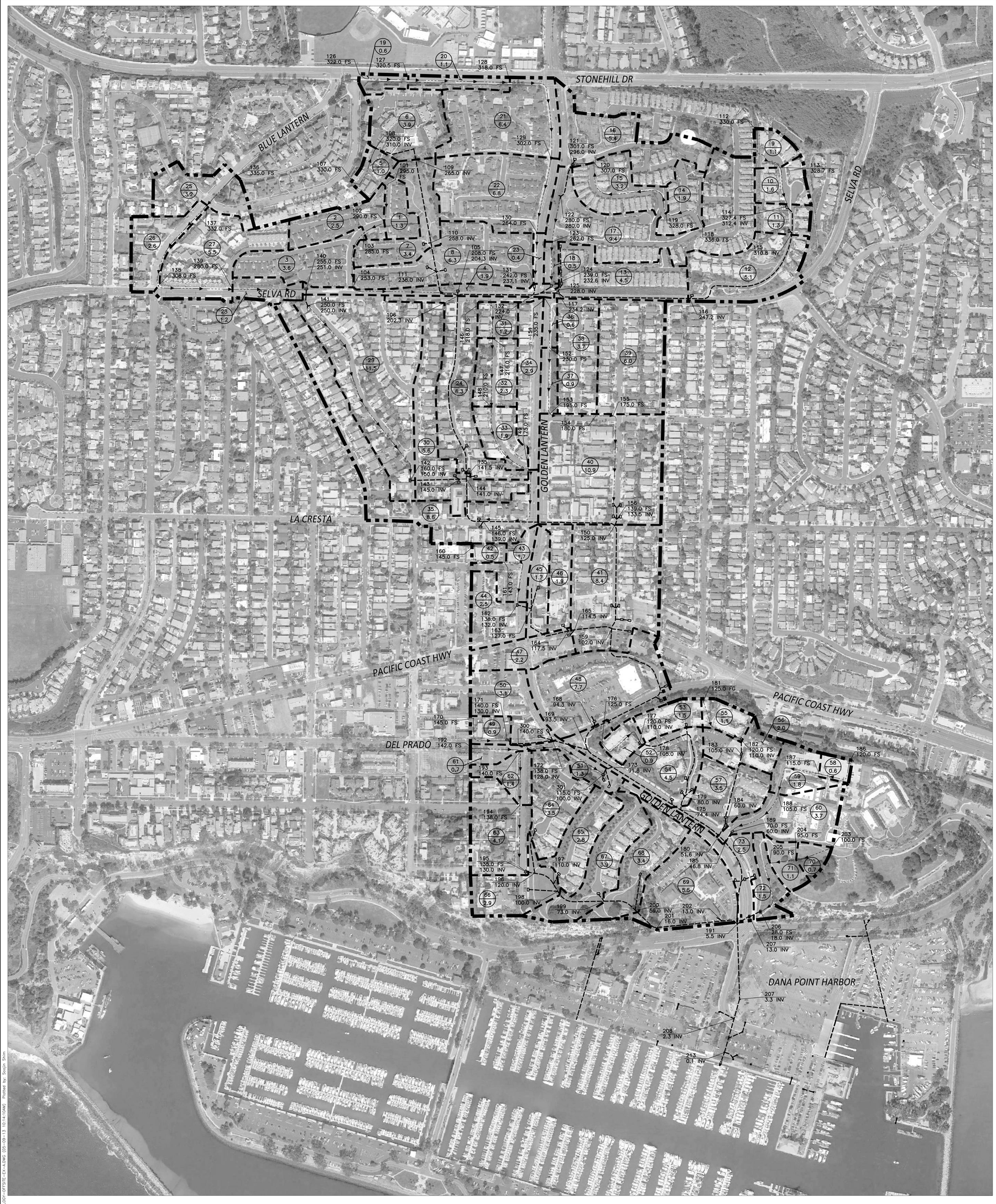
APPENDIX C. HYDROLOGY MAPS

C.1 EXISTING CONDITION W/O HARBOR

C.2 EXISTING CONDITION W/ HARBOR

C.3 PROPOSED CONDITION W/ HARBOR

C.1



LEGEND

- MAJOR WATERSHED BOUNDARY
- DRAINAGE SUBAREA BOUNDARY
- FLOW PATH
- EXISTING STORM DRAIN
- 1 / 5.0 — DRAINAGE AREA DESIGNATION / AREA (ACRES)
- 101 / 25.0 FS / 15.0 INV — NODE NUMBER / FINISHED SURFACE ELEVATION / PIPE INVERT ELEVATION

FUSCOE ENGINEERING
full circle thinking

EXHIBIT A

STORM DRAIN LINE L00P01 EXISTING CONDITION HYDROLOGY MAP

(EXCLUDING TRIBUTARY FROM OC DANA POINT HARBOR)

CITY OF DANA POINT, COUNTY OF ORANGE

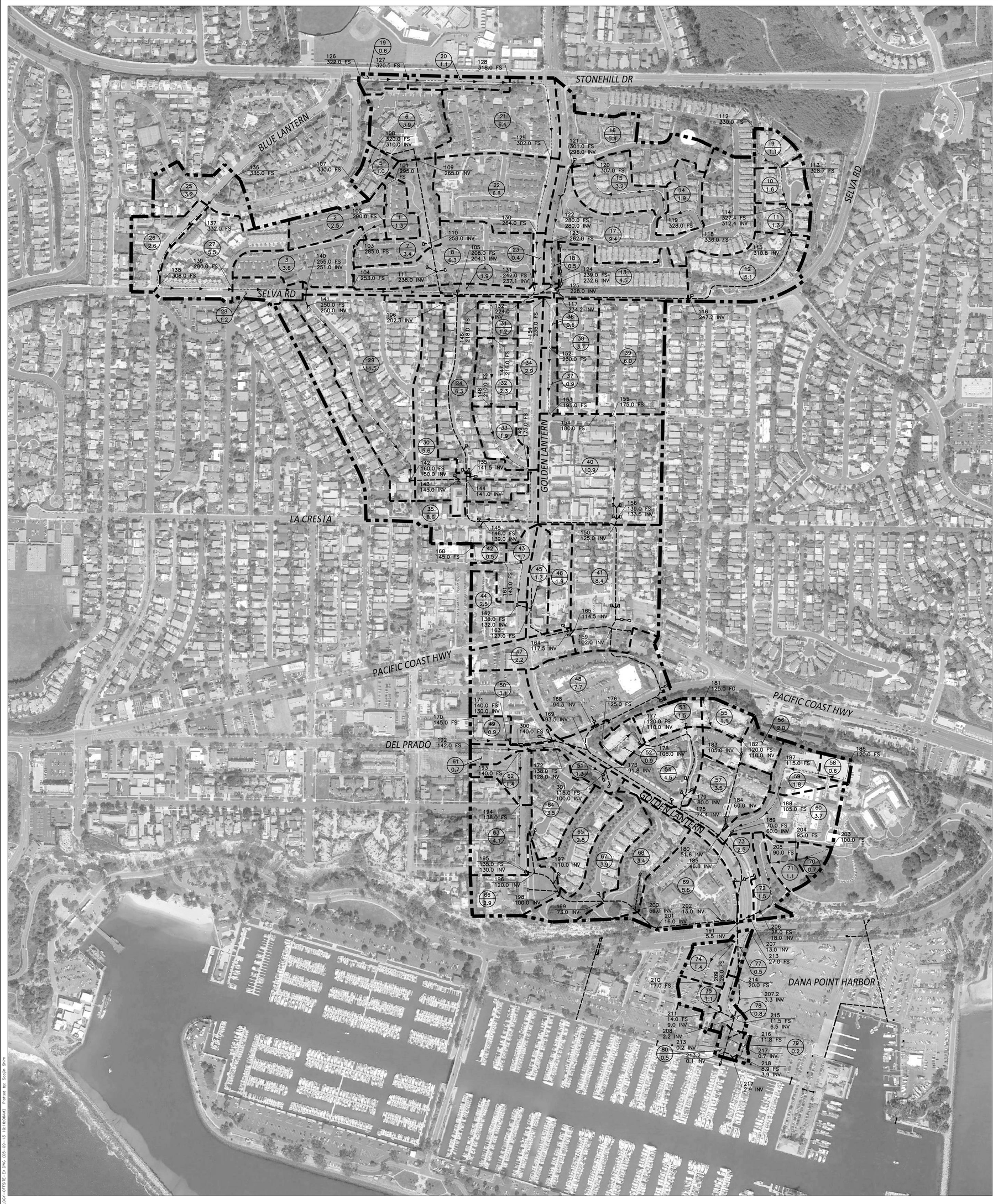
N

200' 0' 100' 200' 400'

SCALE: 1" = 200'

P:\PROJECTS\307\DATA\DWG_FILE CABINET\REPORTS\HYDROLOGY\OFFSITE HYD\307XHH-HYDROLOGY-OFFSITE-EX-A.DWG (05-09-13 10:14:10AM) Plotted by: Seojin Shim

C.2



LEGEND

- MAJOR WATERSHED BOUNDARY
- DRAINAGE SUBAREA BOUNDARY
- FLOW PATH
- EXISTING STORM DRAIN
- 1 / 5.0 — DRAINAGE AREA DESIGNATION / AREA (ACRES)
- 101 / 25.0 FS / 15.0 INV — NODE NUMBER / FINISHED SURFACE ELEVATION / PIPE INVERT ELEVATION

EXHIBIT B

STORM DRAIN LINE L00P01 EXISTING CONDITION HYDROLOGY MAP

(INCLUDING TRIBUTARY FROM OC DANA POINT HARBOR)

CITY OF DANA POINT, COUNTY OF ORANGE

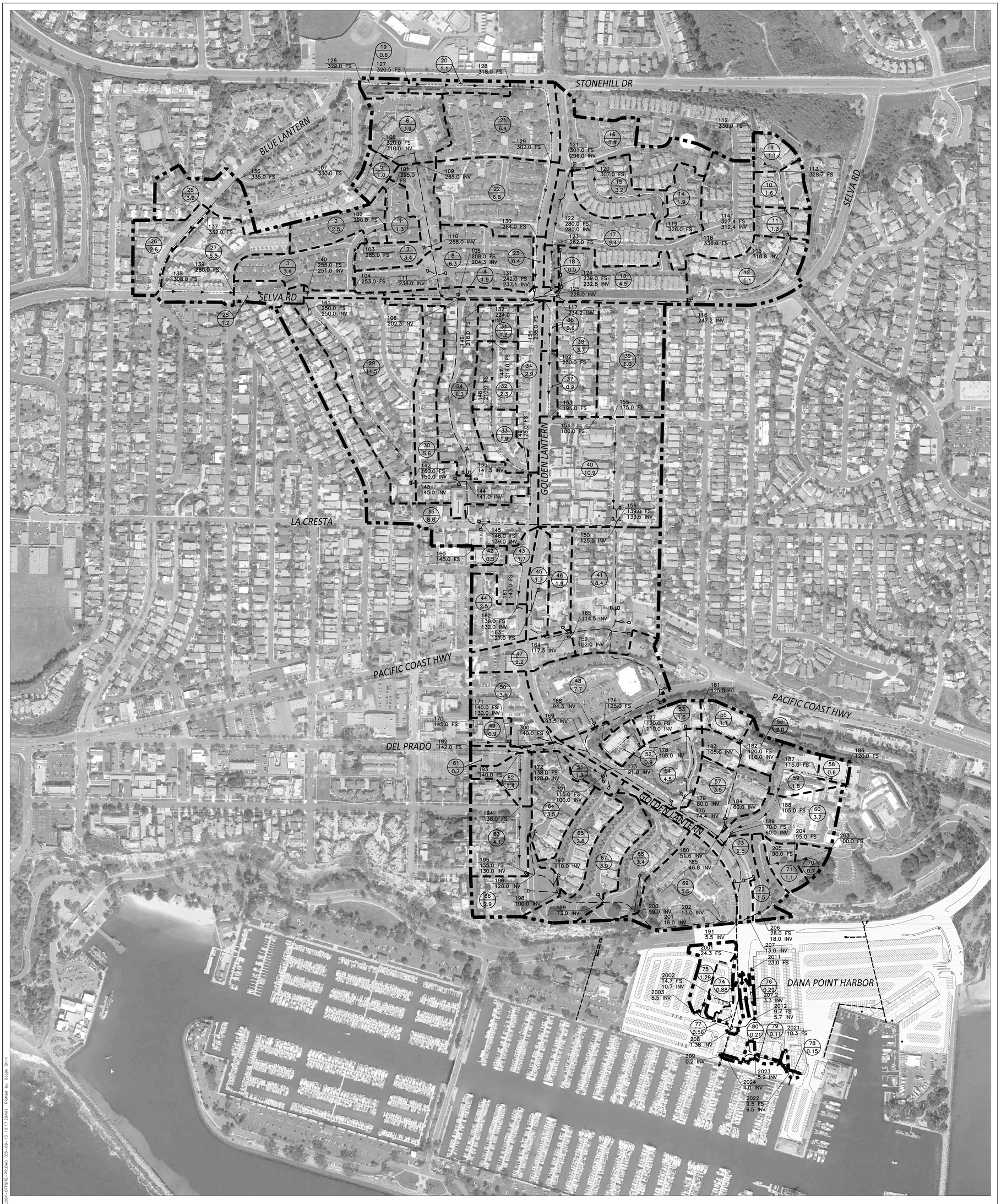
FUSCOE ENGINEERING
full circle thinking

N

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

P:\PROJECTS\307\08\DWG_FILE CABINET\REPORTS\HYDROLOGY\OFFSITE HYD\307808H-HYDROLOGY-OFFSITE-EX.DWG (05-09-13 10:16:06AM) Plotted by: Sevjin Shim

C.3



LEGEND

- MAJOR WATERSHED BOUNDARY
- DRAINAGE SUBAREA BOUNDARY
- FLOW PATH
- EXISTING STORM DRAIN
- 1 / 5.0 — DRAINAGE AREA DESIGNATION / AREA (ACRES)
- 101 — NODE NUMBER
- 25.0 FS / 15.0 INV — FINISHED SURFACE ELEVATION / PIPE INVERT ELEVATION

EXHIBIT C

STORM DRAIN LINE L00P01 PROPOSED CONDITION HYDROLOGY MAP

(INCLUDING TRIBUTARY FROM OC DANA POINT HARBOR)

CITY OF DANA POINT, COUNTY OF ORANGE

FUSCOE ENGINEERING
full circle thinking

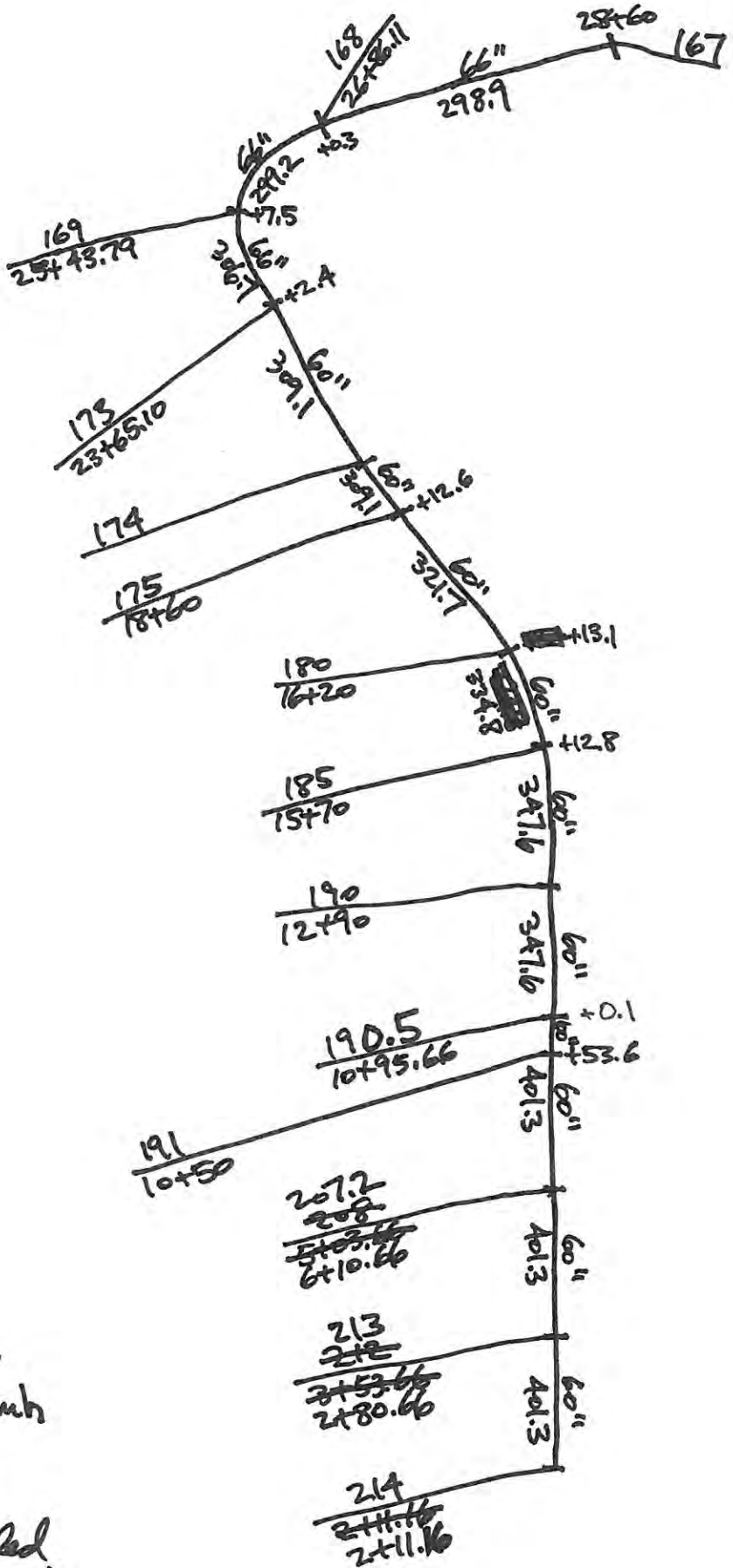
N

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

P:\PROJECTS\307\08\ENG_FILE CABINET\REPORTS\HYDROLOGY\OFFSITE HYA\307X8XH-HYDROLOGY-OFFSITE-FIN.DWG 05-09-13 10:17:23AM) Plotted by: Seojin Shim

APPENDIX D. WSPG HYDRAULIC MODELS

D.1



Hydrology: DPHOSR2
Hydraulics: dphjx60mh

Existing 10-year
w/o Harbor Included
(Consistent w/ City MPD)

Exist. 10-Yr 60" Hydraulics w/o Harbor

♀ FILE: dphjx60mh.WSW

dphjx60mh
W S P G W - CIVILDESIGN Version 14.06
Program Package Serial Number: 1863
WATER SURFACE PROFILE LISTING

Date: 5- 2-2013 Time: 2:42:42

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
199.390	-12.220	17.260	5.040	401.40	8.03	1.00	6.04	.00	3.69	10.00	5.000	10.000	.00	0 .0
11.770	.0518					.0033	.04	17.26	.63	1.58	.015	-.02	.00	BOX
211.160	-11.610	16.689	5.079	401.40	8.03	1.00	6.08	.00	3.69	10.00	5.000	10.000	.00	0 .0
TRANS STR	.0500					.0175	.44	16.69	.63		.015	.00	.00	BOX
236.140	-10.360	11.484	1.124	401.40	20.44	6.49	7.61	.00	4.89	.00	5.000	.000	.00	1 .0
2.211	.2269					.0238	.05	11.48	.00	1.96	.013	.00	.00	PIPE
238.351	-9.858	11.031	1.173	401.40	20.44	6.49	7.66	.00	4.89	.00	5.000	.000	.00	1 .0
HYDRAULIC JUMP														
238.351	-9.858	3.001	-6.857	401.40	32.62	16.52	9.66	.00	4.89	4.90	5.000	.000	.00	1 .0
5.406	.2269					.0505	.27	3.00	3.63	1.96	.013	.00	.00	PIPE
243.758	-8.632	3.084	-5.548	401.40	31.58	15.48	9.93	.00	4.89	4.86	5.000	.000	.00	1 .0
7.057	.2269					.0456	.32	3.08	3.44	1.96	.013	.00	.00	PIPE
250.815	-7.031	3.213	-3.818	401.40	30.11	14.07	10.26	.00	4.89	4.79	5.000	.000	.00	1 .0
6.131	.2269					.0405	.25	3.21	3.18	1.96	.013	.00	.00	PIPE
256.946	-5.640	3.350	-2.290	401.40	28.71	12.80	10.51	.00	4.89	4.70	5.000	.000	.00	1 .0
5.326	.2269					.0360	.19	3.35	2.93	1.96	.013	.00	.00	PIPE
262.272	-4.432	3.497	-.935	401.40	27.37	11.63	10.70	.00	4.89	4.59	5.000	.000	.00	1 .0
4.616	.2269					.0322	.15	3.50	2.70	1.96	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1054.000	5.290	20.952	26.242	347.80	17.71	4.87	31.11	.00	4.80	.00	5.000	.000	.00	1 .0
41.660	.0046					.0178	.74	20.95	.00	5.00	.013	.00	.00	PIPE
1095.660	5.480	21.505	26.985	347.80	17.71	4.87	31.86	.00	4.80	.00	5.000	.000	.00	1 .0
JUNCT STR	.0420					.0178	.09	21.50	.00		.013	.00	.00	PIPE
1100.660	5.690	21.390	27.080	347.70	17.71	4.87	31.95	.00	4.80	.00	5.000	.000	.00	1 .0
24.170	.1080					.0178	.43	21.39	.00	2.22	.013	.00	.00	PIPE
1124.830	8.300	19.210	27.510	347.70	17.71	4.87	32.38	.00	4.80	.00	5.000	.000	.00	1 .0
64.140	.1082					.0178	1.14	.00	.00	2.22	.013	.00	.00	PIPE
1188.970	15.240	13.789	29.029	347.70	17.71	4.87	33.90	.00	4.80	.00	5.000	.000	.00	1 .0
6.007	.0740					.0178	.11	13.79	.00	2.47	.013	.00	.00	PIPE
1194.977	15.684	13.452	29.137	347.70	17.71	4.87	34.01	.00	4.80	.00	5.000	.000	.00	1 .0
HYDRAULIC JUMP														
1194.977	15.684	2.429	18.114	347.70	36.74	20.95	39.07	.00	4.80	5.00	5.000	.000	.00	1 .0
92.523	.0740					.0800	7.40	2.43	4.70	2.47	.013	.00	.00	PIPE
1287.500	22.530	2.405	24.935	347.70	37.22	21.52	46.45	.00	4.80	5.00	5.000	.000	.00	1 .0
JUNCT STR	.0720					.0816	.41	2.40	4.80		.013	.00	.00	PIPE
1292.500	22.890	2.402	25.292	347.60	37.27	21.57	46.86	.00	4.80	5.00	5.000	.000	.00	1 .0
65.970	.0741					.0834	5.50	2.40	4.81	2.47	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1358.470	27.780	2.375	30.155	347.60	37.82	22.21	52.37	1.47	4.80	4.99	5.000	.000	.00	1 .0
101.230	.0873					.0842	8.52	3.85	4.91	2.36	.013	.00	.00	PIPE
1459.700	36.620	2.388	39.008	347.60	37.54	21.88	60.89	.36	4.80	5.00	5.000	.000	.00	1 .0
107.800	.0924					.0797	8.59	2.75	4.86	2.32	.013	.00	.00	PIPE
1567.500	46.580	2.452	49.032	347.60	36.30	20.46	69.49	.00	4.80	5.00	5.000	.000	.00	1 .0
JUNCT STR	.0920					.0788	.39	2.82	4.62		.013	.00	.00	PIPE
1572.500	47.040	2.353	49.393	334.80	36.86	21.10	70.49	.38	4.78	4.99	5.000	.000	.00	1 .0
45.000	.0924					.0799	3.60	2.73	4.82	2.27	.013	.00	.00	PIPE
1617.500	51.200	2.379	53.579	334.80	36.34	20.51	74.09	.00	4.78	4.99	5.000	.000	.00	1 .0
JUNCT STR	.1600					.0786	.39	2.72	4.72		.013	.00	.00	PIPE
1622.500	52.000	2.322	54.322	321.70	36.03	20.16	74.49	.33	4.74	4.99	5.000	.000	.00	1 .0
87.549	.0936					.0741	6.49	2.65	4.75	2.21	.013	.00	.00	PIPE
1710.049	60.193	2.407	62.600	321.70	34.40	18.38	80.98	.30	4.74	5.00	5.000	.000	.00	1 .0
55.961	.0936					.0654	3.66	2.71	4.43	2.21	.013	.00	.00	PIPE
1766.010	65.430	2.498	67.928	321.70	32.80	16.71	84.64	.00	4.74	5.00	5.000	.000	.00	1 .0
37.405	.0937					.0578	2.16	2.50	4.13	2.21	.013	.00	.00	PIPE
1803.415	68.934	2.588	71.522	321.70	31.37	15.28	86.80	.00	4.74	5.00	5.000	.000	.00	1 .0
30.273	.0937					.0511	1.55	2.59	3.86	2.21	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1833.688	71.769	2.688	74.458	321.70	29.91	13.89	88.34	.00	4.74	4.99	5.000	.000	.00	1 .0
23.812	.0937					.0451	1.07	2.69	3.59	2.21	.013	.00	.00	PIPE
1857.500	74.000	2.794	76.794	321.70	28.51	12.62	89.42	.00	4.74	4.97	5.000	.000	.00	1 .0
JUNCT STR	.1080					.0443	.22	2.79	3.33		.013	.00	.00	PIPE
1862.500	74.540	2.652	77.192	309.10	29.23	13.26	90.46	.00	4.70	4.99	5.000	.000	.00	1 .0
24.422	.0772					.0443	1.08	2.65	3.54	2.28	.013	.00	.00	PIPE
1886.923	76.425	2.725	79.151	309.10	28.25	12.39	91.54	.00	4.70	4.98	5.000	.000	.00	1 .0
27.249	.0772					.0398	1.08	2.73	3.36	2.28	.013	.00	.00	PIPE
1914.172	78.529	2.833	81.361	309.10	26.93	11.26	92.63	.00	4.70	4.96	5.000	.000	.00	1 .0
21.663	.0772					.0352	.76	2.83	3.12	2.28	.013	.00	.00	PIPE
1935.835	80.201	2.946	83.147	309.10	25.68	10.24	93.39	.00	4.70	4.92	5.000	.000	.00	1 .0
17.592	.0772					.0311	.55	2.95	2.89	2.28	.013	.00	.00	PIPE
1953.426	81.559	3.066	84.625	309.10	24.48	9.31	93.93	.00	4.70	4.87	5.000	.000	.00	1 .0
14.480	.0772					.0275	.40	3.07	2.68	2.28	.013	.00	.00	PIPE
1967.906	82.677	3.194	85.870	309.10	23.34	8.46	94.33	.00	4.70	4.80	5.000	.000	.00	1 .0
12.012	.0772					.0244	.29	3.19	2.48	2.28	.013	.00	.00	PIPE
1979.918	83.604	3.329	86.933	309.10	22.26	7.69	94.63	.00	4.70	4.72	5.000	.000	.00	1 .0
9.990	.0772					.0217	.22	3.33	2.29	2.28	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

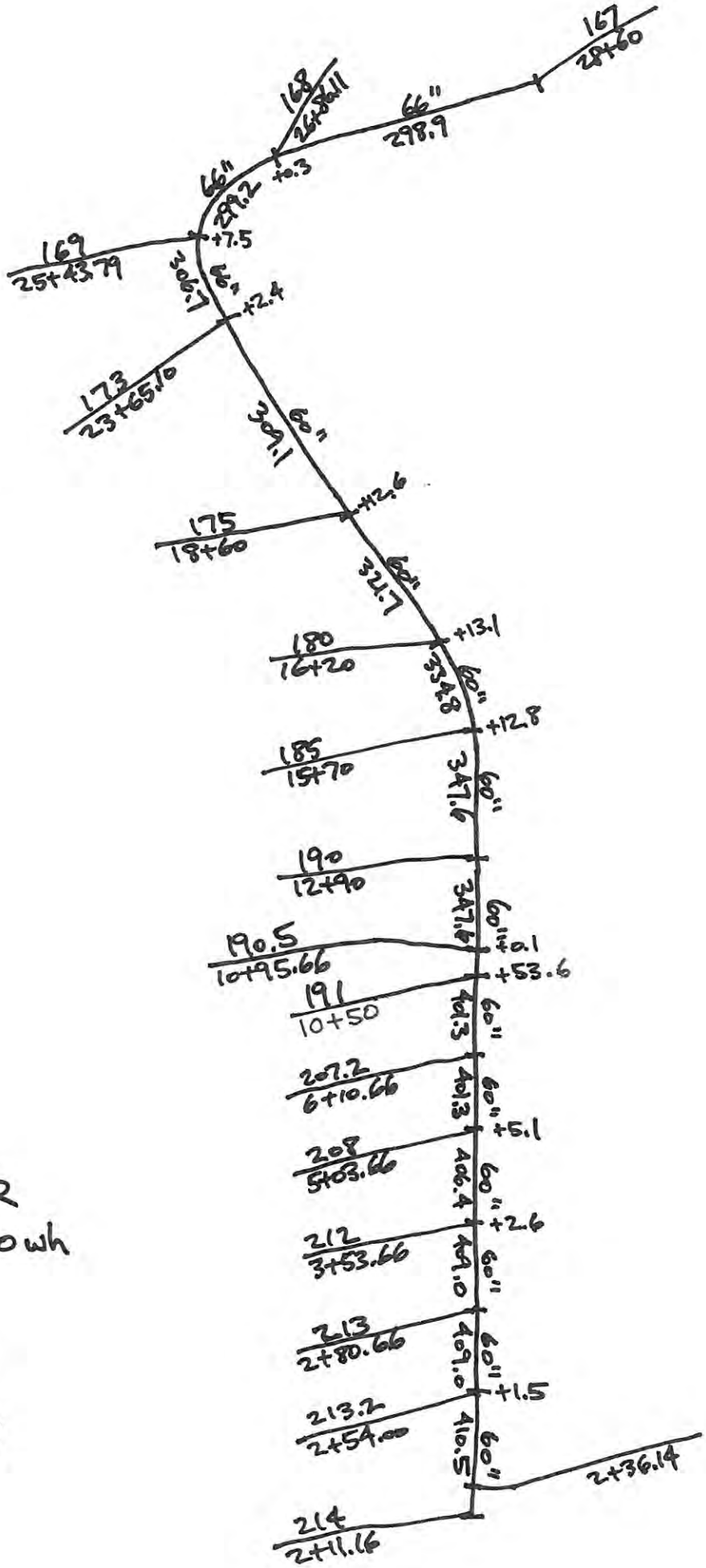
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1989.908	84.375	3.475	87.850	309.10	21.22	6.99	94.84	.00	4.70	4.60	5.000	.000	.00	1 .0
8.286	.0772					.0194	.16	3.47	2.10	2.28	.013	.00	.00	PIPE
1998.195	85.015	3.632	88.646	309.10	20.24	6.36	95.00	.00	4.70	4.46	5.000	.000	.00	1 .0
6.805	.0772					.0174	.12	3.63	1.93	2.28	.013	.00	.00	PIPE
2005.000	85.540	3.802	89.342	309.10	19.29	5.78	95.12	.00	4.70	4.27	5.000	.000	.00	1 .0
153.531	.0171					.0160	2.46	3.80	1.75	3.74	.013	.00	.00	PIPE
2158.531	88.164	3.886	92.050	309.10	18.88	5.53	97.58	.00	4.70	4.16	5.000	.000	.00	1 .0
139.002	.0171					.0149	2.07	3.89	1.68	3.74	.013	.00	.00	PIPE
2297.533	90.540	4.085	94.625	309.10	18.00	5.03	99.65	.00	4.70	3.87	5.000	.000	.00	1 .0
64.967	.0171					.0136	.88	4.09	1.50	3.74	.013	.00	.00	PIPE
2362.500	91.650	4.314	95.964	309.10	17.16	4.57	100.54	.00	4.70	3.44	5.000	.000	.00	1 .0
JUNCT STR	.1080					.0124	.06	4.31	1.32		.013	.00	.00	PIPE
2367.500	92.190	3.852	96.042	306.70	17.26	4.62	100.67	.00	4.81	5.04	5.500	.000	.00	1 .0
124.250	.0132					.0113	1.40	3.85	1.62	3.70	.013	.00	.00	PIPE
2491.750	93.830	4.021	97.851	306.70	16.48	4.22	102.07	.48	4.81	4.88	5.500	.000	.00	1 .0
49.540	.0131					.0103	.51	4.50	1.49	3.71	.013	.00	.00	PIPE
2541.290	94.480	4.153	98.633	306.70	15.93	3.94	102.58	.00	4.81	4.73	5.500	.000	.00	1 .0
JUNCT STR	.0120					.0106	.05	4.73	1.39		.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
2546.290	94.540	3.840	98.380	299.20	16.89	4.43	102.81	.69	4.76	5.05	5.500	.000	.00	1 .0
83.858	.0133					.0109	.91	4.53	1.59	3.63	.013	.00	.00	PIPE
2630.148	95.651	3.989	99.640	299.20	16.21	4.08	103.72	.62	4.76	4.91	5.500	.000	.00	1 .0
53.462	.0133					.0098	.52	4.61	1.47	3.63	.013	.00	.00	PIPE
2683.610	96.360	4.176	100.536	299.20	15.46	3.71	104.25	.00	4.76	4.70	5.500	.000	.00	1 .0
JUNCT STR	.0100					.0093	.05	4.18	1.34		.013	.00	.00	PIPE
2688.610	96.410	4.162	100.572	298.90	15.50	3.73	104.30	.00	4.76	4.72	5.500	.000	.00	1 .0
94.252	.0100					.0090	.85	4.16	1.35	4.05	.013	.00	.00	PIPE
2782.862	97.350	4.284	101.634	298.90	15.05	3.52	105.15	.00	4.76	4.57	5.500	.000	.00	1 .0
61.405	.0100					.0083	.51	4.28	1.27	4.05	.013	.00	.00	PIPE
2844.267	97.963	4.504	102.467	298.90	14.35	3.20	105.67	.00	4.76	4.24	5.500	.000	.00	1 .0
15.733	.0100					.0076	.12	4.50	1.14	4.05	.013	.00	.00	PIPE
2860.000	98.120	4.758	102.878	298.90	13.68	2.91	105.79	.00	4.76	3.76	5.500	.000	.00	1 .0

♀

D.2



Hydrology : DPHOSR
Hydraulics : dphjx60wh

Existing 10-year
/3.8 Ac Harbor
+ 0.7 Ac Harbor
Tributary Included

EX. 10-YEAR
60" HYDRAULICS
W/ HARBOR INCLUDED

♀ FILE: dphjx60wh.WSW

dphjx60wh
W S P G W - CIVILDESIGN Version 14.06
Program Package Serial Number: 1863
WATER SURFACE PROFILE LISTING

Date: 5- 7-2013 Time: 4:13:26

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
199.390	-12.220	17.260	5.040	410.60	8.21	1.05	6.09	.00	3.74	10.00	5.000	10.000	.00	0 .0
11.770	.0518					.0035	.04	17.26	.65	1.60	.015	-.02	.00	BOX
211.160	-11.610	16.691	5.081	410.60	8.21	1.05	6.13	.00	3.74	10.00	5.000	10.000	.00	0 .0
TRANS STR	.0500					.0183	.46	16.69	.65		.015	.00	.00	BOX
236.140	-10.360	11.303	.943	410.60	20.91	6.79	7.73	.00	4.90	.00	5.000	.000	.00	1 .0
.577	.2266					.0249	.01	11.30	.00	1.98	.013	.00	.00	PIPE
236.717	-10.229	11.185	.956	410.60	20.91	6.79	7.75	.00	4.90	.00	5.000	.000	.00	1 .0
HYDRAULIC JUMP														
236.717	-10.229	3.028	-7.201	410.60	33.01	16.92	9.72	.00	4.90	4.89	5.000	.000	.00	1 .0
7.792	.2266					.0506	.39	3.03	3.65	1.98	.013	.00	.00	PIPE
244.508	-8.464	3.149	-5.315	410.60	31.52	15.43	10.11	.00	4.90	4.83	5.000	.000	.00	1 .0
6.992	.2266					.0449	.31	3.15	3.38	1.98	.013	.00	.00	PIPE
251.500	-6.880	3.282	-3.598	410.60	30.06	14.03	10.43	.00	4.90	4.75	5.000	.000	.00	1 .0
JUNCT STR	.2280					.0406	.20	3.28	3.12		.013	.00	.00	PIPE
256.500	-5.740	3.372	-2.368	409.10	29.04	13.10	10.73	.00	4.90	4.69	5.000	.000	.00	1 .0
4.757	.2268					.0371	.18	3.37	2.95	1.98	.013	.00	.00	PIPE
261.257	-4.661	3.499	-1.162	409.10	27.88	12.07	10.90	.00	4.90	4.58	5.000	.000	.00	1 .0
4.849	.2268					.0334	.16	3.50	2.75	1.98	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/ Dia.-FT or I.D. / X-Fall	Base Wt / ZR	ZL	No Wth Prs/Pip / Type Ch
266.106	-3.561	3.658	.097	409.10	26.58	10.97	11.07	.00	4.90	4.43	5.000	.000	.00	1 .0
4.184	.2268				.0299	.13	3.66	2.51	1.98	.013	.00	.00		PIPE
270.290	-2.612	3.831	1.219	409.10	25.34	9.97	11.19	.00	4.90	4.23	5.000	.000	.00	1 .0
3.575	.2268				.0269	.10	3.83	2.29	1.98	.013	.00	.00		PIPE
273.865	-1.801	4.023	2.222	409.10	24.16	9.07	11.29	.00	4.90	3.97	5.000	.000	.00	1 .0
2.993	.2268				.0244	.07	4.02	2.06	1.98	.013	.00	.00		PIPE
276.858	-1.122	4.241	3.119	409.10	23.04	8.24	11.36	.00	4.90	3.59	5.000	.000	.00	1 .0
2.384	.2268				.0225	.05	4.24	1.82	1.98	.013	.00	.00		PIPE
279.242	-.582	4.504	3.922	409.10	21.97	7.49	11.41	.00	4.90	2.99	5.000	.000	.00	1 .0
1.418	.2268				.0219	.03	4.50	1.55	1.98	.013	.00	.00		PIPE
280.660	-.260	4.895	4.635	409.10	20.94	6.81	11.45	.00	4.90	1.43	5.000	.000	.00	1 .0
2.910	.0108				.0229	.07	4.90	1.00	5.00	.013	.00	.00		PIPE
283.570	-.229	5.000	4.771	409.10	20.84	6.74	11.51	.00	4.90	.00	5.000	.000	.00	1 .0
67.590	.0108				.0242	1.64	5.00	.00	5.00	.013	.00	.00		PIPE
351.160	.500	5.939	6.439	409.10	20.84	6.74	13.18	.00	4.90	.00	5.000	.000	.00	1 .0
JUNCT STR	.0100				.0245	.12	5.94	.00		.013	.00	.00		PIPE
356.160	.550	6.178	6.728	406.50	20.70	6.66	13.38	.00	4.89	.00	5.000	.000	.00	1 .0
145.000	.0107				.0244	3.53	6.18	.00	5.00	.013	.00	.00		PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
501.160	2.100	8.161	10.261	406.50	20.70	6.66	16.92	.00	4.89	.00	5.000	.000	.00	1 .0
JUNCT STR	.0120					.0241	.12	8.16	.00		.013	.00	.00	PIPE
506.160	2.160	8.553	10.713	401.40	20.44	6.49	17.20	.00	4.89	.00	5.000	.000	.00	1 .0
104.500	.0107					.0238	2.48	8.55	.00	5.00	.013	.00	.00	PIPE
610.660	3.280	10.454	13.734	401.40	20.44	6.49	20.22	.00	4.89	.00	5.000	.000	.00	1 .0
319.340	.0045					.0238	7.59	10.45	.00	5.00	.013	.00	.00	PIPE
930.000	4.730	16.589	21.319	401.40	20.44	6.49	27.81	.00	4.89	.00	5.000	.000	.00	1 .0
120.000	.0045					.0238	2.85	16.59	.00	5.00	.013	.00	.00	PIPE
1050.000	5.270	18.900	24.170	401.40	20.44	6.49	30.66	.00	4.89	.00	5.000	.000	.00	1 .0
JUNCT STR	.0050					.0208	.08	18.90	.00		.013	.00	.00	PIPE
1054.000	5.290	21.830	27.120	347.80	17.71	4.87	31.99	.00	4.80	.00	5.000	.000	.00	1 .0
41.660	.0046					.0178	.74	21.83	.00	5.00	.013	.00	.00	PIPE
1095.660	5.480	22.383	27.863	347.80	17.71	4.87	32.73	.00	4.80	.00	5.000	.000	.00	1 .0
JUNCT STR	.0420					.0178	.09	22.38	.00		.013	.00	.00	PIPE
1100.660	5.690	22.267	27.957	347.70	17.71	4.87	32.83	.00	4.80	.00	5.000	.000	.00	1 .0
24.170	.1080					.0178	.43	22.27	.00	2.22	.013	.00	.00	PIPE
1124.830	8.300	20.088	28.388	347.70	17.71	4.87	33.26	.00	4.80	.00	5.000	.000	.00	1 .0
64.140	.1082					.0178	1.14	.00	.00	2.22	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1188.970	15.240	14.667	29.907	347.70	17.71	4.87	34.78	.00	4.80	.00	5.000	.000	.00	1 .0
20.877	.0740					.0178	.37	14.67	.00	2.47	.013	.00	.00	PIPE
1209.847	16.785	13.494	30.279	347.70	17.71	4.87	35.15	.00	4.80	.00	5.000	.000	.00	1 .0
HYDRAULIC JUMP														
1209.847	16.785	2.424	19.209	347.70	36.84	21.08	40.28	.00	4.80	5.00	5.000	.000	.00	1 .0
77.653	.0740					.0803	6.24	2.42	4.72	2.47	.013	.00	.00	PIPE
1287.500	22.530	2.405	24.935	347.70	37.22	21.52	46.45	.00	4.80	5.00	5.000	.000	.00	1 .0
JUNCT STR	.0720					.0816	.41	2.40	4.80		.013	.00	.00	PIPE
1292.500	22.890	2.402	25.292	347.60	37.27	21.57	46.86	.00	4.80	5.00	5.000	.000	.00	1 .0
65.970	.0741					.0834	5.50	2.40	4.81	2.47	.013	.00	.00	PIPE
1358.470	27.780	2.375	30.155	347.60	37.82	22.21	52.37	1.47	4.80	4.99	5.000	.000	.00	1 .0
101.230	.0873					.0842	8.52	3.85	4.91	2.36	.013	.00	.00	PIPE
1459.700	36.620	2.388	39.008	347.60	37.54	21.88	60.89	.36	4.80	5.00	5.000	.000	.00	1 .0
107.800	.0924					.0797	8.59	2.75	4.86	2.32	.013	.00	.00	PIPE
1567.500	46.580	2.452	49.032	347.60	36.30	20.46	69.49	.00	4.80	5.00	5.000	.000	.00	1 .0
JUNCT STR	.0920					.0788	.39	2.82	4.62		.013	.00	.00	PIPE
1572.500	47.040	2.353	49.393	334.80	36.86	21.10	70.49	.38	4.78	4.99	5.000	.000	.00	1 .0
45.000	.0924					.0799	3.60	2.73	4.82	2.27	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1617.500	51.200	2.379	53.579	334.80	36.34	20.51	74.09	.00	4.78	4.99	5.000	.000	.00	1 .0
JUNCT STR	.1600					.0786	.39	2.72	4.72		.013	.00	.00	PIPE
1622.500	52.000	2.322	54.322	321.70	36.03	20.16	74.49	.33	4.74	4.99	5.000	.000	.00	1 .0
87.549	.0936					.0741	6.49	2.65	4.75	2.21	.013	.00	.00	PIPE
1710.049	60.193	2.407	62.600	321.70	34.40	18.38	80.98	.30	4.74	5.00	5.000	.000	.00	1 .0
55.961	.0936					.0654	3.66	2.71	4.43	2.21	.013	.00	.00	PIPE
1766.010	65.430	2.498	67.928	321.70	32.80	16.71	84.64	.00	4.74	5.00	5.000	.000	.00	1 .0
37.405	.0937					.0578	2.16	2.50	4.13	2.21	.013	.00	.00	PIPE
1803.415	68.934	2.588	71.522	321.70	31.37	15.28	86.80	.00	4.74	5.00	5.000	.000	.00	1 .0
30.273	.0937					.0511	1.55	2.59	3.86	2.21	.013	.00	.00	PIPE
1833.688	71.769	2.688	74.458	321.70	29.91	13.89	88.34	.00	4.74	4.99	5.000	.000	.00	1 .0
23.812	.0937					.0451	1.07	2.69	3.59	2.21	.013	.00	.00	PIPE
1857.500	74.000	2.794	76.794	321.70	28.51	12.62	89.42	.00	4.74	4.97	5.000	.000	.00	1 .0
JUNCT STR	.1080					.0443	.22	2.79	3.33		.013	.00	.00	PIPE
1862.500	74.540	2.652	77.192	309.10	29.23	13.26	90.46	.00	4.70	4.99	5.000	.000	.00	1 .0
24.422	.0772					.0443	1.08	2.65	3.54	2.28	.013	.00	.00	PIPE
1886.923	76.425	2.725	79.151	309.10	28.25	12.39	91.54	.00	4.70	4.98	5.000	.000	.00	1 .0
27.249	.0772					.0398	1.08	2.73	3.36	2.28	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1914.172	78.529	2.833	81.361	309.10	26.93	11.26	92.63	.00	4.70	4.96	5.000	.000	.00	1 .0
21.663	.0772					.0352	.76	2.83	3.12	2.28	.013	.00	.00	PIPE
1935.835	80.201	2.946	83.147	309.10	25.68	10.24	93.39	.00	4.70	4.92	5.000	.000	.00	1 .0
17.592	.0772					.0311	.55	2.95	2.89	2.28	.013	.00	.00	PIPE
1953.426	81.559	3.066	84.625	309.10	24.48	9.31	93.93	.00	4.70	4.87	5.000	.000	.00	1 .0
14.480	.0772					.0275	.40	3.07	2.68	2.28	.013	.00	.00	PIPE
1967.906	82.677	3.194	85.870	309.10	23.34	8.46	94.33	.00	4.70	4.80	5.000	.000	.00	1 .0
12.012	.0772					.0244	.29	3.19	2.48	2.28	.013	.00	.00	PIPE
1979.918	83.604	3.329	86.933	309.10	22.26	7.69	94.63	.00	4.70	4.72	5.000	.000	.00	1 .0
9.990	.0772					.0217	.22	3.33	2.29	2.28	.013	.00	.00	PIPE
1989.908	84.375	3.475	87.850	309.10	21.22	6.99	94.84	.00	4.70	4.60	5.000	.000	.00	1 .0
8.286	.0772					.0194	.16	3.47	2.10	2.28	.013	.00	.00	PIPE
1998.195	85.015	3.632	88.646	309.10	20.24	6.36	95.00	.00	4.70	4.46	5.000	.000	.00	1 .0
6.805	.0772					.0174	.12	3.63	1.93	2.28	.013	.00	.00	PIPE
2005.000	85.540	3.802	89.342	309.10	19.29	5.78	95.12	.00	4.70	4.27	5.000	.000	.00	1 .0
153.531	.0171					.0160	2.46	3.80	1.75	3.74	.013	.00	.00	PIPE
2158.531	88.164	3.886	92.050	309.10	18.88	5.53	97.58	.00	4.70	4.16	5.000	.000	.00	1 .0
139.002	.0171					.0149	2.07	3.89	1.68	3.74	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

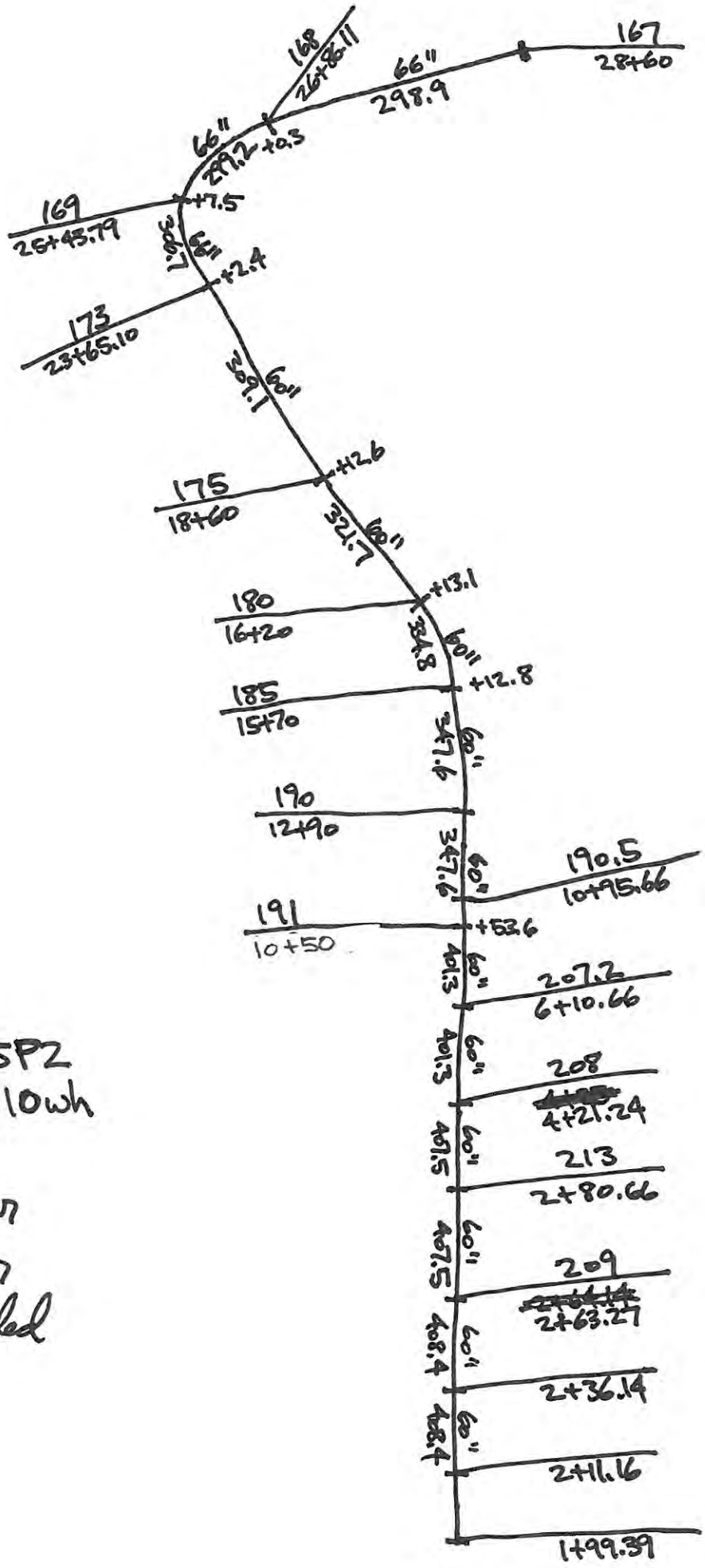
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2297.533	90.540	4.085	94.625	309.10	18.00	5.03	99.65	.00	4.70	3.87	5.000	.000	.00	1 .0
64.967	.0171					.0136	.88	4.09	1.50	3.74	.013	.00	.00	PIPE
2362.500	91.650	4.314	95.964	309.10	17.16	4.57	100.54	.00	4.70	3.44	5.000	.000	.00	1 .0
JUNCT STR	.1080					.0124	.06	4.31	1.32		.013	.00	.00	PIPE
2367.500	92.190	3.852	96.042	306.70	17.26	4.62	100.67	.00	4.81	5.04	5.500	.000	.00	1 .0
124.250	.0132					.0113	1.40	3.85	1.62	3.70	.013	.00	.00	PIPE
2491.750	93.830	4.021	97.851	306.70	16.48	4.22	102.07	.48	4.81	4.88	5.500	.000	.00	1 .0
49.540	.0131					.0103	.51	4.50	1.49	3.71	.013	.00	.00	PIPE
2541.290	94.480	4.153	98.633	306.70	15.93	3.94	102.58	.00	4.81	4.73	5.500	.000	.00	1 .0
JUNCT STR	.0120					.0106	.05	4.73	1.39		.013	.00	.00	PIPE
2546.290	94.540	3.840	98.380	299.20	16.89	4.43	102.81	.69	4.76	5.05	5.500	.000	.00	1 .0
83.858	.0133					.0109	.91	4.53	1.59	3.63	.013	.00	.00	PIPE
2630.148	95.651	3.989	99.640	299.20	16.21	4.08	103.72	.62	4.76	4.91	5.500	.000	.00	1 .0
53.462	.0133					.0098	.52	4.61	1.47	3.63	.013	.00	.00	PIPE
2683.610	96.360	4.176	100.536	299.20	15.46	3.71	104.25	.00	4.76	4.70	5.500	.000	.00	1 .0
JUNCT STR	.0100					.0093	.05	4.18	1.34		.013	.00	.00	PIPE
2688.610	96.410	4.162	100.572	298.90	15.50	3.73	104.30	.00	4.76	4.72	5.500	.000	.00	1 .0
94.252	.0100					.0090	.85	4.16	1.35	4.05	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Existing Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2782.862	97.350	4.284	101.634	298.90	15.05	3.52	105.15	.00	4.76	4.57	5.500	.000	.00	1 .0
61.405	.0100					.0083	.51	4.28	1.27	4.05	.013	.00	.00	PIPE
2844.267	97.963	4.504	102.467	298.90	14.35	3.20	105.67	.00	4.76	4.24	5.500	.000	.00	1 .0
15.733	.0100					.0076	.12	4.50	1.14	4.05	.013	.00	.00	PIPE
2860.000	98.120	4.758	102.878	298.90	13.68	2.91	105.79	.00	4.76	3.76	5.500	.000	.00	1 .0

♀

D.3



Hydrology: DPHOSP2
Hydraulics: dphjp10wh

Proposed 10-year
w/ 3.5 Ac Harbor
Tributary Included

PROP. 10-YR 60" HYDRAULICS w/ Harbor Included

♀ FILE: dphjp10wh.WSW

dphjp10wh
W S P G W - CIVILDESIGN Version 14.06
Program Package Serial Number: 1863
WATER SURFACE PROFILE LISTING

Date: 5- 2-2013 Time: 3:28:53

Dana Point Harbor
60-inch Line L00P01
Proposed Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
199.390	-12.220	17.260	5.040	408.50	8.17	1.04	6.08	.00	3.73	10.00	5.000	10.000	.00	0 .0
11.770	.0518					.0034	.04	17.26	.64	1.60	.015	-.02	.00	BOX
211.160	-11.610	16.690	5.080	408.50	8.17	1.04	6.12	.00	3.73	10.00	5.000	10.000	.00	0 .0
TRANS STR	.0500					.0181	.45	16.69	.64		.015	.00	.00	BOX
236.140	-10.360	11.345	.985	408.50	20.80	6.72	7.71	.00	4.89	.00	5.000	.000	.00	1 .0
.621	.2351					.0246	.02	11.34	.00	1.96	.013	.00	.00	PIPE
236.761	-10.214	11.210	.996	408.50	20.80	6.72	7.72	.00	4.89	.00	5.000	.000	.00	1 .0
HYDRAULIC JUMP														
236.761	-10.214	3.014	-7.200	408.50	33.02	16.93	9.73	.00	4.89	4.89	5.000	.000	.00	1 .0
5.900	.2351					.0514	.30	3.01	3.66	1.96	.013	.00	.00	PIPE
242.661	-8.827	3.107	-5.720	408.50	31.86	15.76	10.04	.00	4.89	4.85	5.000	.000	.00	1 .0
6.898	.2351					.0463	.32	3.11	3.45	1.96	.013	.00	.00	PIPE
249.559	-7.205	3.237	-3.968	408.50	30.37	14.33	10.36	.00	4.89	4.78	5.000	.000	.00	1 .0
5.998	.2351					.0411	.25	3.24	3.19	1.96	.013	.00	.00	PIPE
255.557	-5.796	3.376	-2.420	408.50	28.96	13.02	10.60	.00	4.89	4.68	5.000	.000	.00	1 .0
5.213	.2351					.0366	.19	3.38	2.94	1.96	.013	.00	.00	PIPE
260.770	-4.570	3.525	-1.045	408.50	27.61	11.84	10.79	.00	4.89	4.56	5.000	.000	.00	1 .0
JUNCT STR	.1860					.0331	.17	3.52	2.70		.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Proposed Condition Hydraulic Model

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
423.740	1.270	7.322	8.592	401.40	20.44	6.49	15.08	.00	4.89	.00	5.000	.000	.00	1 .0
186.920	.0108					.0238	4.44	7.32	.00	5.00	.013	.00	.00	PIPE
610.660	3.280	10.290	13.570	401.40	20.44	6.49	20.06	.00	4.89	.00	5.000	.000	.00	1 .0
439.340	.0045					.0238	10.44	10.29	.00	5.00	.013	.00	.00	PIPE
1050.000	5.270	18.736	24.006	401.40	20.44	6.49	30.50	.00	4.89	.00	5.000	.000	.00	1 .0
JUNCT STR	.0050					.0208	.08	18.74	.00		.013	.00	.00	PIPE
1054.000	5.290	21.666	26.956	347.80	17.71	4.87	31.83	.00	4.80	.00	5.000	.000	.00	1 .0
41.660	.0046					.0178	.74	21.67	.00	5.00	.013	.00	.00	PIPE
1095.660	5.480	22.219	27.699	347.80	17.71	4.87	32.57	.00	4.80	.00	5.000	.000	.00	1 .0
JUNCT STR	.0420					.0178	.09	22.22	.00		.013	.00	.00	PIPE
1100.660	5.690	22.104	27.794	347.70	17.71	4.87	32.66	.00	4.80	.00	5.000	.000	.00	1 .0
24.170	.1080					.0178	.43	22.10	.00	2.22	.013	.00	.00	PIPE
1124.830	8.300	19.925	28.225	347.70	17.71	4.87	33.09	.00	4.80	.00	5.000	.000	.00	1 .0
64.140	.1082					.0178	1.14	.00	.00	2.22	.013	.00	.00	PIPE
1188.970	15.240	14.504	29.744	347.70	17.71	4.87	34.61	.00	4.80	.00	5.000	.000	.00	1 .0
18.110	.0740					.0178	.32	14.50	.00	2.47	.013	.00	.00	PIPE
1207.080	16.580	13.486	30.066	347.70	17.71	4.87	34.94	.00	4.80	.00	5.000	.000	.00	1 .0
HYDRAULIC JUMP														

Dana Point Harbor
60-inch Line L00P01
Proposed Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1207.080	16.580	2.427	19.007	347.70	36.79	21.02	40.02	.00	4.80	5.00	5.000	.000	.00	1 .0
80.420	.0740					.0802	6.45	2.43	4.71	2.47	.013	.00	.00	PIPE
1287.500	22.530	2.405	24.935	347.70	37.22	21.52	46.45	.00	4.80	5.00	5.000	.000	.00	1 .0
JUNCT STR	.0720					.0816	.41	2.40	4.80		.013	.00	.00	PIPE
1292.500	22.890	2.402	25.292	347.60	37.27	21.57	46.86	.00	4.80	5.00	5.000	.000	.00	1 .0
65.970	.0741					.0834	5.50	2.40	4.81	2.47	.013	.00	.00	PIPE
1358.470	27.780	2.375	30.155	347.60	37.82	22.21	52.37	1.47	4.80	4.99	5.000	.000	.00	1 .0
101.230	.0873					.0842	8.52	3.85	4.91	2.36	.013	.00	.00	PIPE
1459.700	36.620	2.388	39.008	347.60	37.54	21.88	60.89	.36	4.80	5.00	5.000	.000	.00	1 .0
107.800	.0924					.0797	8.59	2.75	4.86	2.32	.013	.00	.00	PIPE
1567.500	46.580	2.452	49.032	347.60	36.30	20.46	69.49	.00	4.80	5.00	5.000	.000	.00	1 .0
JUNCT STR	.0920					.0788	.39	2.82	4.62		.013	.00	.00	PIPE
1572.500	47.040	2.353	49.393	334.80	36.86	21.10	70.49	.38	4.78	4.99	5.000	.000	.00	1 .0
45.000	.0924					.0799	3.60	2.73	4.82	2.27	.013	.00	.00	PIPE
1617.500	51.200	2.379	53.579	334.80	36.34	20.51	74.09	.00	4.78	4.99	5.000	.000	.00	1 .0
JUNCT STR	.1600					.0786	.39	2.72	4.72		.013	.00	.00	PIPE
1622.500	52.000	2.322	54.322	321.70	36.03	20.16	74.49	.33	4.74	4.99	5.000	.000	.00	1 .0
87.549	.0936					.0741	6.49	2.65	4.75	2.21	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Proposed Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1710.049	60.193	2.407	62.600	321.70	34.40	18.38	80.98	.30	4.74	5.00	5.000	.000	.00	1 .0
55.961	.0936					.0654	3.66	2.71	4.43	2.21	.013	.00	.00	PIPE
1766.010	65.430	2.498	67.928	321.70	32.80	16.71	84.64	.00	4.74	5.00	5.000	.000	.00	1 .0
37.405	.0937					.0578	2.16	2.50	4.13	2.21	.013	.00	.00	PIPE
1803.415	68.934	2.588	71.522	321.70	31.37	15.28	86.80	.00	4.74	5.00	5.000	.000	.00	1 .0
30.273	.0937					.0511	1.55	2.59	3.86	2.21	.013	.00	.00	PIPE
1833.688	71.769	2.688	74.458	321.70	29.91	13.89	88.34	.00	4.74	4.99	5.000	.000	.00	1 .0
23.812	.0937					.0451	1.07	2.69	3.59	2.21	.013	.00	.00	PIPE
1857.500	74.000	2.794	76.794	321.70	28.51	12.62	89.42	.00	4.74	4.97	5.000	.000	.00	1 .0
JUNCT STR	.1080					.0443	.22	2.79	3.33		.013	.00	.00	PIPE
1862.500	74.540	2.652	77.192	309.10	29.23	13.26	90.46	.00	4.70	4.99	5.000	.000	.00	1 .0
24.422	.0772					.0443	1.08	2.65	3.54	2.28	.013	.00	.00	PIPE
1886.923	76.425	2.725	79.151	309.10	28.25	12.39	91.54	.00	4.70	4.98	5.000	.000	.00	1 .0
27.249	.0772					.0398	1.08	2.73	3.36	2.28	.013	.00	.00	PIPE
1914.172	78.529	2.833	81.361	309.10	26.93	11.26	92.63	.00	4.70	4.96	5.000	.000	.00	1 .0
21.663	.0772					.0352	.76	2.83	3.12	2.28	.013	.00	.00	PIPE
1935.835	80.201	2.946	83.147	309.10	25.68	10.24	93.39	.00	4.70	4.92	5.000	.000	.00	1 .0
17.592	.0772					.0311	.55	2.95	2.89	2.28	.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Proposed Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1953.426	81.559	3.066	84.625	309.10	24.48	9.31	93.93	.00	4.70	4.87	5.000	.000	.00	1 .0
14.480	.0772					.0275	.40	3.07	2.68	2.28	.013	.00	.00	PIPE
1967.906	82.677	3.194	85.870	309.10	23.34	8.46	94.33	.00	4.70	4.80	5.000	.000	.00	1 .0
12.012	.0772					.0244	.29	3.19	2.48	2.28	.013	.00	.00	PIPE
1979.918	83.604	3.329	86.933	309.10	22.26	7.69	94.63	.00	4.70	4.72	5.000	.000	.00	1 .0
9.990	.0772					.0217	.22	3.33	2.29	2.28	.013	.00	.00	PIPE
1989.908	84.375	3.475	87.850	309.10	21.22	6.99	94.84	.00	4.70	4.60	5.000	.000	.00	1 .0
8.286	.0772					.0194	.16	3.47	2.10	2.28	.013	.00	.00	PIPE
1998.195	85.015	3.632	88.646	309.10	20.24	6.36	95.00	.00	4.70	4.46	5.000	.000	.00	1 .0
6.805	.0772					.0174	.12	3.63	1.93	2.28	.013	.00	.00	PIPE
2005.000	85.540	3.802	89.342	309.10	19.29	5.78	95.12	.00	4.70	4.27	5.000	.000	.00	1 .0
153.531	.0171					.0160	2.46	3.80	1.75	3.74	.013	.00	.00	PIPE
2158.531	88.164	3.886	92.050	309.10	18.88	5.53	97.58	.00	4.70	4.16	5.000	.000	.00	1 .0
139.002	.0171					.0149	2.07	3.89	1.68	3.74	.013	.00	.00	PIPE
2297.533	90.540	4.085	94.625	309.10	18.00	5.03	99.65	.00	4.70	3.87	5.000	.000	.00	1 .0
64.967	.0171					.0136	.88	4.09	1.50	3.74	.013	.00	.00	PIPE
2362.500	91.650	4.314	95.964	309.10	17.16	4.57	100.54	.00	4.70	3.44	5.000	.000	.00	1 .0
JUNCT STR	.1080					.0124	.06	4.31	1.32		.013	.00	.00	PIPE

Dana Point Harbor
60-inch Line L00P01
Proposed Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2367.500	92.190	3.852	96.042	306.70	17.26	4.62	100.67	.00	4.81	5.04	5.500	.000	.00	1 .0
124.250	.0132					.0113	1.40	3.85	1.62	3.70	.013	.00	.00	PIPE
2491.750	93.830	4.021	97.851	306.70	16.48	4.22	102.07	.48	4.81	4.88	5.500	.000	.00	1 .0
49.540	.0131					.0103	.51	4.50	1.49	3.71	.013	.00	.00	PIPE
2541.290	94.480	4.153	98.633	306.70	15.93	3.94	102.58	.00	4.81	4.73	5.500	.000	.00	1 .0
JUNCT STR	.0120					.0106	.05	4.73	1.39		.013	.00	.00	PIPE
2546.290	94.540	3.840	98.380	299.20	16.89	4.43	102.81	.69	4.76	5.05	5.500	.000	.00	1 .0
83.858	.0133					.0109	.91	4.53	1.59	3.63	.013	.00	.00	PIPE
2630.148	95.651	3.989	99.640	299.20	16.21	4.08	103.72	.62	4.76	4.91	5.500	.000	.00	1 .0
53.462	.0133					.0098	.52	4.61	1.47	3.63	.013	.00	.00	PIPE
2683.610	96.360	4.176	100.536	299.20	15.46	3.71	104.25	.00	4.76	4.70	5.500	.000	.00	1 .0
JUNCT STR	.0100					.0093	.05	4.18	1.34		.013	.00	.00	PIPE
2688.610	96.410	4.162	100.572	298.90	15.50	3.73	104.30	.00	4.76	4.72	5.500	.000	.00	1 .0
94.252	.0100					.0090	.85	4.16	1.35	4.05	.013	.00	.00	PIPE
2782.862	97.350	4.284	101.634	298.90	15.05	3.52	105.15	.00	4.76	4.57	5.500	.000	.00	1 .0
61.405	.0100					.0083	.51	4.28	1.27	4.05	.013	.00	.00	PIPE
2844.267	97.963	4.504	102.467	298.90	14.35	3.20	105.67	.00	4.76	4.24	5.500	.000	.00	1 .0
15.733	.0100					.0076	.12	4.50	1.14	4.05	.013	.00	.00	PIPE

Program Package Serial Number: 1863

WATER SURFACE PROFILE LISTING Date: 5- 2-2013 Time: 3:28:53

Dana Point Harbor
60-inch Line L00P01
Proposed Condition Hydraulic Model

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2860.000	98.120	4.758	102.878	298.90	13.68	2.91	105.79	.00	4.76	3.76	5.500	.000	.00	1 .0