FUSCOE
ENGINEERING

TECHNICAL MEMORANDUM

STORM DRAIN MASTER PLAN DRAINAGE ASSESSMENT

PREPARED FOR
City of Santa Ana

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DATE PREPARED: January 2023
DATE REVISED: March 2023

PROJECT NUMBER: 622.015.02

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TECHNICAL MEMORANDUM

STORM DRAIN MASTER PLAN DRAINAGE ASSESSMENT

SANTA ANA, CA

622.015.02

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TECHNICAL MEMORANDUM

STORM DRAIN MASTER PLAN DRAINAGE ASSESSMENT

SANATA ANA, CA

622.015.02

City of Santa Ana Storm Drain Master Plan – Drainage Assessment

PREPARED FOR: City of Santa Ana

PREPARED BY: Fuscoe Engineering, Inc.

DATE: March 31, 2023

Purpose

The purpose of the technical memorandum is to present the results of Fuscoe's review of a portion of the 2018 Storm Drain Master Plan (SDMP). The SDMP has been prepared and published by the City of Santa Ana. The watershed under review is the Gardens Watershed, which is tributary to the Orange County Flood Control Department (OCFCD) Gardens Channel.

The specific portion of the Gardens Watershed that was reviewed included an area within Subarea 40, located at the downstream end of the Gardens Channel Watershed. The study area is bounded to the north by MacArthur Boulevard, to the south by Sunflower Avenue, to the east by Bristol Street, and to the west by Plaza Drive and existing commercial development. The SDMP shows the drainage pattern of this area as draining southerly, toward Sunflower Avenue. However, based on our review, a portion of this area drains northerly, toward MacArthur Boulevard. Additionally, our review also discovered that an area in the Bristol Street vicinity does not enter Sunflower Avenue, but actually drains into the Gardens Channel through an existing storm drain in Bristol Street. An excerpt of the study area is included as Figure 1.1 below. Please see Attachment 1 for exhibit showing entire watershed.

Figure 1.1 – Gardens Watershed Subarea Exhibit

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The goal of this study is to determine if the recommended storm drain improvements identified in the SDMP are warranted, or if any of them could be eliminated, or sizes reduced, based on this updated hydrologic and hydraulic evaluation.

Background

The study area described above, and shown on Figure 1.1 is within Subarea 40 of the Gardens Watershed, as identified in the City's 2018 Storm Drain Master Plan (SDMP). The watershed is tributary to the Orange County Flood Control District (OCFCD) Gardens Channel, Facility No. F02. The Gardens Channel is a graded earthen channel from upstream at 1st Street to Alton Avenue. Downstream of Alton Avenue, the channel is a reinforced rectangular concrete section, with a triple-barrel culvert at MacArthur Boulevard and Bristol Street. The Gardens Channel confluences with the Delhi Channel at Sunflower Avenue, east of Bristol Street, and continues flowing southerly toward Upper Newport Bay.

The SDMP recommends upsizing the existing storm drain systems in Sunflower Avenue and Plaza Drive. The existing 54"/60" storm drain line in Sunflower Avenue is originally recommended to be upgraded to a 72"-diameter line. The existing RCP ranging from 18" to 42" in size in Plaza Drive is originally recommended to be upgraded to a 60"-diameter, along with additional pipe-size upgrades. These original SDMP-recommended upgrades are shown on the SDMP exhibit in Attachment 1. Fuscoe's evaluation would determine the required pipe sizes and extent of upgrades for these locations. Additionally, Fuscoe prepared hydraulic analyses of the drains in MacArthur Boulevard and Bristol Street to confirm hydraulic adequacies of those drains to accept the flows associated with the updated hydrologic analyses.

Methodology

Fuscoe requested and received the 10-year Rational Method hydrologic files and drainage exhibit for the SDMP from the city of Santa Ana. This information (10-year Rational Method hydrology for Gardens Watershed) was used as a starting point for our hydrologic and hydraulic evaluation, as discussed in the following sections.

This study was prepared in accordance with the Orange County Hydrology Manual and the Orange County Local Drainage Manual and utilized the existing Rational Method analysis performed for the storm event return period of 10-year for the Gardens Channel Watershed, as confirmed by city staff.

Using existing topography, as-built storm drain plans and atlas maps, and results of underground utility scanning, the city's Rational Method model was adjusted to incorporate the actual field and as-built topographic and storm drain conditions. The city of Santa Ana storm drain atlas maps and reference plans are included as Attachment 2. The OCFCD Gardens Channel as-built plan is included as Attachment 3.

The results of the updated Rational Method hydrologic model for Subarea 40 were used to annotate the city's original SDMP drainage exhibit. The tributary drainage areas, and Q's were added to the annotated city's SDMP exhibit. The updated SDMP drainage exhibit (hydrology map) is included in Attachment 4. The updated 10-year Rational Method hydrology calculations are included in Attachment 5.

Following the updates to the Rational Method hydrology analysis and exhibit labeling, the updated Q10 results were used to prepare storm drain hydraulics for the existing storm drain systems in Plaza Drive, Sunflower Avenue, MacArthur Boulevard, and Bristol Street. The purpose of these hydraulic analyses (Attachment 8) is to determine and confirm the hydraulic capacities of the existing city storm drain systems to adequately convey the Q10 stormwater. The water surface elevations (WSE's) were plotted on the profiles of the city of Santa Ana's storm drain as-built plans. The annotated as-built plans with WSE's are included as Attachment 6. The Water Surface Pressure Gradient (WSPG) hydraulic calculations are included as Attachment 7.

Computer programs were used to perform hydrologic and hydraulic analyses. Advanced Engineering Software (AES) HydroWIN Rational Method and Civil Design's Water Surface Pressure Gradient (WSPG) were utilized to compile the hydrologic data, calculate peak flow discharge rates, and determine the hydraulic grade line (water surface depth) in the storm drain pipes.

Results of Analyses

The results of the hydrologic and hydraulic analyses are discussed in the sections below.

Sunflower Avenue Storm Drain (Subarea 40)

The existing storm drain infrastructure in Sunflower Avenue includes a 54" RCP from Plaza Drive to Bristol Street, and a 60" RCP from Bristol Street to the OCFCD Gardens Channel. The updated existing 10-year hydrologic analysis showed the Q10 at the downstream connection to the channel to be reduced to 118 cfs (from 195 cfs) at node 398. The WSPG hydraulic analysis shows that the existing 54" RCP is undersized for the tributary Q10, based on current (existing) conditions, however, and a 72"-diameter storm drain will be required from Plaza Drive to the Gardens Channel connection.

The total length of new storm drain in Sunflower Avenue would be 2,230 lineal feet (LF) of 72" RCP replacement.

Plaza Drive Storm Drain (Subarea 40)

The existing storm drain infrastructure in Plaza Drive includes 18" storm drain laterals originating at Callens Common and mainline RCP's varying from 36" to 42" at the connection in Sunflower Avenue. The updated 10-year hydrologic analysis shows the Q10 at the downstream connection to the channel to be increased to 67 cfs from 66 cfs in the SDMP at node 396 - 397. The hydraulic analysis based on the updated Q10 shows that the existing 42" pipe portion is undersized for the tributary Q10 , based on current (existing) conditions, and needs to be upsized to 60" RCP to provide the required hydraulic capacity. However, the upstream segments that the original SDMP shows to require upgrades appear to have adequate capacity to handle the existing condition Q10 discharges.

Due to the reduced amount in the Sunflower Avenue storm drain, the hydraulic grade line (HGL) was reduced in the Sunflower Avenue mainline, which further reduced the HGL in Plaza Drive.

The total length of storm drain improvements in Plaza Avenue would be 320 lineal feet of 60" RCP.

MacArthur Boulevard Storm Drain (Subarea 37)

Although Subarea 37 receives additional drainage from the south, as compared to the original SDMP, our evaluation of the northerly portion of this Subarea 37 actually drains northerly toward a storm drain to the north in Subarea 36. Therefore, the increase in acreage to Subarea 37 was minimal. The subareas are depicted on the SDMP exhibit in Attachment 1. The drainage in this vicinity is shown on the storm drain atlas map and as-built storm drain plans in Attachment 2. The updated areas are delineated in the updated SDMP Hydrology Map Exhibit in Attachment 4.

The existing storm drain infrastructure in MacArthur Boulevard includes a 63" RCP from Plaza Drive to the OCFCD Gardens Channel. The updated 10-year existing hydrologic analysis showed the Q10 at the downstream connection to the channel to be increased to 108 cfs from original Q10 of 103 cfs in the SDMP. Although the updated hydrology shows an increase in tributary drainage to this system, the hydraulic analysis based on the updated Q10 shows that the existing 63" RCP is sufficiently sized, and will not need to be upsized. Additionally, the existing 30"-mid-block lateral is also hydraulically adequate.

Bristol Street Storm Drain (Subarea 40)

There is an existing storm drain in Bristol Street, northerly of mid-block between Sunflower Avenue and MacArthur Boulevard. The storm drain consists of 24" RCP and 30" RCP, and connects into the OCFCD Gardens Channel, just south of MacArthur Boulevard. Although this storm drain system was not analyzed hydraulically in the SDMP, a hydraulic analysis was performed based on the updated existing condition10-year hydrology results. The results of the WSPG hydraulic analysis show that this storm drain system has adequate hydraulic capacity, and will not need to be upsized.

Conclusion

The hydrologic and hydraulic analyses performed in this study show that the existing 54"/60" RCP in Sunflower Avenue from Plaza Drive to OCFCD Gardens Channel, east of Bristol Street is hydraulically deficient for the current conditions. Additionally, the downstream 42"-diameter of the Plaza Drive RCP is also hydraulically deficient. Therefore, the following upgrades to the city of Santa Ana storm drain systems are recommended:

1. Sunflower Avenue: 2,230 lineal feet of 72" RCP is recommended to replace existing deficient 54"/60" RCP.

2. Plaza Drive: 320 lineal feet of 60" RCP is recommended to replace existing deficient 42"-diameter reach. The remainder upstream reaches are hydraulically satisfactory.

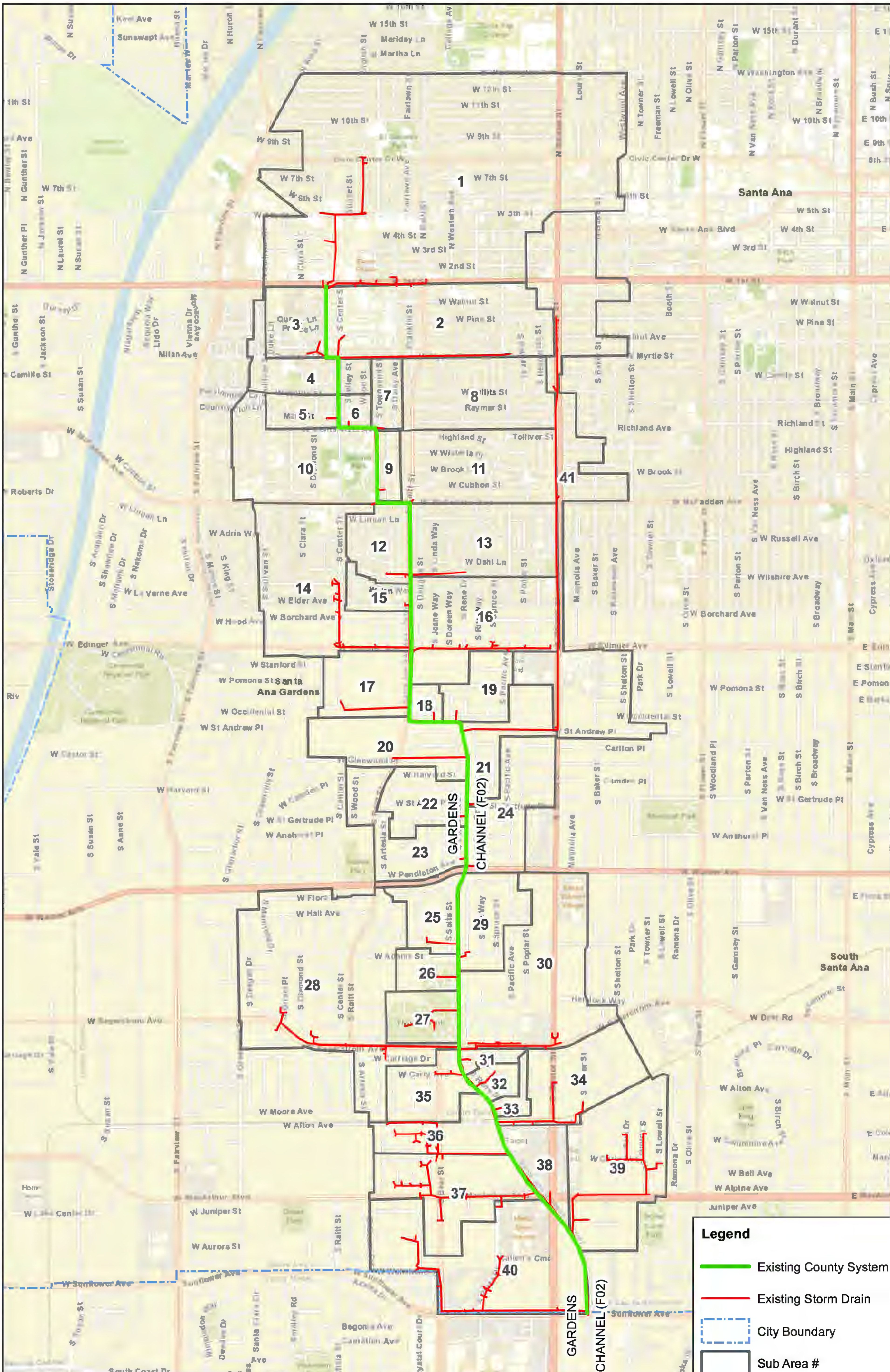
3. MacArthur Boulevard: The existing 63" RCP and 30" RCP mid-block lateral are hydraulically satisfactory.

4. Bristol Street: The existing 30"/24" RCP is hydraulically satisfactory.

Proposed Storm Drain Upgrades			
Reach	**Existing Pipe Size**	**Length of Recommended Upgrade (LF)**	**Proposed Pipe Size of Recommended Upgrade**
Sunflower Avenue	54"/60"	2,230	72"
Plaza Drive	42"	320	60"
MacArthur Boulevard	63"/30"	-	-
Bristol Street	30"/24"	-	-

Attachments

Attachment 1 – City of Santa Ana Storm Drain Master Plan 2018 Excerpts



9/21/2017 JN H:\pdata\153710\GIS\MXD\Watersheds\Gardens\Santa Ana - Gardens- Sub Areas.mxd <USER NAME>

Michael Baker INTERNATIONAL

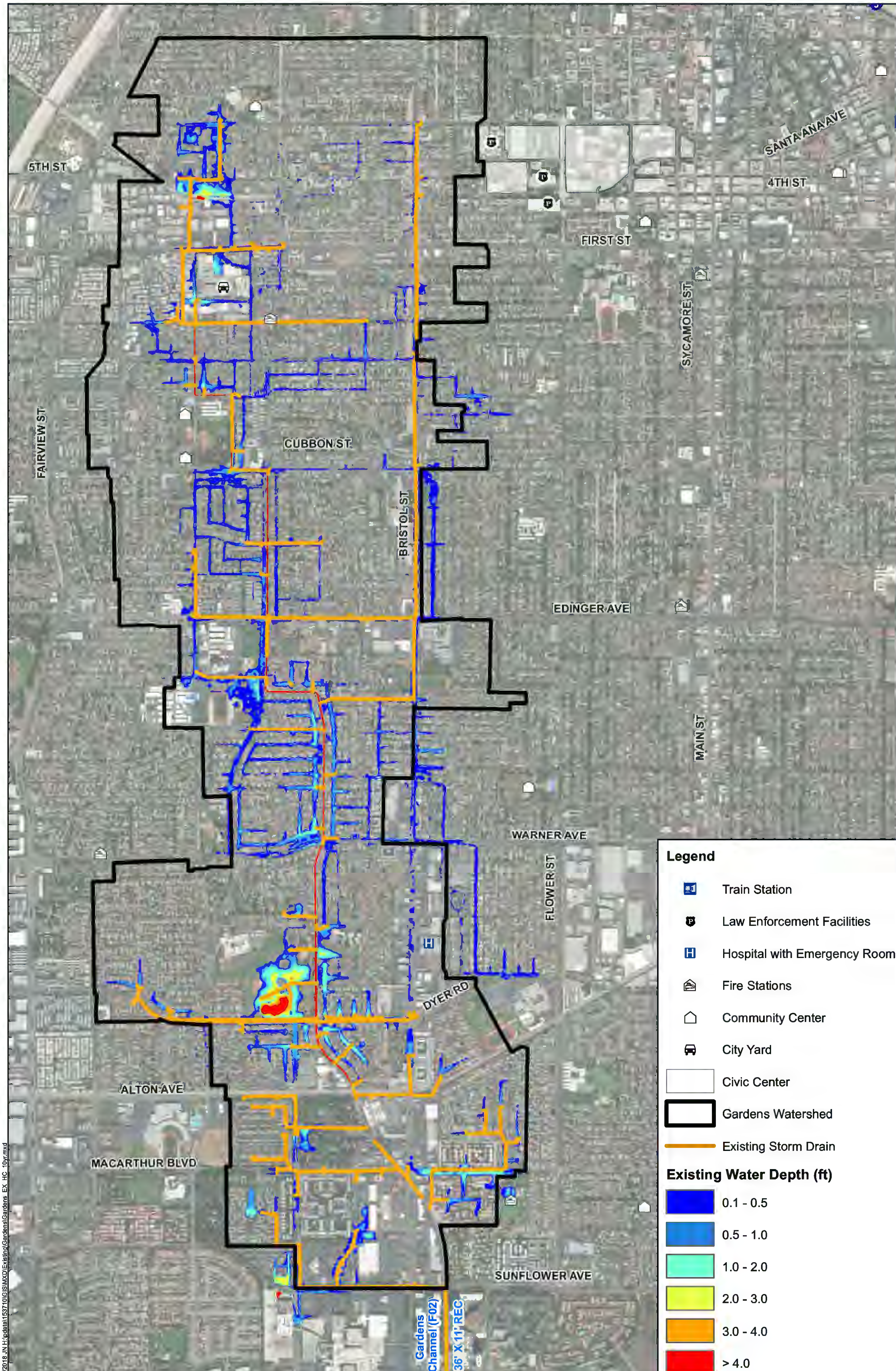
Source:

0 1,000 2,000 4,000 Feet

SANTA ANA MASTER PLAN - PHASE 2

Gardens Watershed Sub Areas Exhibit

Figure 5-1



5/16/2018 JN H:\pdata\153710\GIS\MXD\Existing\Gardens\Gardens_EX_HC_10yr.mxd

Michael Baker INTERNATIONAL

Source:

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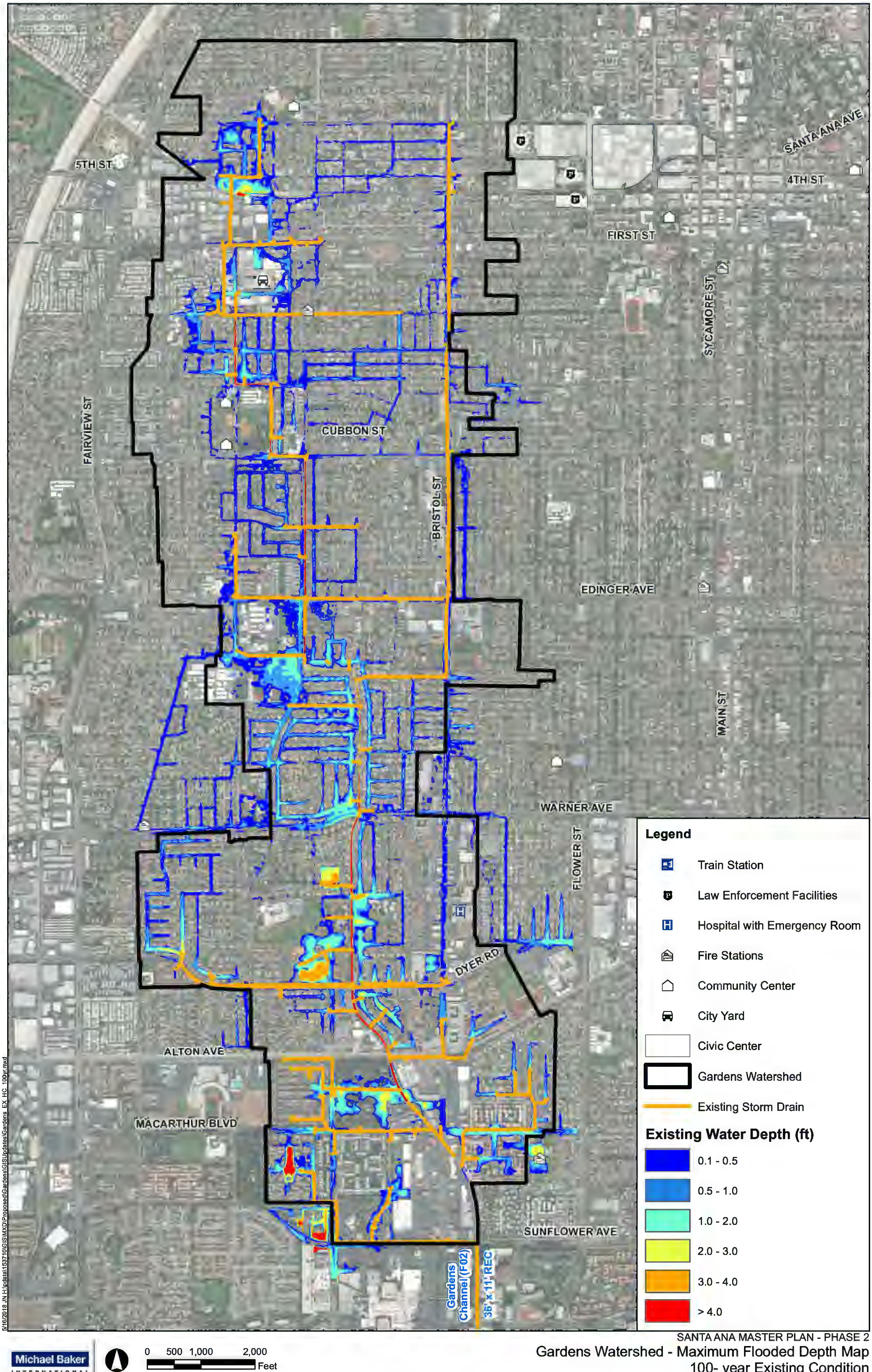
SANTA ANA MASTER PLAN - PHASE 2

Gardens Watershed - Maximum Flooded Depth Map

10- year Existing Condition

Figure 5-2

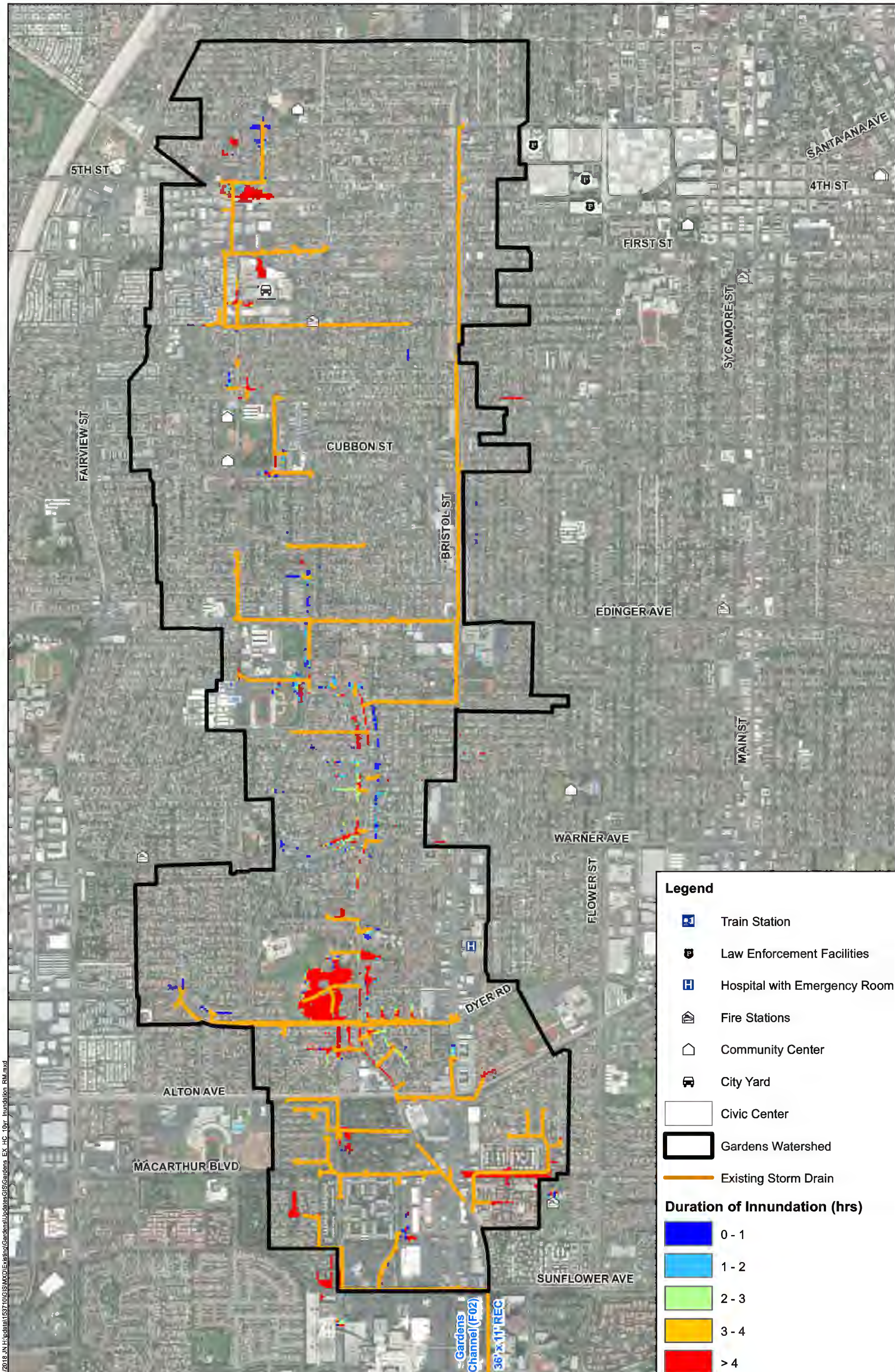


SANTA ANA MASTER PLAN - PHASE 2

Gardens Watershed - Maximum Flooded Depth Map

100- year Existing Condition

Figure 5-3



Michael Baker INTERNATIONAL

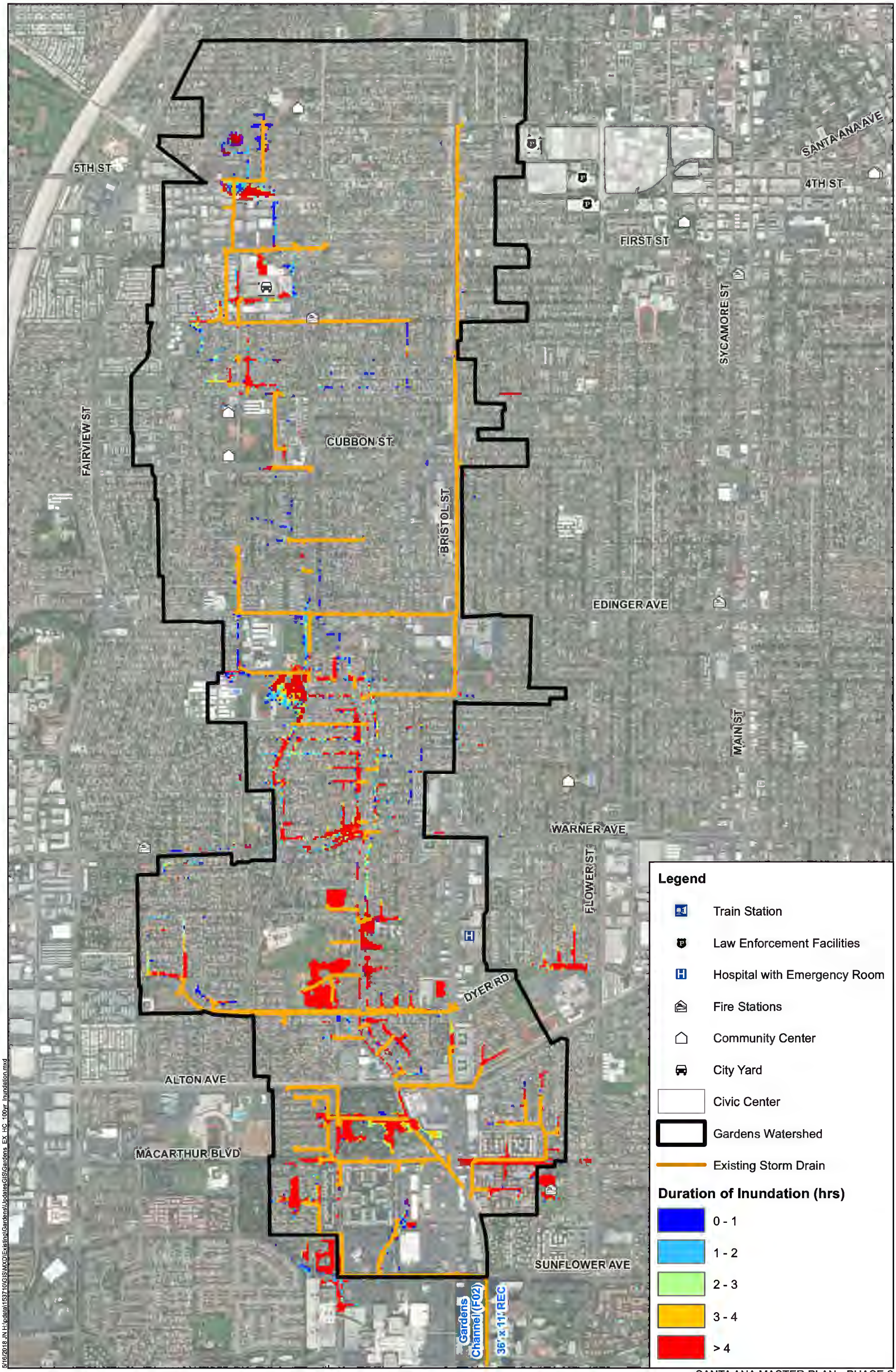
Source:

SANTA ANA MASTER PLAN - PHASE 2

Gardens Watershed - Duration of Inundation Map

10- year Existing Condition

Figure 5-4



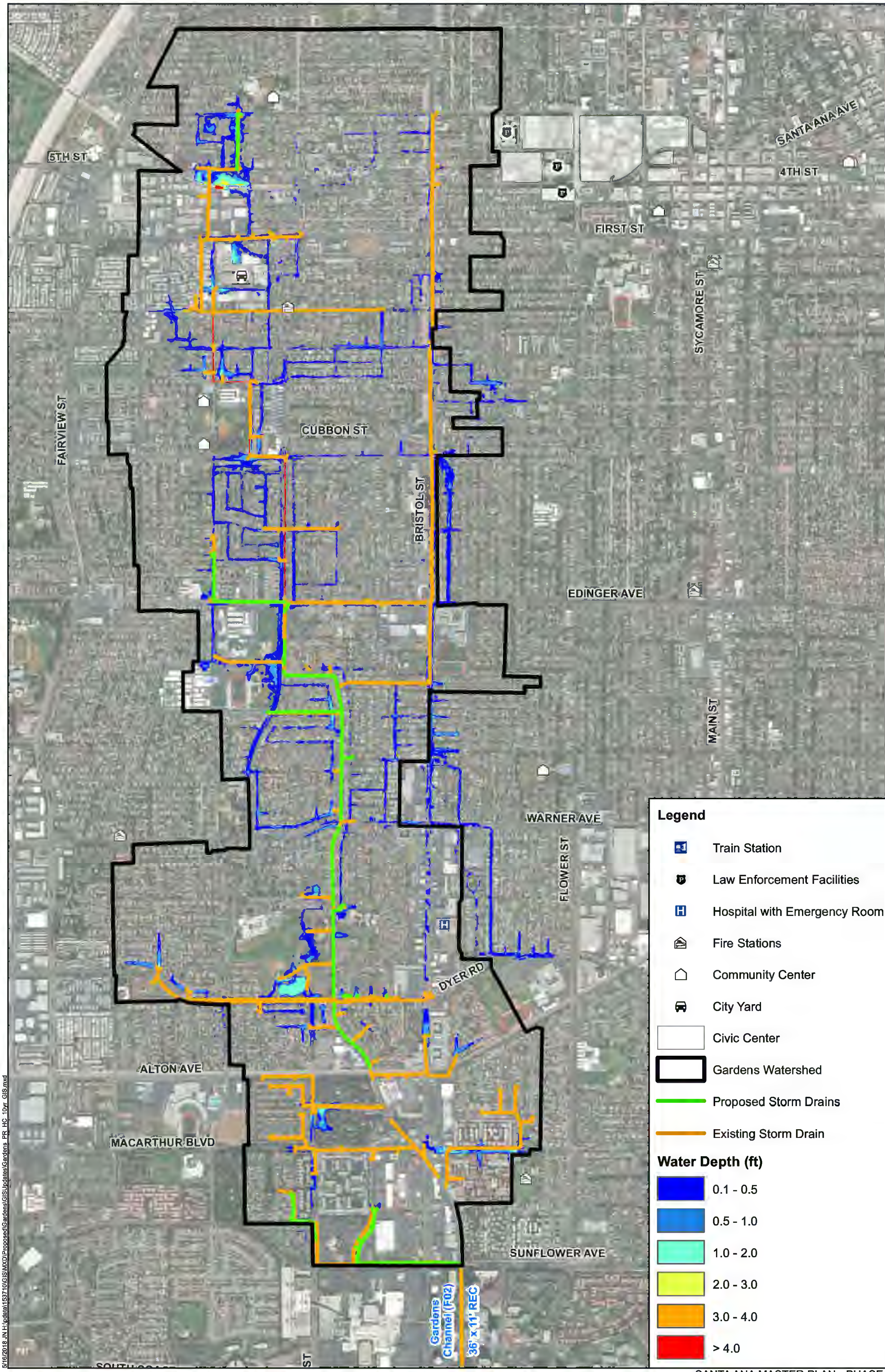
Michael Baker INTERNATIONAL

SANTA ANA MASTER PLAN - PHASE 2

Gardens Watershed - Duration of Inundation Map

100- year Existing Condition

Figure 5-5



SANTA ANA MASTER PLAN - PHASE 2

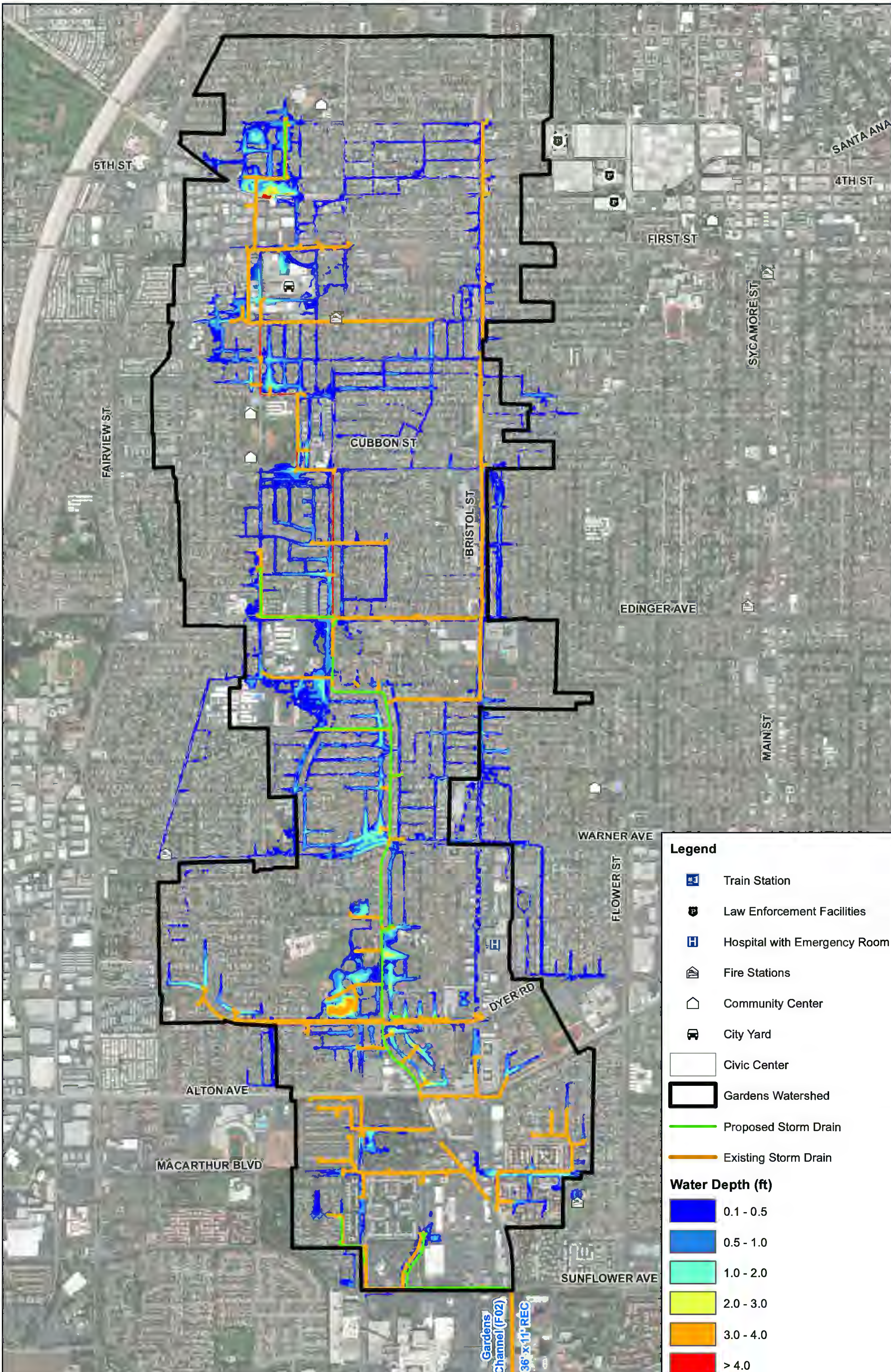
Gardens Watershed - Maximum Flooded Depth Map

10- year Proposed Condition

Figure 5-6

Michael Baker INTERNATIONAL

Source:



Michael Baker INTERNATIONAL

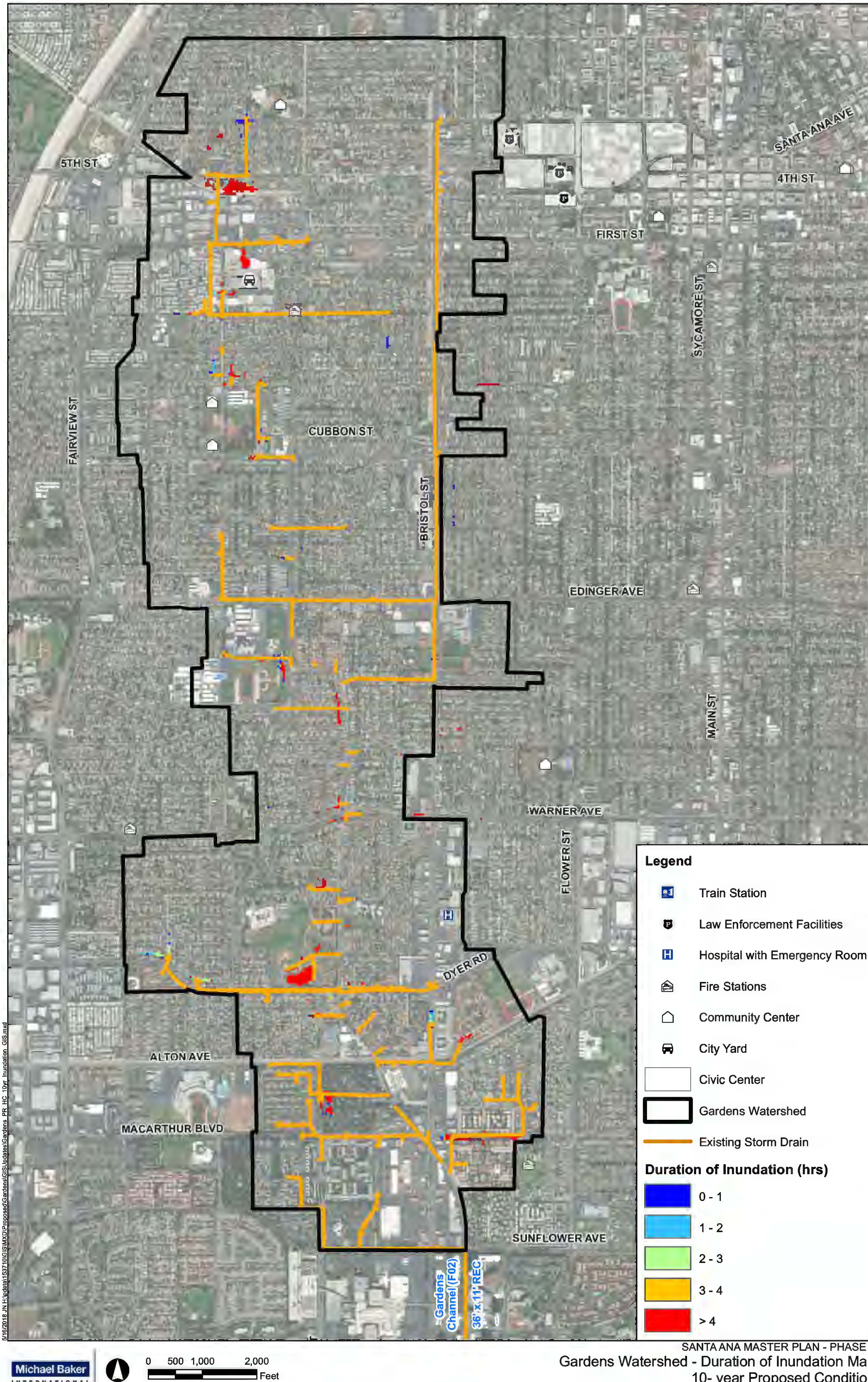
0 500 1,000 2,000 Feet

Source:

SANTA ANA MASTER PLAN - PHASE 2

Gardens Watershed - Maximum Flooded Depth Map
100- year Proposed Condition

Figure 5-7

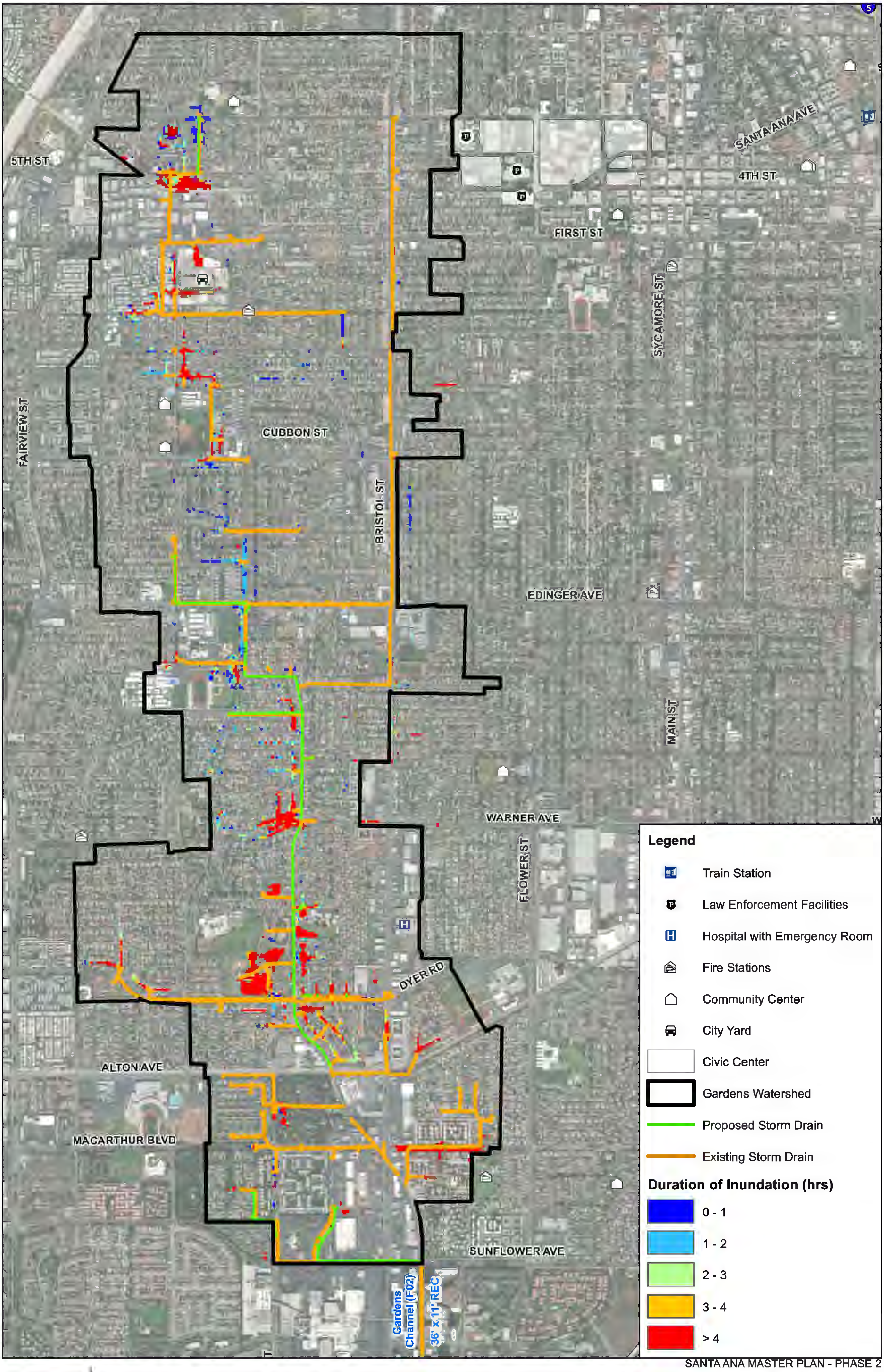


SANTA ANA MASTER PLAN - PHASE 2

Gardens Watershed - Duration of Inundation Map

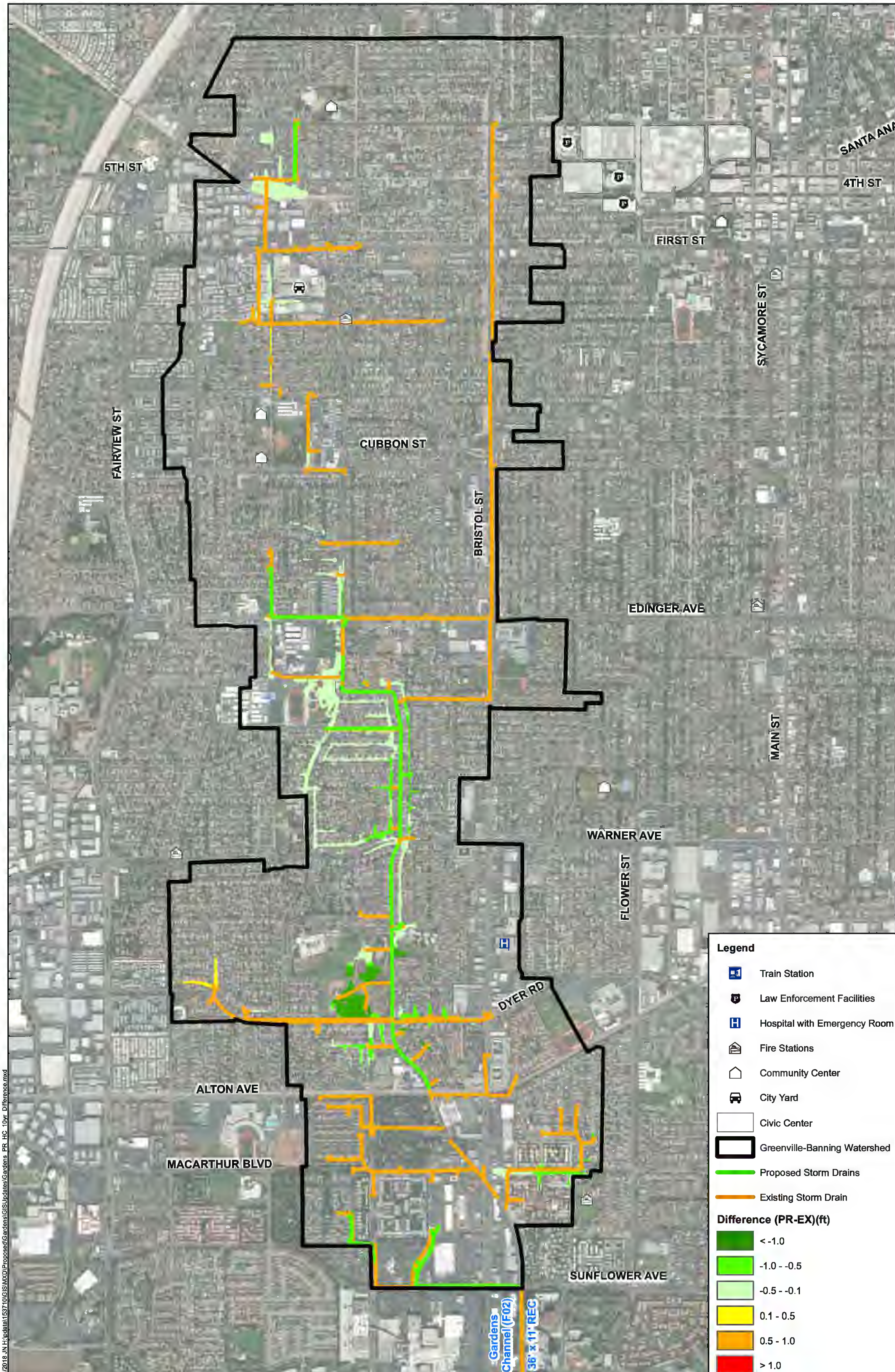
10- year Proposed Condition

Figure 5-8



Gardens Watershed - Duration of Inundation Map
100- year Proposed Condition

Figure 5-9

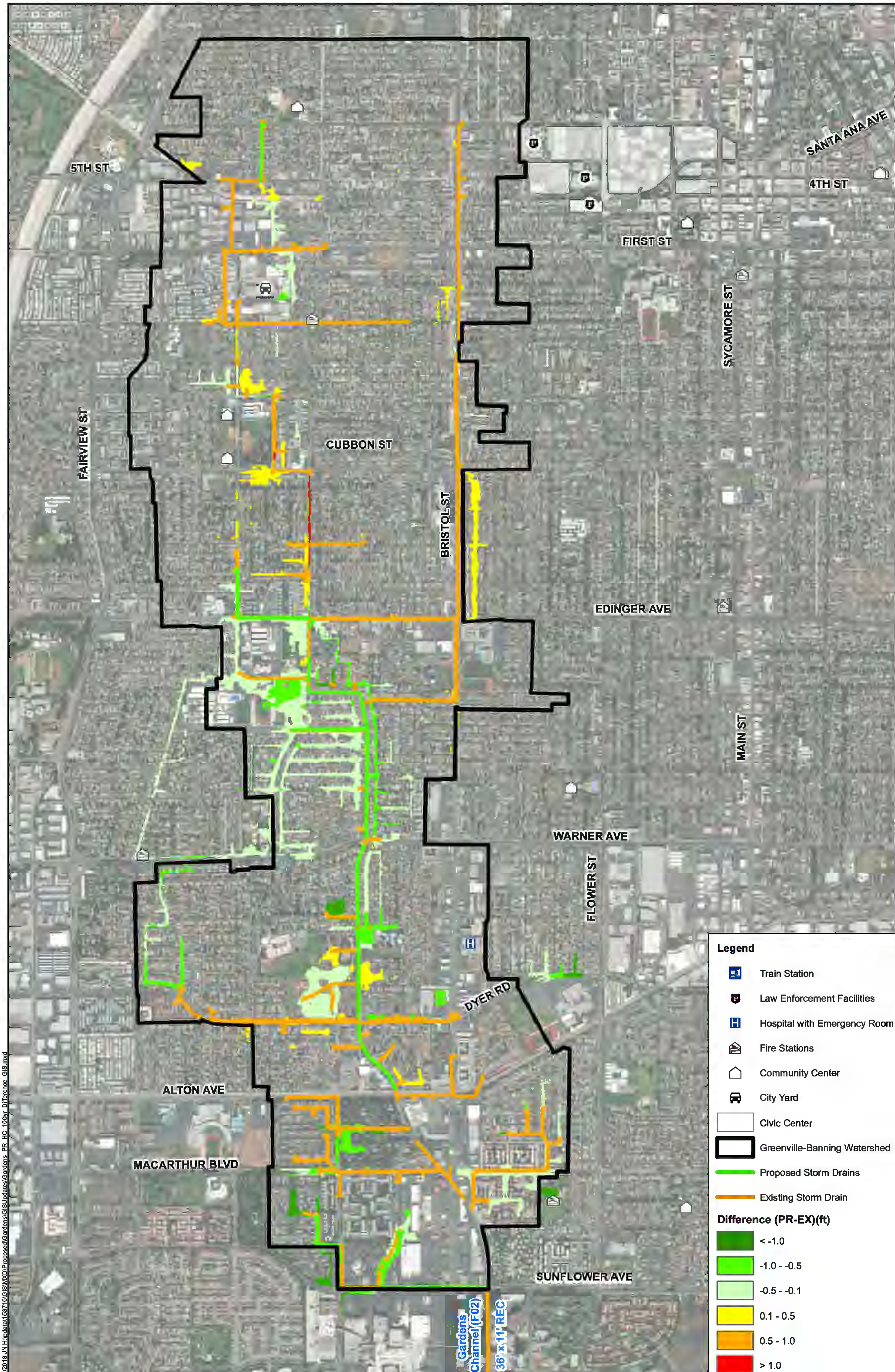


Michael Baker INTERNATIONAL

SANTA ANA MASTER PLAN - PHASE 2

Gardens Watershed - 10- year Difference Map

Figure 5-10



Michael Baker INTERNATIONAL

Source:

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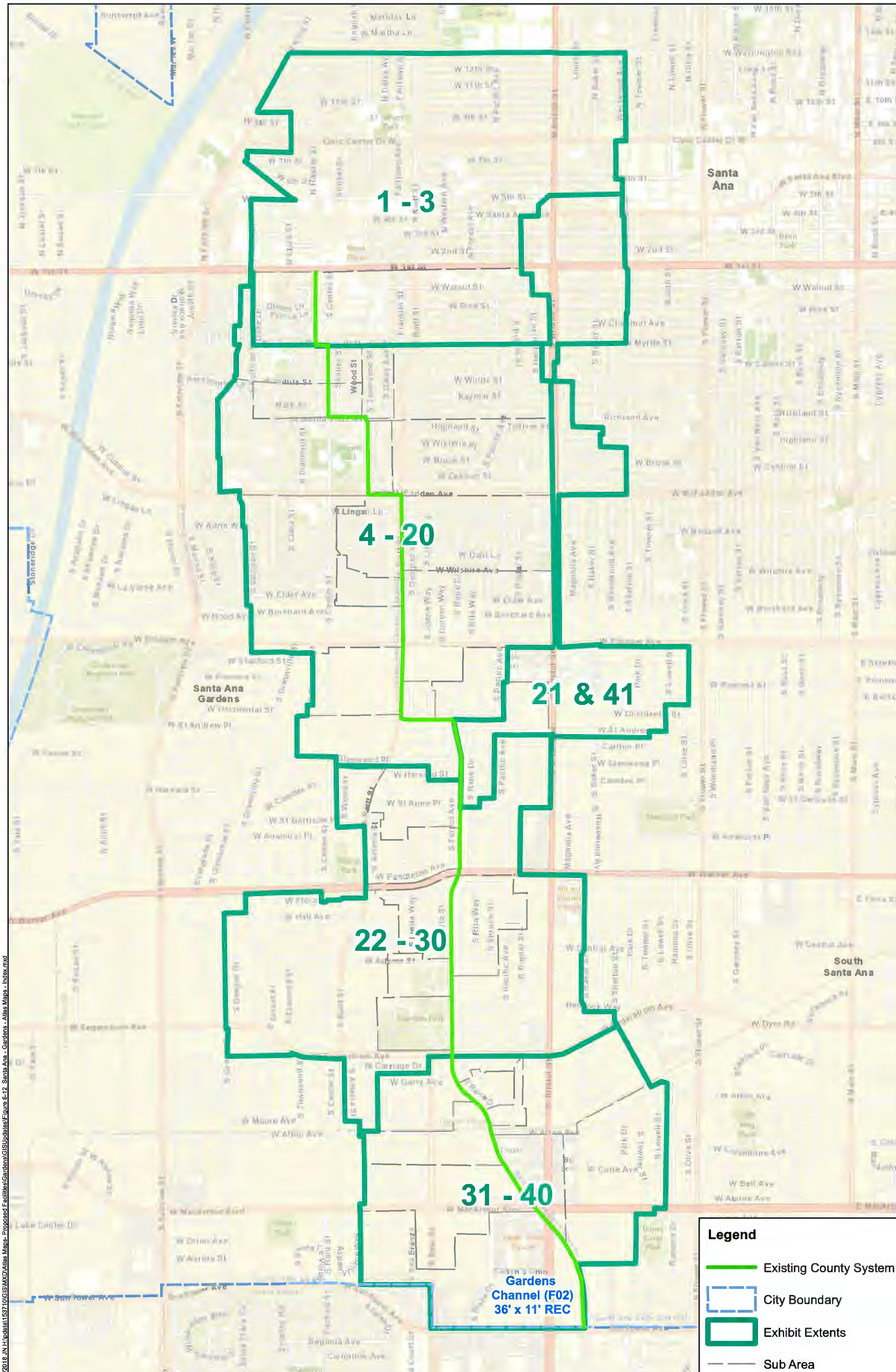
SANTA ANA MASTER PLAN - PHASE 2

Gardens Watershed - 100- year Difference Map

Figure 5-11



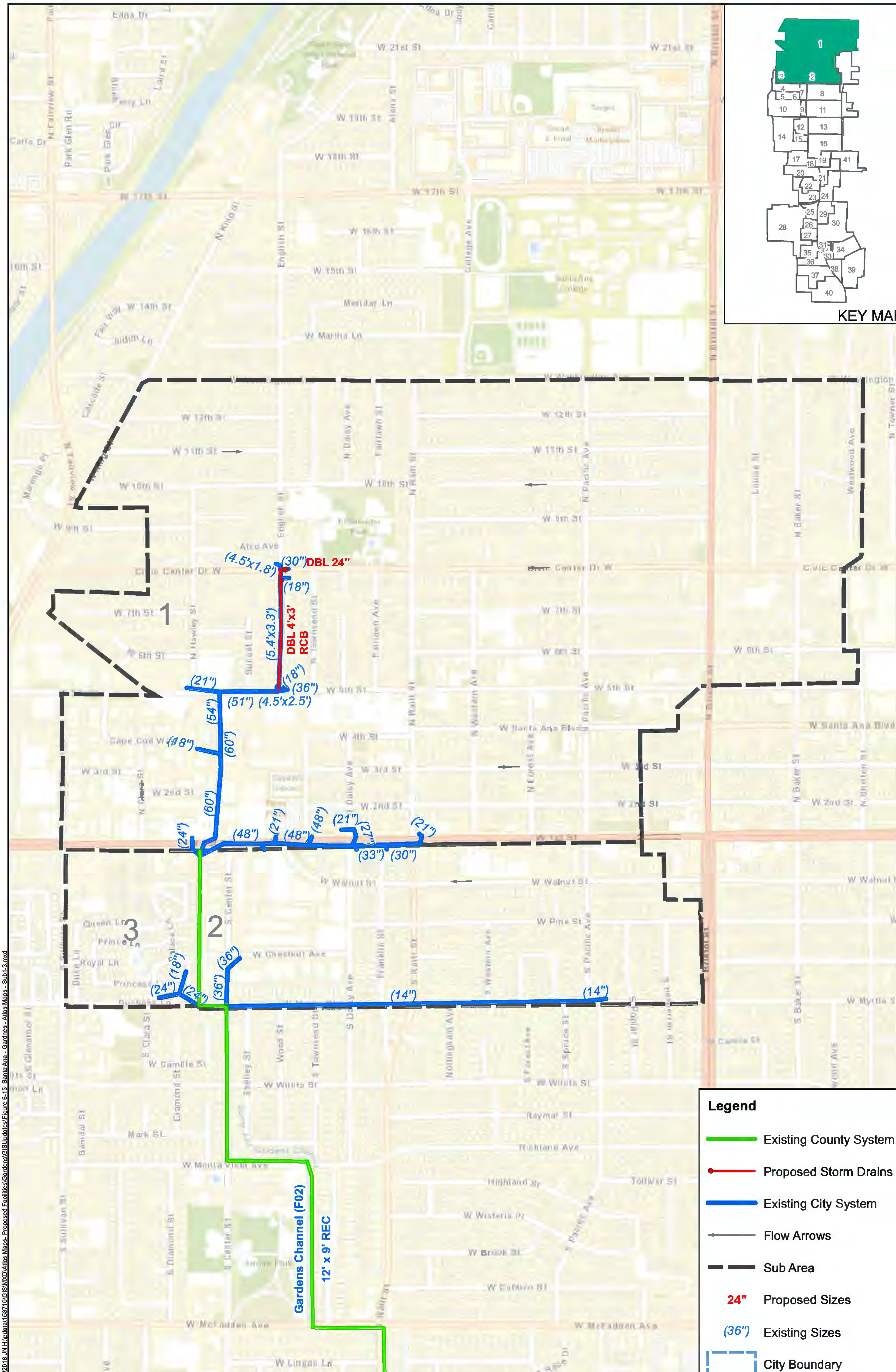
0 500 1,000 2,000
Feet

Source:

SANTA ANA MASTER PLAN OF DRAINAGE
GARDENS WATERSHED

Proposed Facilities - Exhibit Extents Index Map

Figure 5-12



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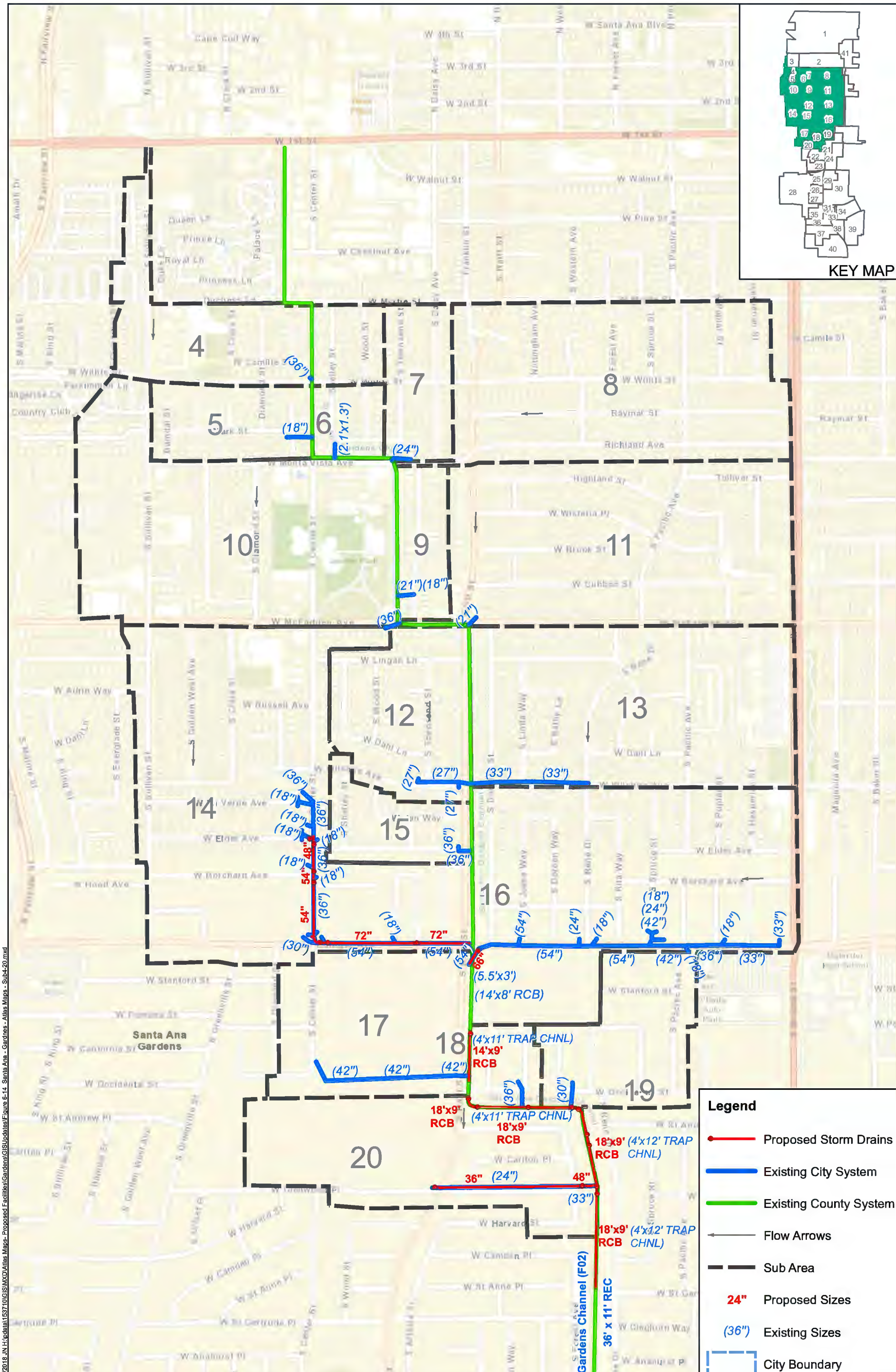
Source:

SANTA ANA MASTER PLAN OF DRAINAGE
GARDENS WATERSHED

Proposed Facilities - Sub Area 1 - 3

Figure 5-13



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Source:

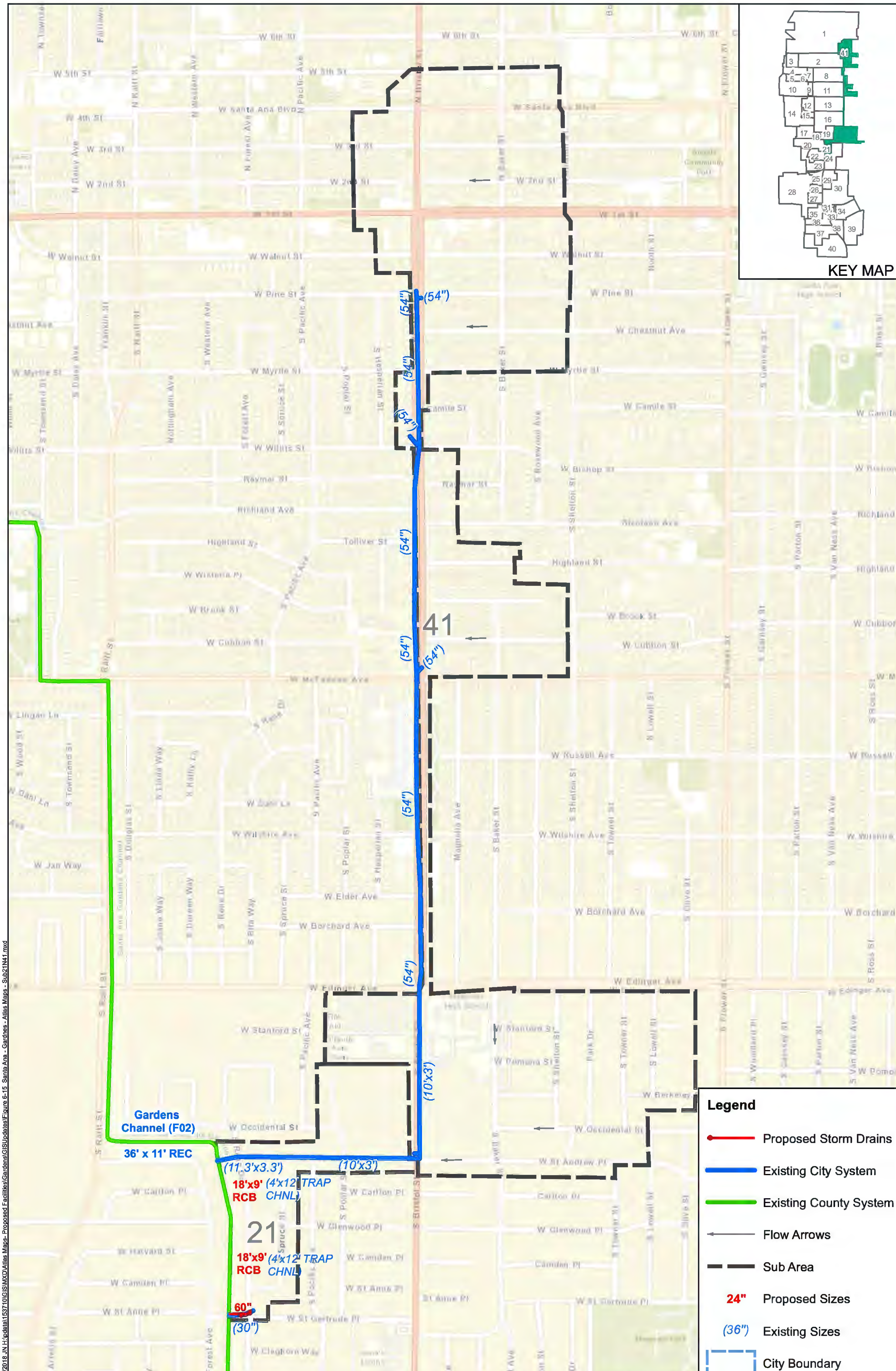
Michael Baker INTERNATIONAL

5/16/2018 JN H:\pdata\153710\GIS\MXD\Atlas Maps - Proposed Facilities\Gardens\GISUpdates\Figure 6-14 Santa Ana - Gardens - Atlas Maps - Sub4-20.mxd

SANTA ANA MASTER PLAN OF DRAINAGE
GARDENS WATERSHED

Proposed Facilities - Sub Area 4 - 20

Figure 5-14



SANTA ANA MASTER PLAN OF DRAINAGE
GARDENS WATERSHED

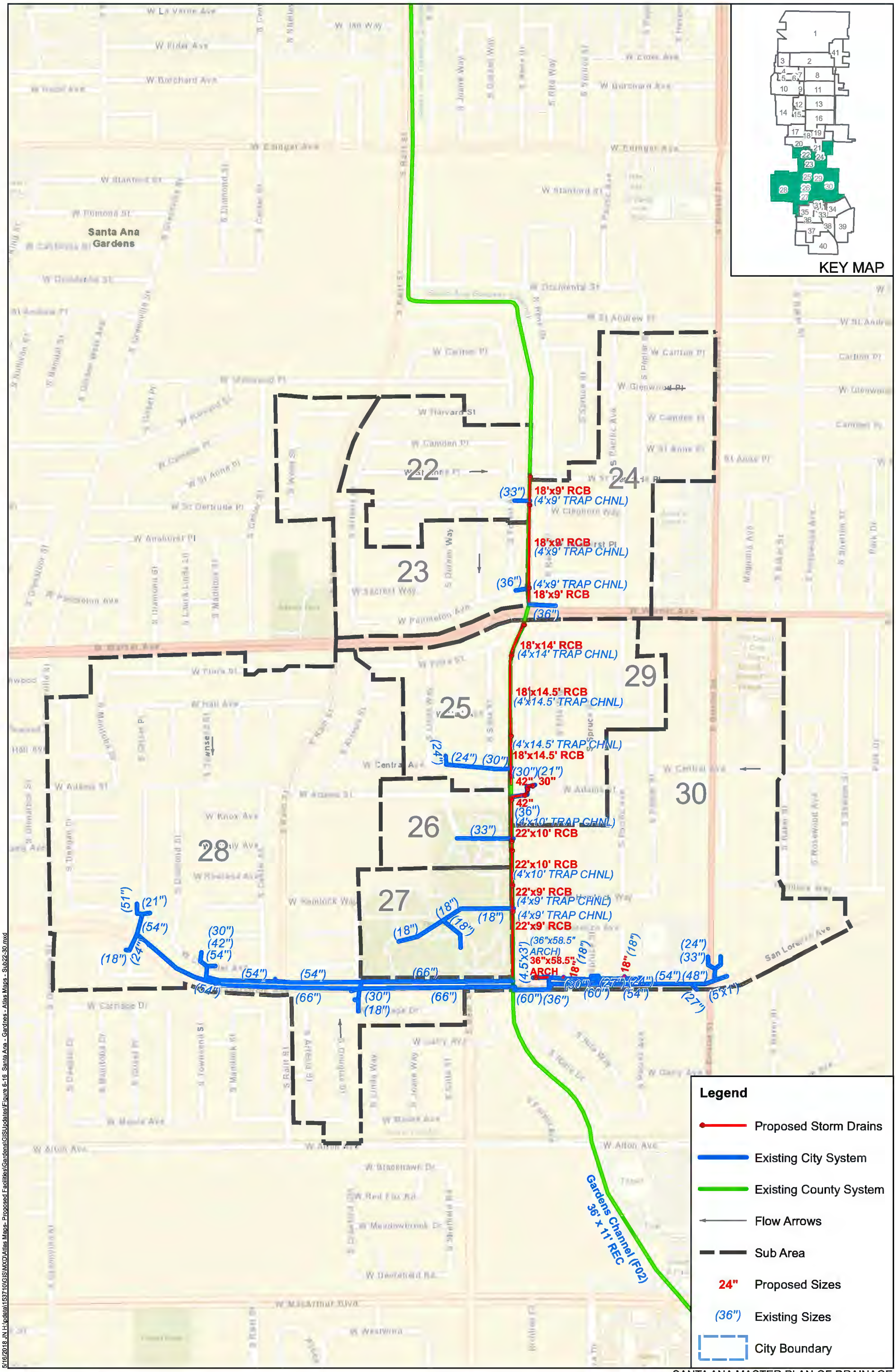
Proposed Facilities - Sub Area 21 & 41

Figure 5-15

Michael Baker INTERNATIONAL

0 500 1,000 Feet

Source:



SANTA ANA MASTER PLAN OF DRAINAGE
GARDENS WATERSHED

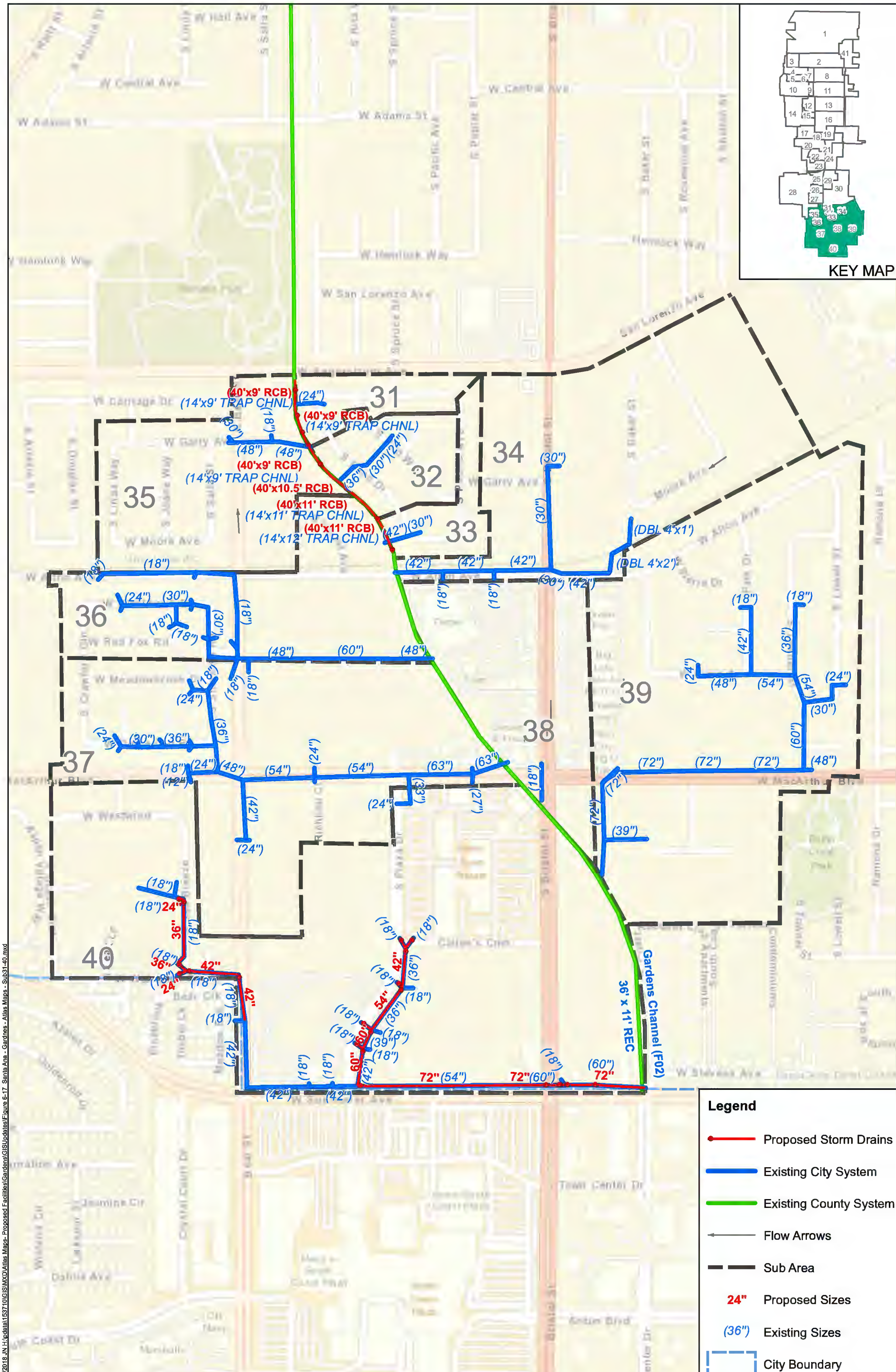
Michael Baker INTERNATIONAL

0 500 1,000 Feet

Source:

Proposed Facilities - Sub Area 22 - 30

Figure 5-16



5/16/2018 JN H:\pdata\153710\GIS\MXD\Atlas Maps- Proposed Facilities\Gardens\GISUpdates\Figure 6-17_Santa Ana - Gardens - Atlas Maps - Sub31-40.mxd

Michael Baker INTERNATIONAL

0 500 1,000 Feet

Source:

SANTA ANA MASTER PLAN OF DRAINAGE
GARDENS WATERSHED

Proposed Facilities - Sub Area 31 - 40

Figure 5-17

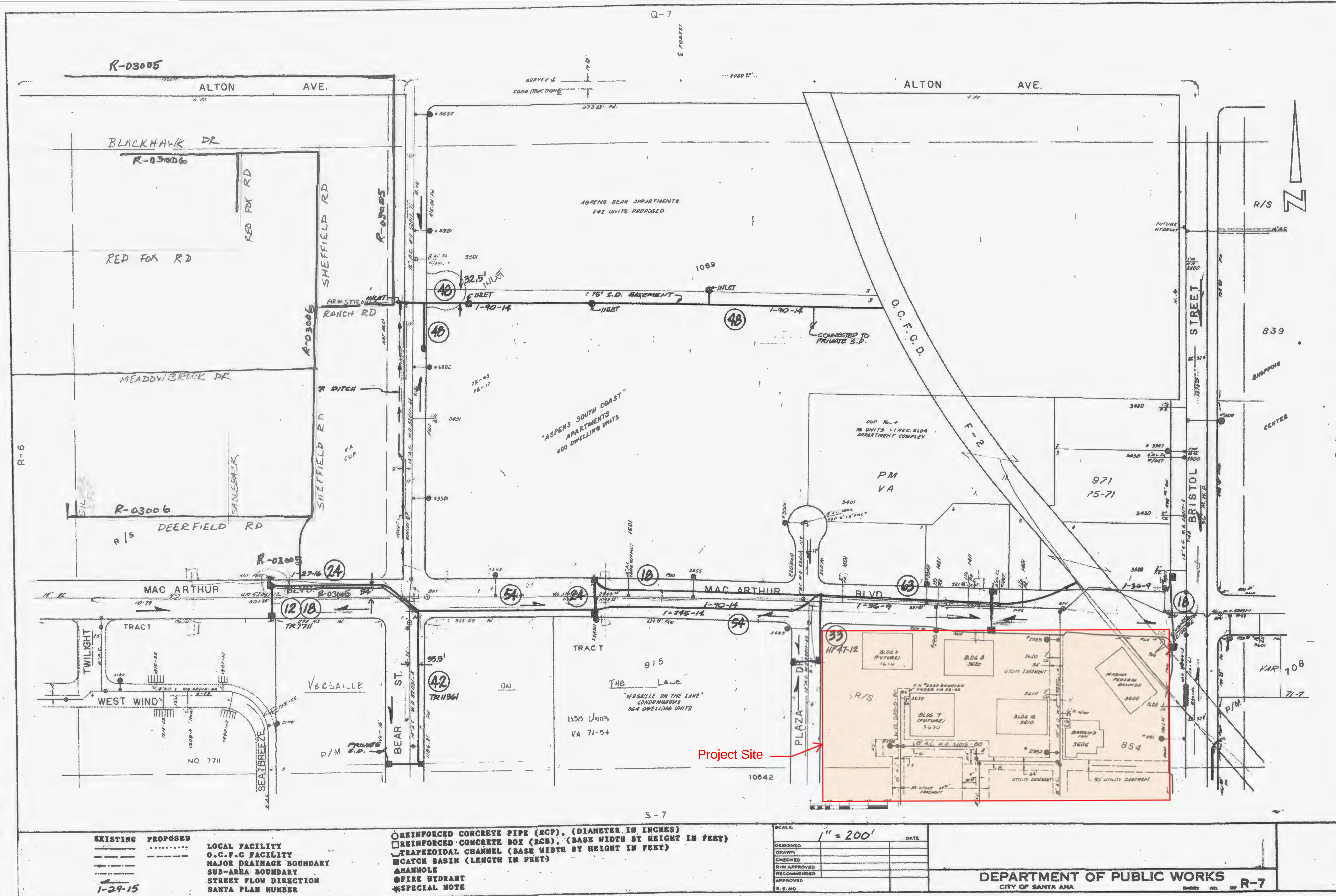
Attachment 2 – Storm Drain Atlas Maps & Reference Plans

ATLAS MF 5423

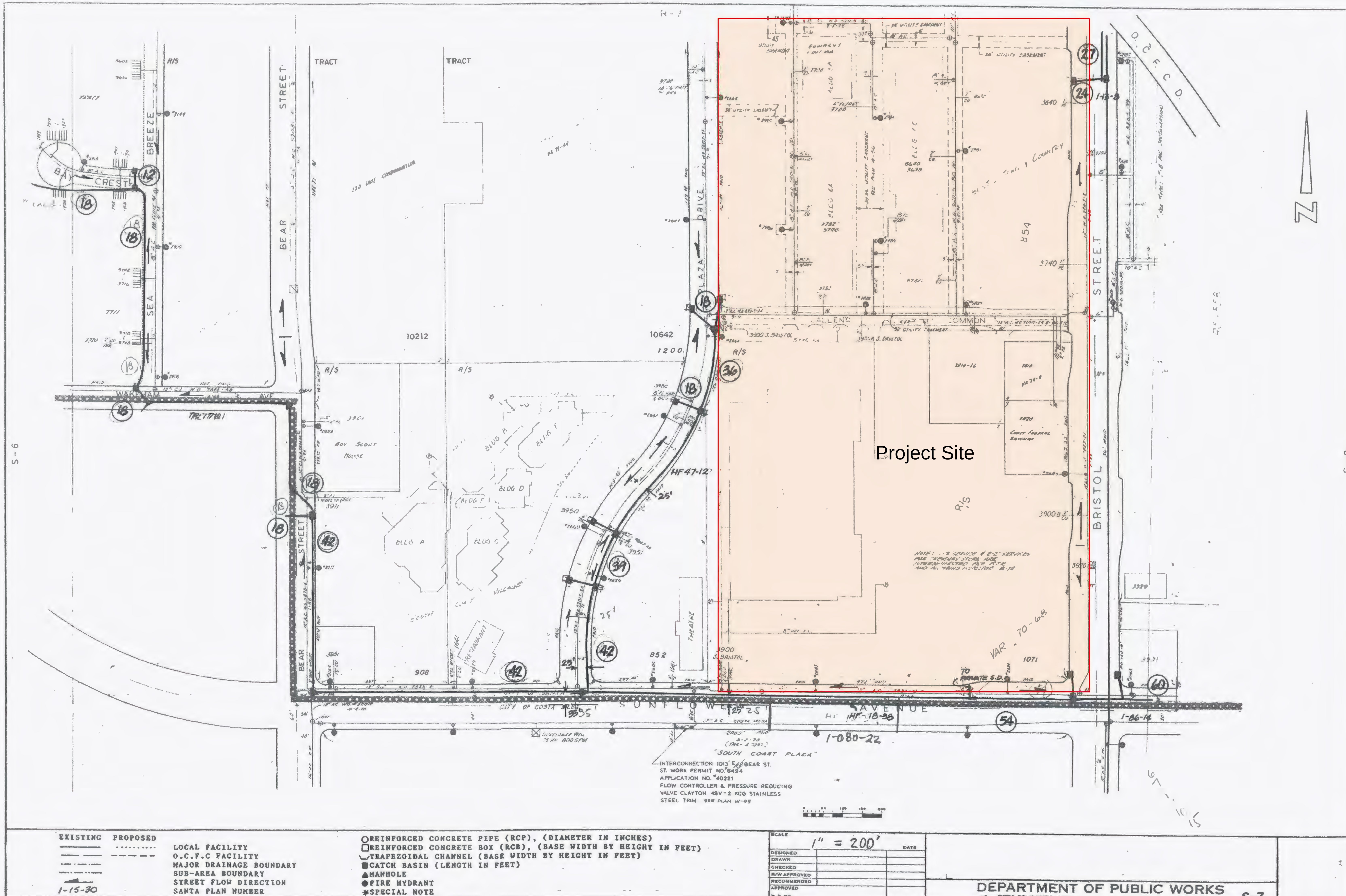
Storm Drain

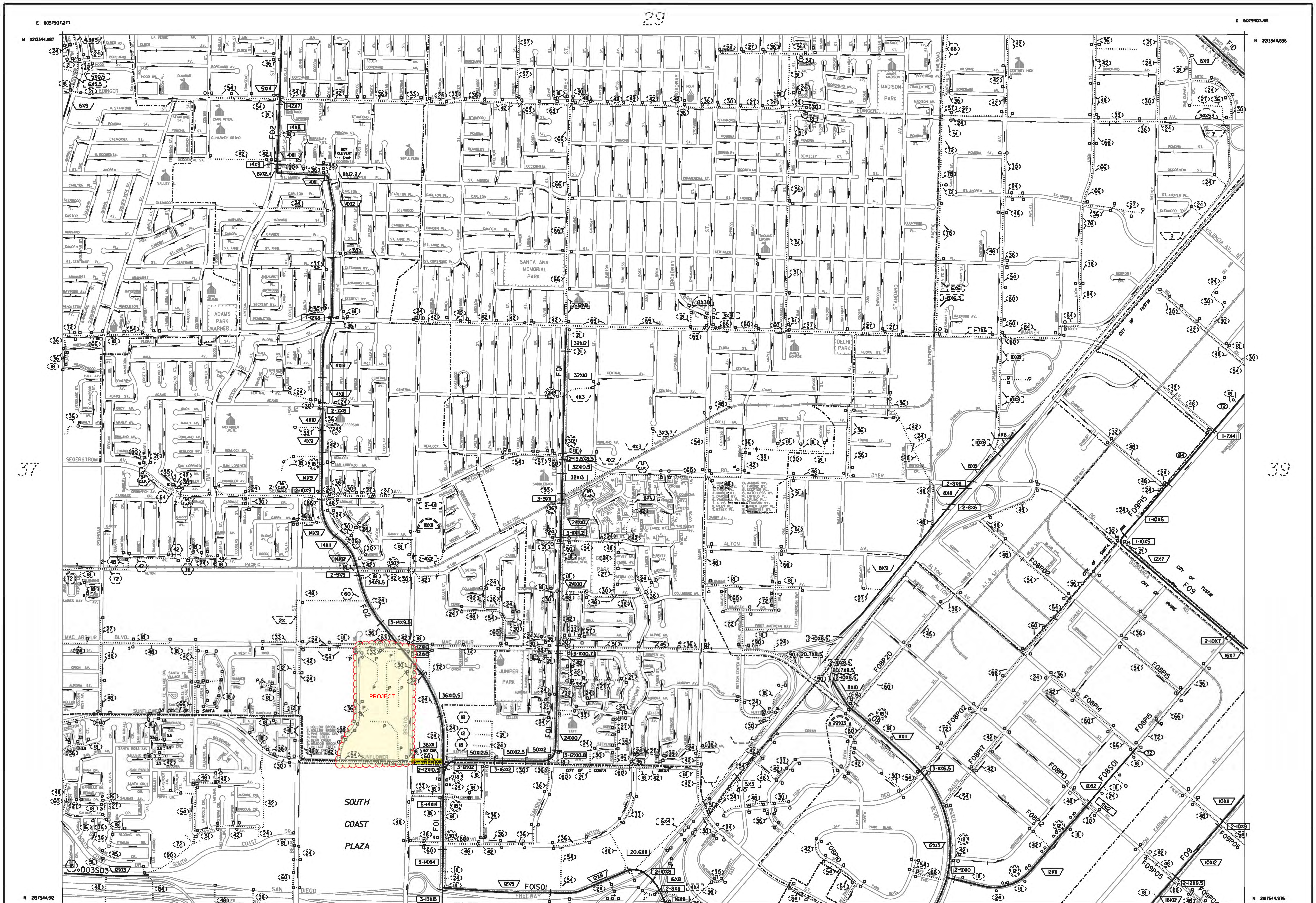
R-7

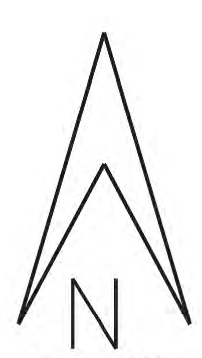
1 of 1



Storm Drain ATLAS S-7 1 of 1







38

NOTICE

This drainage map has been prepared for information purposes only. The location and ownership of facilities have been determined from available information provided by public agencies, but may not be exact. The user of this map is responsible for verifying exact location, ownership and regional versus local character of drainage facilities.

Additional information may be obtained from public plans and recorded deeds. Character designations shown on this map are for convenience only and are not controlling. Neither the county of Orange nor the Orange County Flood Control District (OCFCD) assumes any liabilities for inaccuracies of this map.

To notify the Resources & Development Management Department (RDMD) of additions or corrections, please call Sal Gutierrez at (714) 834-5396 or by email at sal.gutierrez@rdmd.ocgov.com

ORANGE COUNTY FLOOD CONTROL DISTRICT

BASEMAP
OF DRAINAGE FACILITIES
IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
AVU	JAN.12/2000	38	MAPS-113-3

Channel Drainage Area Boundary
Major Sub-Area Drainage Boundary
Minor Sub-Area Drainage Boundary
Existing O.C.F.C.D. Facility
Existing Local Facility
Existing Retarding Basin or Reservoir
Natural Watercourse
City Limits
G G Greenbelt
P.S. P.S. Pump Station
Catch Basin (length in feet)
Drop Inlet or Other Entry
Ownership (if other than City or County)
P Private
S State
F Federal

Existing O.C.F.C.D. | Existing LOCAL

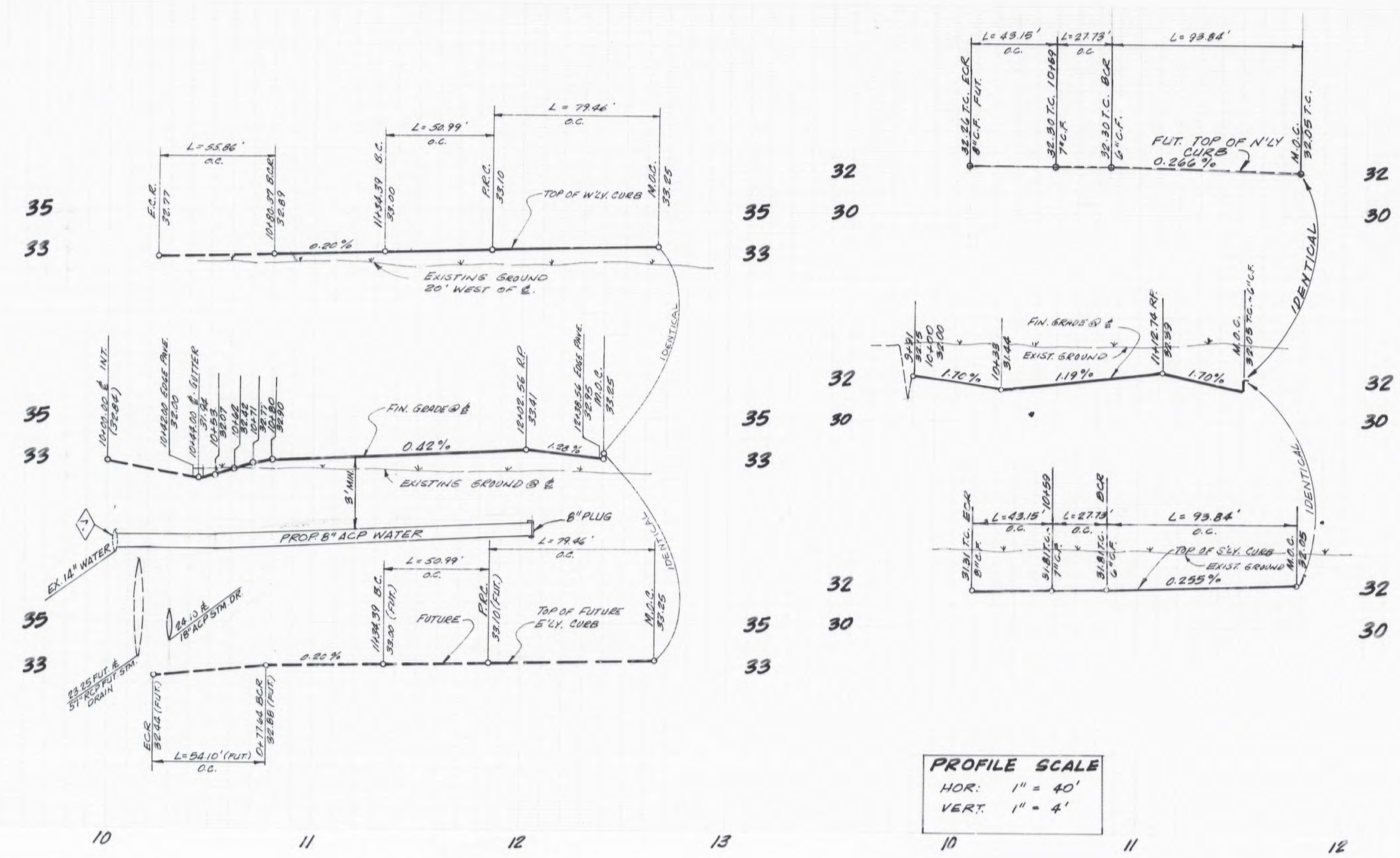
Earth Trapezoidal Channel (base width by height in feet)
Reinforced Concrete Trapezoidal Channel (base width by height in feet)
Reinforced Concrete Rectangular Channel (base width by height in feet)
Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
Reinforced Concrete Pipe (RCP)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

38

1 of 6

ST. IMP. PLAZA DR. FROM MAC ARTHUR- 250' NORTH & STA. "A" BEAR ST- 150' EAST.

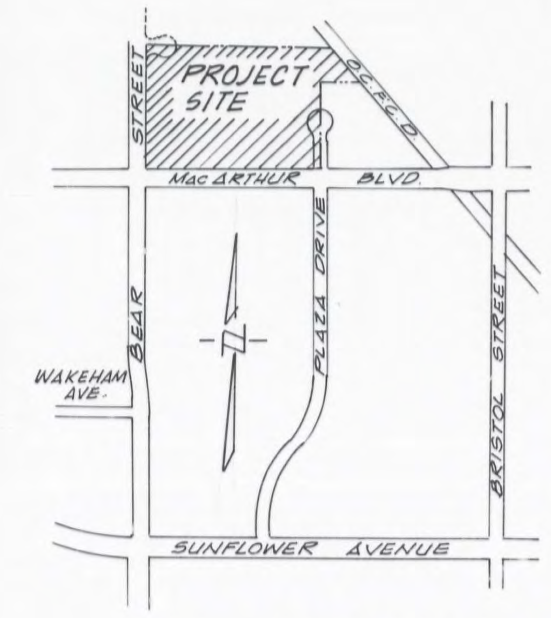
1-90-14



PROFILE SCALE
HOR. 1" = 40'
VERT. 1" = 4'

GENERAL NOTES

1. ALL WORK SHOWN HEREON SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE PROVISIONS OF THE AGC/APWA STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (CURRENT EDITION) AND SUPPLEMENTAL STANDARD PROVISIONS ISSUED BY AND FOR USE IN THE CITY OF SANTA ANA.
2. WITHIN 72 HOURS AFTER FINAL SURFACING IS PLACED, ALL MANHOLE AND VALVE BOX FRAMES AND COVERS SHALL BE ADJUSTED BY THE DEVELOPER TO FINISH GRADE. THIS IS TO BE DONE PRIOR TO PLACING SEAL COAT. AFTER SAID TIME, THE CITY WILL ADJUST THE ABOVE ITEM AND BILL THE CONTRACTOR.
3. PAVEMENT SHALL BE COVERED WITH PENETRATION TYPE ASPHALT EMULSION (0.1 GALLON PER SQUARE YARD) AFTER STREET PAVEMENT HAS BEEN CLEANED.
4. FEATHER AC WHERE MEETING EXISTING PAVEMENT A MINIMUM OF 10 FEET OR AS DIRECTED BY THE CITY ENGINEER.
5. THE ENGINEER FOR THE SUBDIVIDER SHALL PROVIDE HUBS IN THE STREET FOR FINISHED SUBGRADE AND FINISHED GRADE AT THE CROWN, AT ALL POINTS WHERE ELEVATIONS ARE SHOWN ON THE PLANS AND AT ANY ADDITIONAL POINTS REQUIRED BY THE CITY ENGINEER.
6. AT THE TIME OF COMPACTING THE BASEMENT SOIL AND PREPARING SUBGRADE, IF THE MOISTURE CONTENT IS SUCH THAT THE SPECIFIED RELATIVE COMPACTION CANNOT BE OBTAINED OR THE SUBGRADE IS YIELDING, THE FOLLOWING REMEDIAL ACTION SHOULD BE PROVIDED:
   a) REMOVE EXCESS MOISTURE BY SCARIFYING AND AERATING, OR
   b) EXCAVATE UNSTABLE AREAS AND BACKFILL WITH SUITABLE MATERIAL OR BASE, OR
   c) INCREASE THE AGGREGATE BASE SECTION, OR
   d) STABILIZE THE BASEMENT SOIL WITH SUITABLE ADDITIVES, OR
   e) PROVIDE AN ALTERNATE METHOD SUITABLE TO THE CITY ENGINEER.
7. WATER MAINS AND SERVICES ARE TO BE INSTALLED BY THE CITY OF SANTA ANA AFTER THE CURB AND GUTTER IS CONSTRUCTED AND BEFORE THE BASE UNDER THE AC SURFACING IS LAID. CONTACT WATER DIVISION SUPERVISOR AT 834-4922 TO ARRANGE SCHEDULING FOR WATER SYSTEM WORK BY THE CITY.
8. THE SUBDIVIDER SHALL RELOCATE ANY EXISTING PUBLIC UTILITIES LOCATED IN A DEDICATED RIGHT OF WAY AS REQUIRED BY THE CITY ENGINEER.
9. 6" VCP STUB CONNECTIONS SHALL BE CONSTRUCTED FROM SEWER MH AT STA. 12+14.97 AND STA. 15+67.64. THE DEVELOPER IS TO FURNISH THE CITY THE LOCATION OF EACH CONNECTION.
10. ALL VCP JOINTS SHALL BE PLASTIC MECHANICAL COMPRESSION JOINTS OR BANDSEALS.
11. USE FULL DEPTH HEADER FOR VERTICAL FACES OF PCC CONSTRUCTION.
12. IT SHALL BE THE RESPONSIBILITY OF THE SEWER CONTRACTOR TO EXPOSE ALL JOIN POINTS TO THE EXISTING SEWER AND TO HAVE THE LOCATION ELEVATION VERIFIED BY THE PRIVATE CIVIL ENGINEER PRIOR TO ANY SEWER STAKES BEING FURNISHED.
13. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL FLOW LINE ELEVATIONS AT ALL SEWER MANHOLES VERIFIED BY THE PRIVATE CIVIL ENGINEER PRIOR TO ANY PIPE BACKFILL. "AS BUILT" FLOW LINE ELEVATIONS ARE TO BE SUBMITTED TO THE CITY PRIOR TO ANY BOND RELEASE.
14. THE CONTRACTOR SHALL NOTIFY THE PRIVATE CIVIL ENGINEER 24 HOURS IN ADVANCE FOR ANY UTILITY STAKING.
15. ANY PERMANENT BARRICADE OR SAFETY SIGN OMITTED ON THE PLANS AND CONSIDERED NECESSARY BY THE ENGINEER SHALL BE INSTALLED BY THE DEVELOPER AT NO COST TO THE CITY.



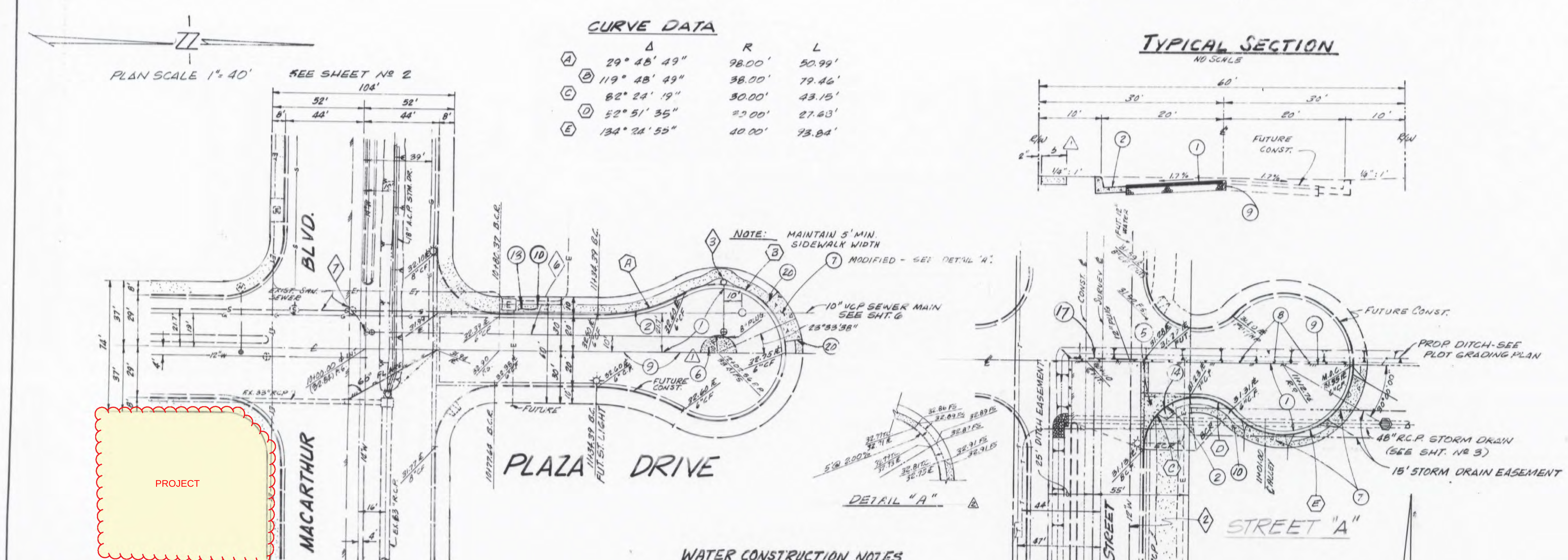
LOCATION MAP
NO SCALE

PLAN SCALE 1" = 40'

CURVE DATA

	Δ	R	L
A	29° 48' 49"	98.00'	50.99'
B	119° 48' 49"	38.00'	79.46'
C	82° 24' 19"	30.00'	43.15'
D	52° 51' 35"	30.00'	27.63'
E	134° 24' 55"	40.00'	93.84'

TYPICAL SECTION
NO SCALE



PLAN SCALE 1" = 40'

CONSTRUCTION NOTES

1. CONST. PER TYP. SECT. ON THIS SHEET, 3" AC OVER 10" AB.
2. CONST. TYPE A-6 CURB & GUTTER PER STD. PLAN 101.
3. CONST. DRIVE APPROACH PER STD. PL. 112.
5. CONST. X GUTTER PER STD. PL. 113
6. CONST. TEXTURED CONC. ISLAND 6" THK OVER 4" AB.
8. INSTALL PADDLEBOARDS @ 5' o.c.
9. INSTALL 2" x 4" REDWOOD HEADER.
10. CONST. PCC SIDEWALK PER STD. PL. 104.
14. PLANT 15 GALLON TREES - TYPE PER ENGINEER
16. CONST. WHEEL CHAIR RAMP PER STD. PLAN 121
17. INSTALL TRAFFIC BARRIER & GUARD RAIL PER STD. PLAN 116
20. REMOVE SIDEWALK TO MEET DRIVEWAY APPROACH. PER ENGINEER.

WATER CONSTRUCTION NOTES
(BY CITY FORCES)

1. CONNECT TO EXIST. 14" CROSS W/14" x 12" REDUCER.
2. INSTALL 12" A.C.P. WATER LINE.
3. INSTALL FIRE HYDRANT PER STD. PLAN 403.
4. INSTALL 8" A.C. WATERMAIN
7. CONNECT TO EXISTING 14" AC WATERMAIN WITH 14" x 8" TAPPING SLEEVE.

STREET LIGHTING:

BEFORE ANY ELECTRIC CABLE OR CONDUIT IS PLACED FOR STREET LIGHTS, THE LOCATIONS FOR THE PROPOSED STREET LIGHTS ARE TO BE VERIFIED BY THE CONSTRUCTION INSPECTOR, (714) 834-4180, AFTER THESE LOCATIONS HAVE BEEN MARKED OUT BY THE DEVELOPER/CONTRACTOR.

PRIVATE ENGINEER'S NOTICE TO CONTRACTOR:

PRIVATE AND PUBLIC UTILITIES, IF SHOWN, REFLECT AVAILABLE RECORD DATA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL LINES AFFECTING THIS WORK AND FOR ANY DAMAGE OR PROTECTION TO THESE LINES. PRIOR TO STARTING CONSTRUCTION OF THIS PROJECT, THE CONTRACTOR SHALL UNCOVER ALL EXISTING UTILITY LINES AFFECTING THIS WORK AND THE PRIVATE ENGINEER SHALL VERIFY THE JOIN ELEVATION OF THE EXISTING SEWER WHEN MAKING CONNECTIONS.

NOTICE TO CONTRACTORS:

ALL CONTRACTORS AND SUB-CONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATIONS SO THAT ALL EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED. ALL CONTRACTORS AND SUB-CONTRACTORS SHALL COMPLY WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS" OF THE U.S. DEPT. OF LABOR OR WITH THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS' "CONSTRUCTION SAFETY ORDERS".

THE CONSTRUCTION ENGINEER AND CITY OF SANTA ANA SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTOR'S AND SUB-CONTRACTOR'S COMPLIANCE WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS" OF THE U.S. DEPT. OF LABOR OR WITH THE STATE OF CALIF. DEPT. OF INDUSTRIAL RELATIONS' "CONSTRUCTION SAFETY ORDERS".

CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB-SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER, ENGINEER AND CITY OF SANTA ANA HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER, THE ENGINEER OR THE CITY OF SANTA ANA.

NOTE:

THE UNDERSIGNED CIVIL ENGINEER HEREBY CERTIFIES THAT THE EDISON CO. UNDERGROUND CABLES CROSSING OR WITHIN PUBLIC RIGHT OF WAY AS SHOW ON THESE PLANS WILL BE STAKED FOR EXACT TRENCH LOCATIONS BY HIS FIELD CREWS PRIOR TO CONSTRUCTION AND FURTHER CERTIFIES THAT FLOW LINE ELEVATIONS AT SEWER MANHOLES SHALL BE VERIFIED PRIOR TO PLACEMENT OF ANY BACKFILL.

JOHN R. HARTUNG R.C.E. 25589

TOUPS CORPORATION - CONSULTING ENGINEERS
1010 N. MAIN ST., SANTA ANA, CAL. 92711 - TEL. 835-4447

PM 596
VA 75-43
121F 75-1-7

FILE NO. 1-90-14

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APP'V'D
1	10-22-76	DRS	CHANGED 4" AC OVER 18" AB TO 3" AC OVER 10" AB. ADDED TEXTURED CONCRETE ISLAND TO PLAZA DR. AND WIDENED SIDEWALK TO 5'.	BS
2	2-8-77	DMS	MODIFY DRIVEWAY APPROACH ON PLAZA DR.	

REFERENCES

BENCH MARK: OCS TAG SO. END EAST HEADWALL DRAIN CHANNEL CROSSING BRISTOL - ELEV. 33.01
T.B.M. - MON. ℄ BRISTOL & MACARTHUR - ELEV. 31.57

TOPO: BOOK 44 PP 16-19
LEVELS: BOOK 44 PP 16-19
HAM FILE: 29-87
DRAY FILE: 1-58-9
DRAY FILE: 1-13-12
DRAY FILE: 1-36-9
DRAY FILE: 1-57-14

PREPARED UNDER SUPERVISION OF JOHN R. HARTUNG R.C.E. 25589

		DATE
DESIGNED	R.M.	8/76
DRAWN	D.G.	8/76
CHECKED	BS	8/76
R/W APPROVED		8/76
RECOMMENDED		
APPROVED DIRECTOR OF PUBLIC WORKS, R.C.E. 11026		8-76

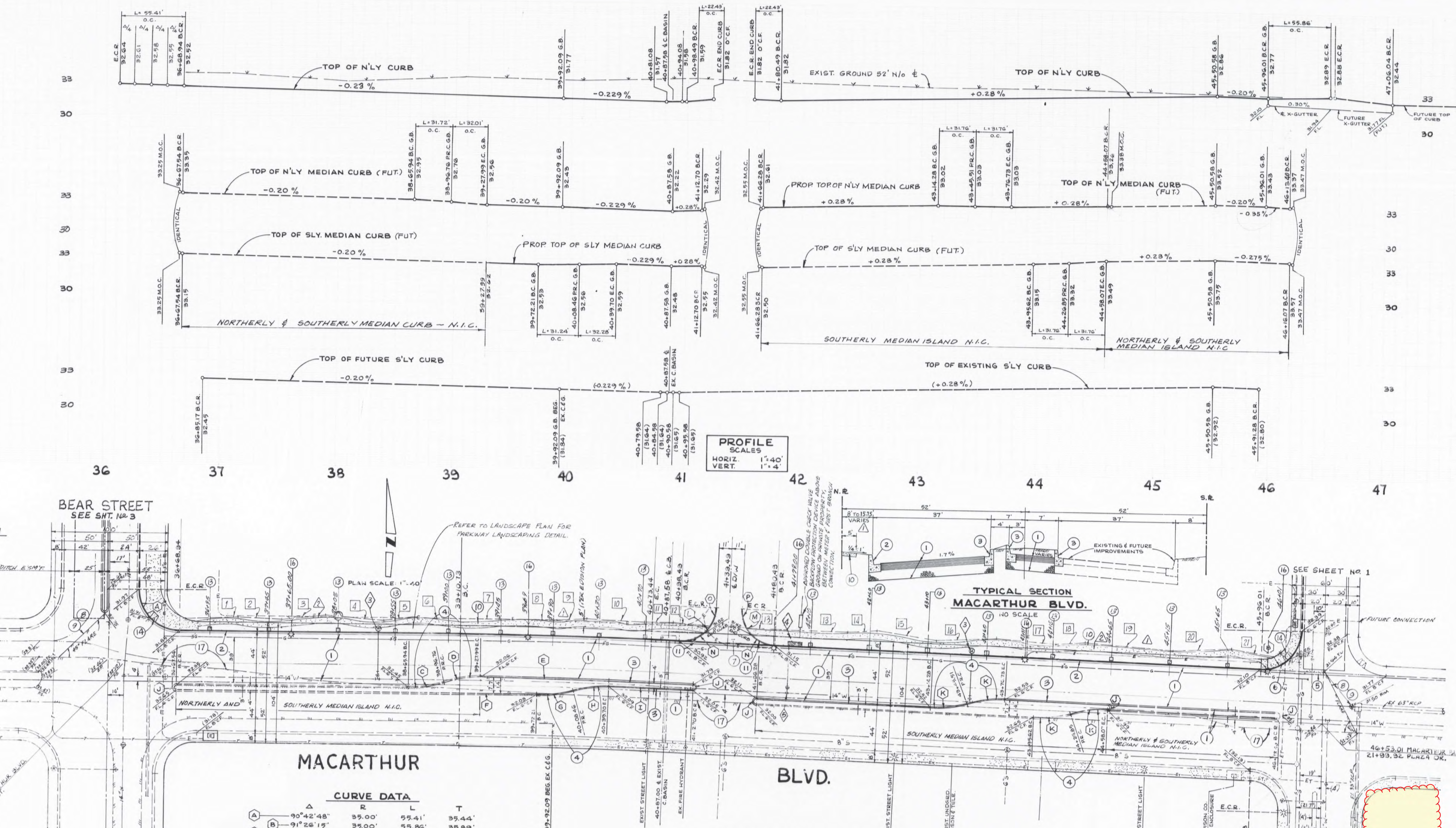
ST. IMP. & TITLE SHEET
PLAZA DR. - FROM MACARTHUR TO 250' NORTH.
STREET "A" - FROM BEAR ST. TO 150' EAST.
DEPARTMENT OF PUBLIC WORKS
CITY OF SANTA ANA

SHEET NO. 1 OF 6

ST. IMP. MAC ARTHUR BLVD. & BEAR ST. - PLAZA DRIVE

2 of 6

1-90-14



SIDEWALK EASEMENT DATA

1	N86°02'27"E	44.52'
2	S89°05'54"E	37.53'
3	N81°46'06"E	37.77'
4	S86°48'54"E	50.16'
5	N81°46'06"E	25.18'
6	N88°36'40"E	25.00'
7	N89°11'03"E	50.00'
8	N88°36'40"E	50.00'
9	N82°54'02"E	25.12'
10	N89°45'25"E	50.00'
11	N87°53'01"E	25.02'
12	S85°15'07"E	25.08'
13	S89°49'33"E	125.00'
14	N83°19'53"E	25.18'
15	S81°51'22"E	50.49'
16	N84°27'49"E	50.25'
17	S86°23'32"E	50.09'
18	N84°27'49E	25.12'
19	S87°09'14"E	75.08'
20	N85°36'01"E	50.16'
21	S80°06'29"E	39.41'

CURVE DATA

	Δ	R	L	T
A	90°42'48"	35.00'	55.41'	35.44'
B	91°26'15"	35.00'	55.86'	35.89'
C	18°10'20"	100.00'	31.72'	15.99' N.I.C.
D	18°20'24"	100.00'	32.01'	16.14' N.I.C.
E	1°23'43"	5971.43'	14[illegible].42'	72.72'
F	0°38'19"	5957.43'	66.40	33.21'
G	17°53'50"	100.00'	31.24'	15.75'
H	18°29'51"	100.00'	32.28'	16.28'
I	0°19'27"	5967.43'	33.76'	16.88'
J	180°00'00"	2.00'	6.28'	-
K	18°11'42"	100.00'	31.76'	16.01'
L	90°00'00"	30.00'	47.12	24.30'
M	85°47'10"	30.00'	44.92	21.57'
N	42°50'00"	30.00'	22.43'	11.77'
O	47°10'00"	30.00'	24.69'	13.10'
P	42°57'10"	30.00'	22.49'	11.80'

WATER CONSTRUCTION NOTES

(BY CITY FORCES)

1. CONNECT TO EXIST. 14" CROSS W/14"x12" REDUCER.
2. INSTALL 12" A.C.P. WATER MAIN.
3. INSTALL FIRE HYDRANT PER STD. PLAN. 403 (FROM EXISTING STUB).
4. INSTALL 10" A.C.P. COMBINATION FIRE & DOMESTIC SERVICE PER STD. 420.
5. CONNECT 10" A.C.P. TO EXISTING 14" A.C.P. W/14"x10" TAPPING SLEEVE.

CONSTRUCTION NOTES

1. CONST. PER TYP. SECTION THIS SHEET, 4 "A.C. OVER 19" A.B.
2. CONST. TYPE A-2-8" C&G. PER STD. PLAN 101.
3. CONST. TYPE "B-1A" MODIFIED C.&G. PER DETAIL SHEET 1.
4. CONST. STD. MEDIAN TURN POCKET PER STD PLAN 118.
5. CONST. P.C.C. CROSS-GUTTER PER STD. PLAN 108.
6. TRANSISTION CURB FROM 8" C.F. TO 6" AROUND CURB RETURN.
7. CONST. P.C.C. DRIVE APPROACH PER STD. PL. 112 B.
8. INSTALL PADDLEBOARDS @ 5' O.C.
9. INSTALL 2"x4" REDWOOD HEADER
10. CONST P.C.C. SIDEWALK PER STD. PL. 104
11. TRANSISTION CURB FROM 8" C.F. TO 0" C.F. AROUND CURB RETURN.
12.
13. ~~TREEWELLS PER STD PLAN 104.~~ PLANT 15 GAL. TREES TYPE PER ENGINEER.
14. CONSTRUCT WHEEL CHAIR RAMP PER STD. PLAN 121.
16. CONSTRUCT 35,000 LMV UNDERGROUND SERVICE ST. LIGHT.
17. JOIN TO EXIST. PAVEMENT. FEATHER SMOOTHLY TO SATISFACTION OF ENGINEER

REVISION 2 BY: J. OSBORN R.C.E. 16583 OSBORN & ASSOCIATES

FILE NO. 1-9014

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APP'V'D.
1	10-22-76	DRG	REVISED SIDEWALK ON NORTH SIDE MACARTHUR TO CURVELINEAR AS SHOWN. REVISE NOTE 13	BS
2	7-28-77	IMG	REVISED SIDEWALK AND EASEMENT ON NORTH SIDE OF MacARTHUR BLVD.	[illegible]

REFERENCES

BENCH MARK: OCS TAG SO. END EAST HDWL. DRAIN CHANNEL CROSSING BRISTOL - EL. 33.01

T.B.M. MON. ℄ BRISTOL & MACARTHUR - EL. 31.37

TOPO: BOOK 44 PP 16-19.
LEVELS: BOOK 44 PP 16-19.
H&M FILE: 29-57
DRAY FILE: 1-58-9
DRAY FILE: 1-13-12
DRAY FILE: 1-36-9
DRAY FILE: 1-57-14

TOUPS CORPORATION – CONSULTING ENGINEERS
1010 N. MAIN ST., SANTA ANA, CAL. 92711 - TEL. 835-4447

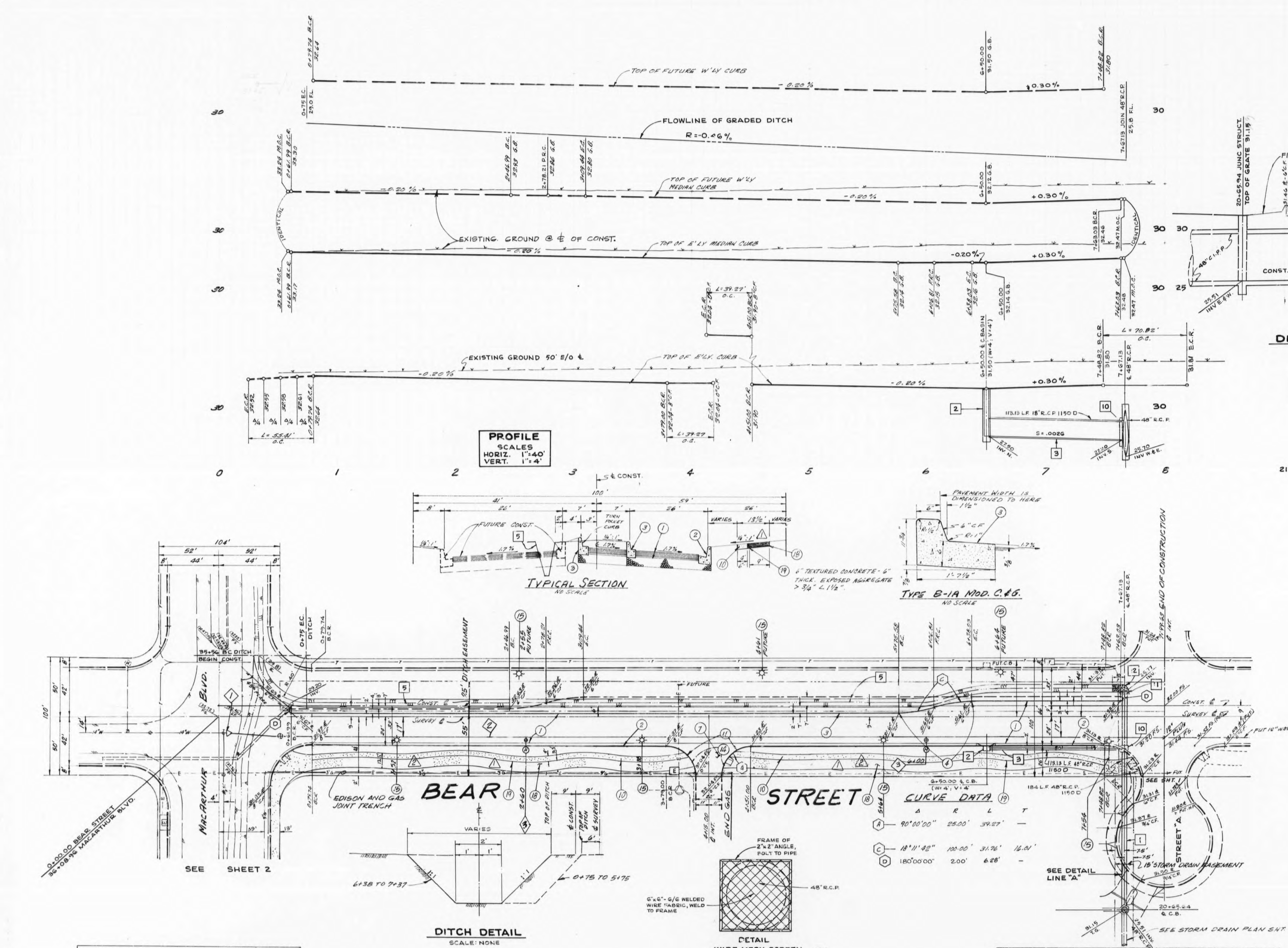
PREPARED UNDER SUPERVISION OF:
JOHN R. HARTUNG RCE 25589

		DATE
DESIGNED	TS	5/76
DRAWN	DK	5/76
CHECKED	BS. J.M. C. 73	8/76
R/W APPROVED	TH	8/76
RECOMMENDED		8-76
APPROVED: DIRECTOR OF PUBLIC WORKS, R.C.E. 11025		8-6-76

P.C. 526
VA 75-43
CUP 75-17

STREET IMPROVEMENTS
MACARTHUR BOULEVARD
FROM BEAR STREET TO PLAZA DRIVE.

DEPARTMENT OF PUBLIC WORKS
CITY OF SANTA ANA



CONSTRUCTION NOTES

1. CONST. PER TYPICAL SECT. THIS SHEET 4"AC/18"AB
2. CONST. TYPE A 2-8 C.&G. PER STD. PLAN 101.
3. CONST. TYPE B-1A MODIFIED C.&G. PER DETAIL THIS SHEET.
4. CONST. STD. MEDIAN TURN POCKET PER STD. PLAN 118.
7. CONST. DRIVE APPROACH PER STD. PL. 112 B.
10. CONST. P.C.C. SIDEWALK PER STD. PL. 104.
11. CONST. TRANSITION CURB FROM 8"C.F. TO 0"C.F.
15. CONST. 20,000 LMV UNDERGROUND SERVICE ST. LIGHT.
14. CONST. WHEEL CHAIR RAMP PER STD. PL. 121
18. CONST. PER TYP. SECTION THIS SHEET 2"AC./4"AB.
19. CONST. PER TYP. SECTION - THIS SHEET 6" TEXTURED CONC. - 6" THK.

STORM DRAIN CONSTRUCTION NOTES

1. CONSTRUCT STORM DRAIN, SIZE & "D" AS SHOWN. (SEE SPECS ON SHT. 5)
2. CONSTRUCT TYPE "C" CATCH BASIN PER STANDARD PLANS 303, 305 & 305A.
3. PLACE CONNECTOR PIPE, SIZE & "D" AS SHOWN.
5. CONSTRUCT DITCH PER TYPICAL SECTION THIS SHEET AND ELEVATIONS SHOWN ON PLAN
6. FILL & COMPACT EXIST. DITCH AND PLACE TEMP. 3"A.C./4"A.B.
10. CONST JUNCTION STRUCTURE PER DETAIL ON SHT. 5.
11. CONST. WIRE MESH SCREEN PER DETAIL THIS SHEET.
12. INSTALL ROCK FACING, 18" THICK IN DITCH

WATER CONSTRUCTION NOTES

(BY CITY FORCES)

1. CONNECT TO EXIST 14" CROSS W/14"x12" REDUCER
2. INSTALL 12" A.C. WATER MAIN.
3. INSTALL FIRE HYDRANT PER STD. PLAN 403

PM 926
VA 75-43
CLIP 75-17

REVISION 2 BY: J. OSBORN R.C.E. 16583 OSBORN & ASSOCIATES

TOUPS CORPORATION - CONSULTING ENGINEERS
1010 N. MAIN ST, SANTA ANA, CAL. 92711 - TEL. 835-4447

FILE NO. 1-90-14

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APP'V'D.
1	10-22-76	DRG	REVISED SIDEWALK, ADD NOTES 18 AND 19	B.S.
2	7-28-77	JMG	REVISED SIDEWALK AND BIKEPATH ON EAST SIDE OF BEAR STR.	[illegible]

REFERENCES

BENCH MARK: OCS TAG SO. END EAST HDWL. DRAIN CHANNEL CROSSING BRISTOL. - EL. 33.01

T.B.M. MON. ℄ BRISTOL & MACARTHUR - EL. 31.37

TOPO: BOOK 44 PP 16-19.
LEVELS: BOOK 44 PP 16-19.
HAN FILE: 29-57
DRAY FILE: 1-58-9
DRAY FILE: 1-13-12
DRAY FILE: 1-36-9
DRAY FILE: 1-57-14

PREPARED UNDER SUPERVISION OF: JOHN R. HARTUNG RCE 25589

		DATE
DESIGNED	DG	5/76
DRAWN	DG	5/76
CHECKED	B.S. 2M.	8/76
R/W APPROVED	TH	
RECOMMENDED		8-76
APPROVED	DIRECTOR OF PUBLIC WORKS - RCE 11026	8-6-76

STREET & STORM DRAIN IMPROVEMENTS

BEAR STREET

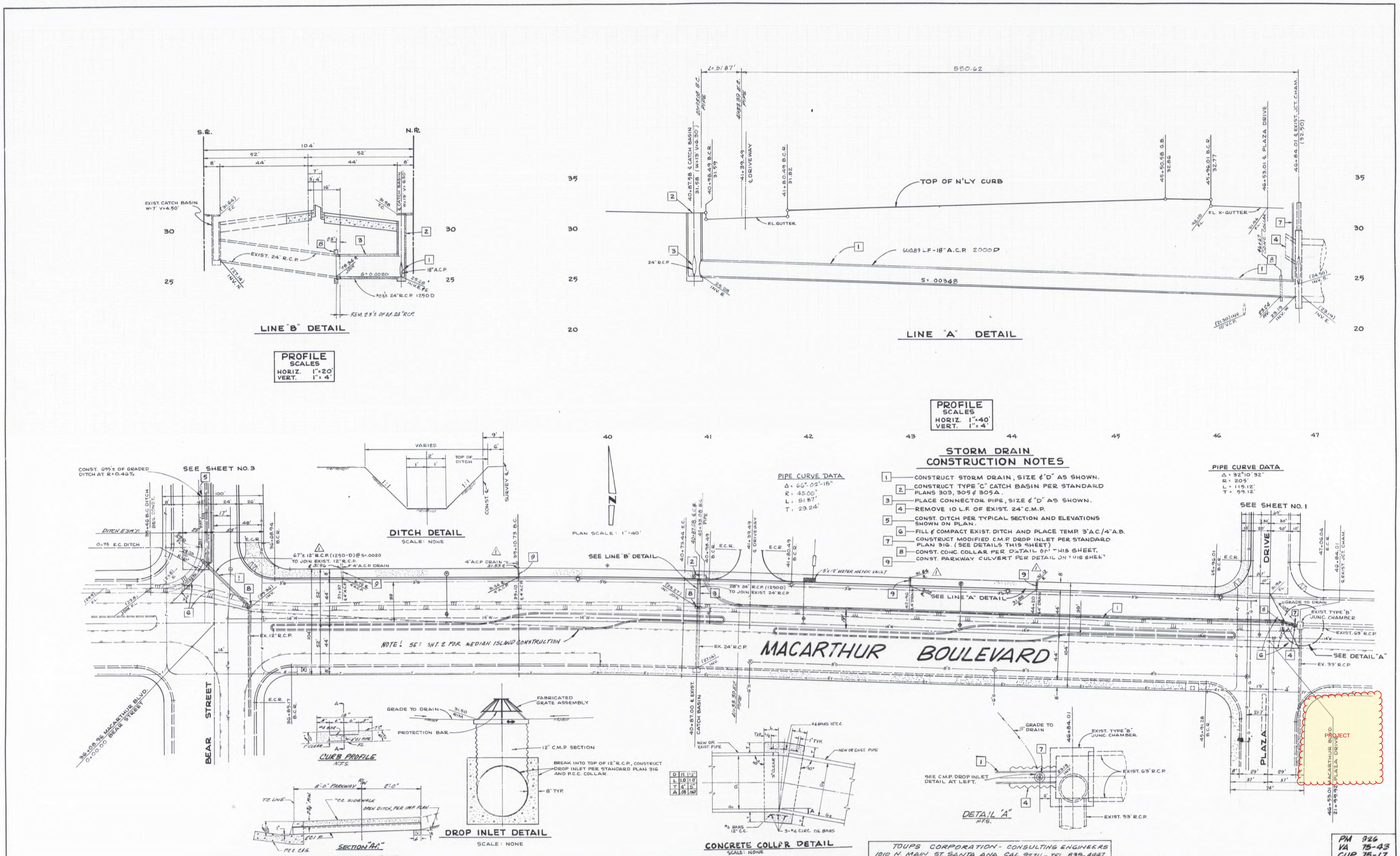
FROM MACARTHUR BLVD. TO 800' NORTH

DEPARTMENT OF PUBLIC WORKS

CITY OF SANTA ANA

SHEET NO. 3 OF 6

S.D. IMP. MAC ARTHUR BLVD. TEMP. S.D.
FROM BEAR ST- PLAZA DRIVE
4 of 6
1-90-14



TOUPS CORPORATION - CONSULTING ENGINEERS
1010 N. MAIN ST, SANTA ANA, CAL. 92711 - TEL. 835-4447

PM 926
VA 75-43
CUP 75-17

FILE NO. 1-90-14

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APP'V'D.
1	10-22-76	T.S.	ADDED ℄ @ STA. 39+10.73 & 37+37. REVISED ℄ @ STA. 42+96 & 44+20	BS.

REFERENCES

BENCH MARK: OCS TAG SO. END EAST HDWL. DRAIN CHANNEL CROSSING BRISTOL. - EL. 33.01
T.B.M. MON. ℄ BRISTOL & MACARTHUR - EL. 31.57

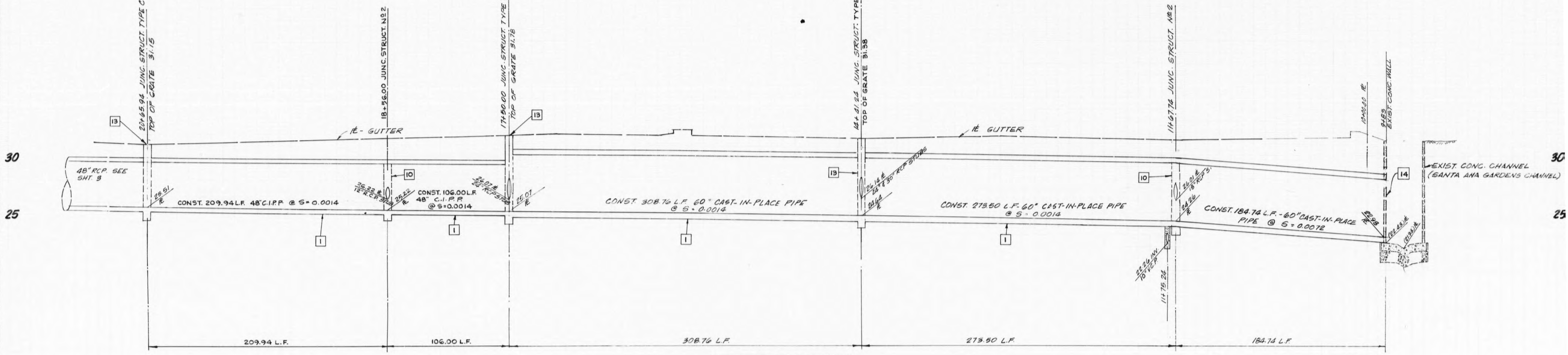
TOPO: BOOK 44 PP 16-19.
LEVELS: BOOK 44 PP 16-19
HAN FILE: 29-57
DRAY FILE: 1-58-9
DRAY FILE: 1-18-12
DRAY FILE: 1-36-9
DRAY FILE: 1-57-12

PREPARED UNDER SUPERVISION OF: JOHN R. HARTUNG RCE 25989

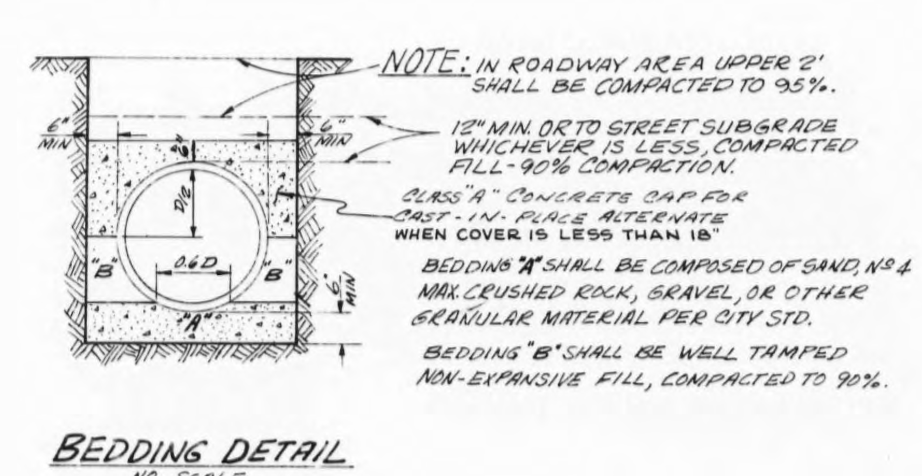
		DATE
DESIGNED	TS	5/76
DRAWN	TS	5/76
CHECKED	B.S.	8/76
R/W APPROVED		8/76
RECOMMENDED		8-76
APPROVED: DIRECTOR OF PUBLIC WORKS - R.C.E. 11026		8-6-76

STORM DRAIN IMPROVEMENTS
MACARTHUR BOULEVARD
TEMP. STORM DRAIN FROM BEAR ST. TO PLAZA DRIVE
DEPARTMENT OF PUBLIC WORKS
CITY OF SANTA ANA
SHEET NO. 4 OF 6

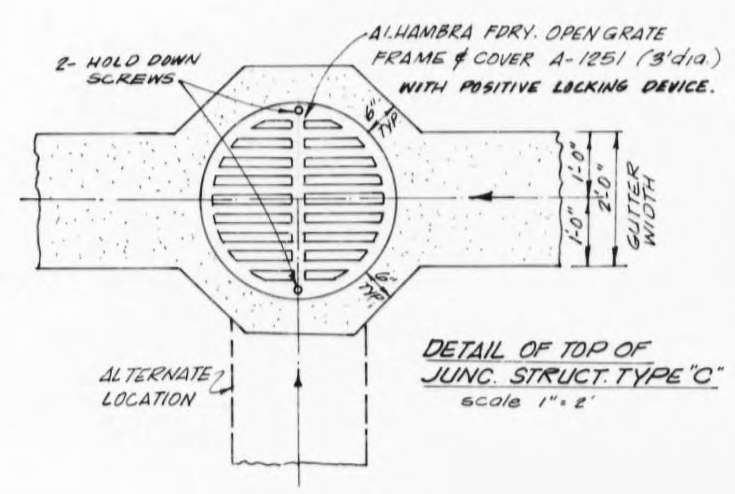
S.D. IMP. FROM SANTA ANA GARDENS CHANNEL TO BEAR ST.
FOR ASPEN SOUTH COAST DEVELOPMENT
1-90-14
5 of 6



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



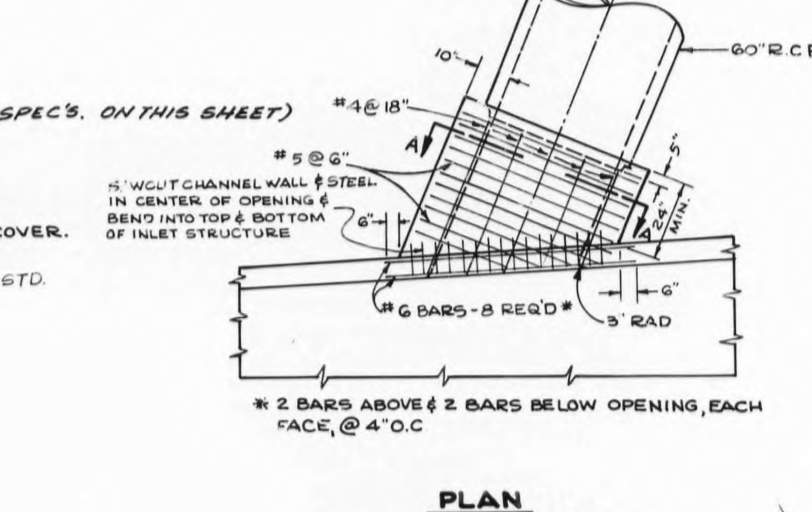
BEDDING DETAIL
NO SCALE



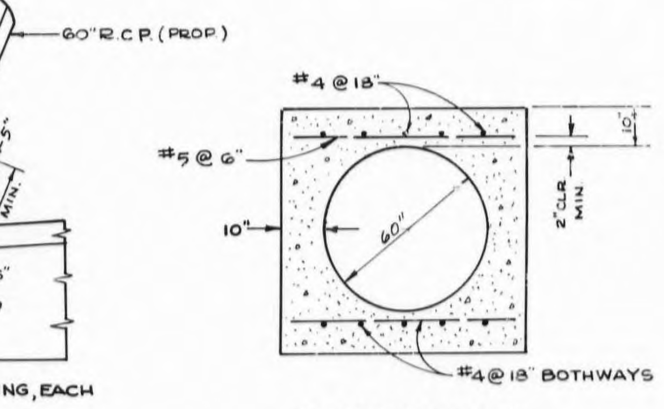
DETAIL OF TOP OF JUNC. STRUCT. TYPE "C"
scale 1" = 2'

STORM DRAIN CONSTRUCTION NOTES

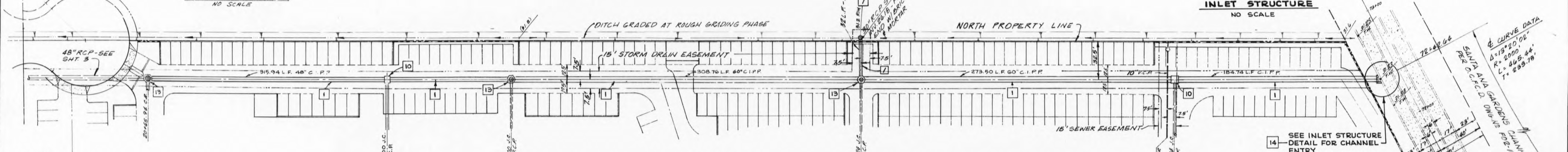
1 — CONSTRUCT STORM DRAIN, SIZE & "D" AS SHOWN. (SEE SPEC'S. ON THIS SHEET)
10 — CONSTRUCT JUNCTION STRUCTURE PER DETAIL SHOWN ON THIS SHEET.
13 — CONSTRUCT JUNCTION STRUCTURE TYPE "C" PER CITY OF SANTA ANA STD. PLAN 308 W/ALHAMBRA FOUNDRY MH. FRAME & COVER A-1251-4 OPEN GRATE IN LIEU OF SOLID COVER.
14 — CONSTRUCT INLET STRUCTURE PER DETAIL THIS SHEET.
7 — CONSTRUCT MODIFIED CMP DROP INLET PER SANTA ANA STD. PLAN 316. SEE DETAIL ON SHEET 4.

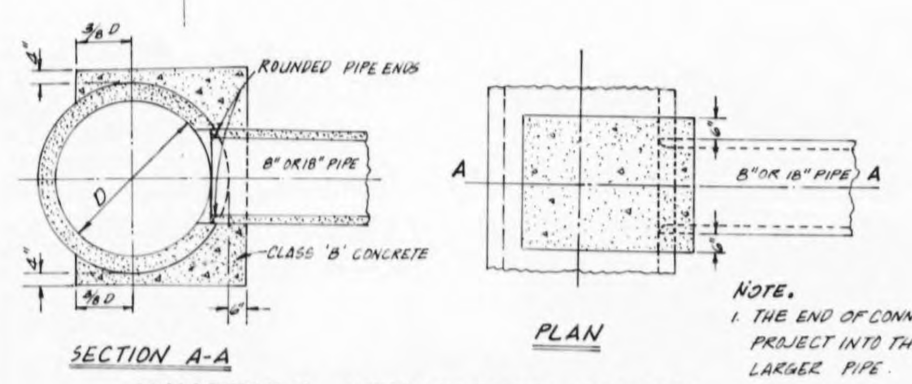


PLAN
INLET STRUCTURE
NO SCALE



SECTION A-A
NO SCALE





JUNCTION STRUCTURE DETAIL

NOTE.
1. THE END OF CONNECTING PIPE SHALL NOT PROJECT INTO THE WATERWAY OF THE LARGER PIPE.

SPECIFICATION FOR CAST-IN-PLACE PIPE.
1. CAST-IN-PLACE CONC. PIPE SHALL BE CONSTRUCTED IN ACCORDANCE WITH CALIFORNIA STD. SPECIFICATION, SECTION 63, (JAN. 1973).
2. PRIOR TO PAVING (NO LESS THAN 28 DAYS AFTER PLACEMENT OF CAST-IN-PLACE PIPE), THERE SHALL BE 3 FT. OF EARTH MOUND OVER THE PIPE FOR PIPE PROTECTION, WHILE CURING OCCURS.
3. CAST-IN-PLACE CONC. PIPE SHALL BE CONST. WITH 4000 P.S.I. CONC.

PLAN SCALE
1" = 40'

ORANGE COUNTY FLOOD CONTROL DISTRICT
ALL INSTALLATIONS AND WORK AFFECTING FLOOD CONTROL DISTRICT FACILITIES SHALL CONFORM WITH DISTRICT'S STANDARD SPECIFICATIONS AND WITH THE PROVISIONS OF THE CONSTRUCTION PERMIT GRANTED BY DISTRICT. CONTRACTOR SHALL MAINTAIN A COPY OF SAID PERMIT AND STAMPED PLANS ON THE JOB SITE. USE OF DISTRICT PROPERTY AND CONFORMANCE WITH THE ABOVE SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY DISTRICT'S DULY ASSIGNED INSPECTOR.
DISTRICT INSPECTOR SHALL BE NOTIFIED PRIOR TO COMMENCEMENT OF ANY WORK IN ACCORDANCE WITH PERMIT PROVISIONS.

TOUPS CORPORATION - CONSULTING ENGINEERS
1010 N. MAIN ST. SANTA ANA, CAL. 92711 - TEL. 835-4447

PM 926
VA 75-43
CUP 75-17

FILE NO. 1-90-14

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APP'V'D.

REFERENCES

BENCH MARK: OCS TAG So. END EAST HOWL. DRAIN CHANNEL CROSSING BRISTOL. - EL. 33.01	TOPO: BOOK 44 PP 16-19
	LEVELS: BOOK 44 PP 16-19
T.B.M. MON. © BRISTOL & MACARTHUR - EL. 31.37	O.C.F.C.D. - SANTA ANA GARDENS CHANNEL DWG. F02-101-3-A

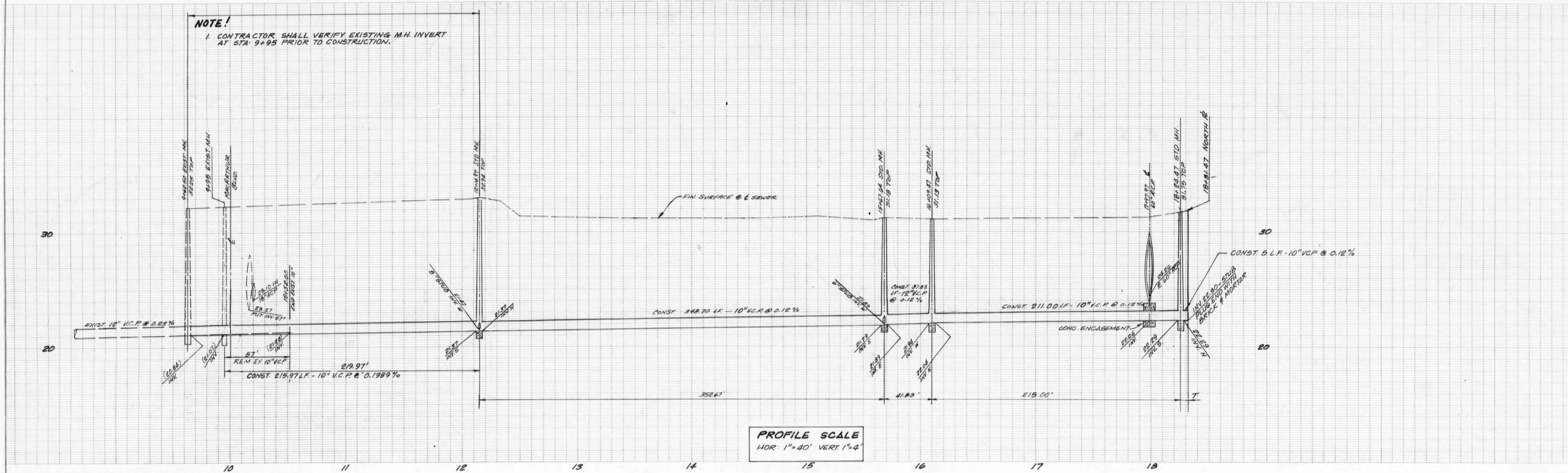
PREPARED UNDER SUPERVISION OF: JOHN R. HARTUNG RCE 25589

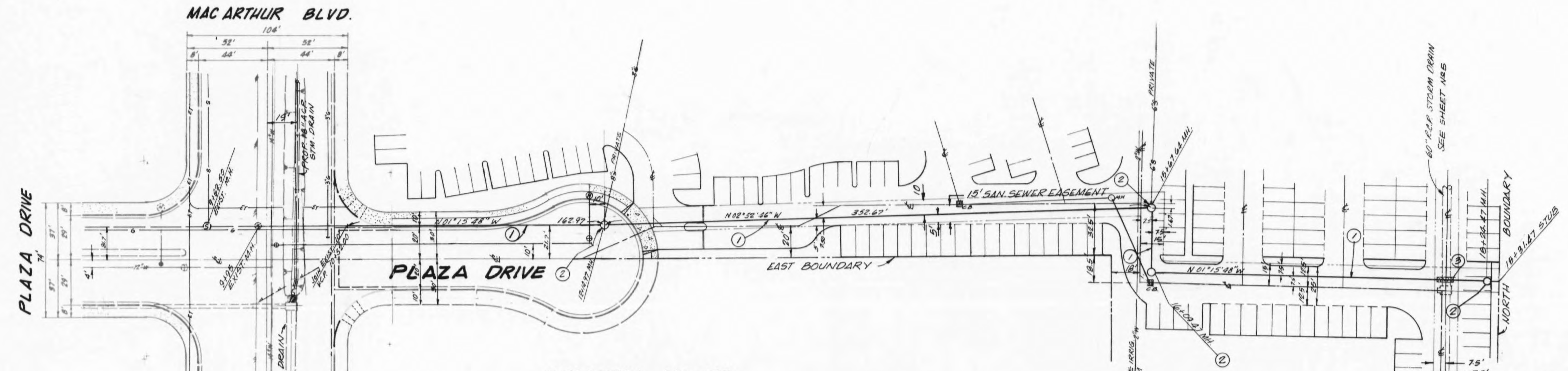
		DATE
DESIGNED	RM	
DRAWN	DG.	
CHECKED	BS 2M.	8/76
R/W APPROVED	TH	8/76
RECOMMENDED		8-76
APPROVED: DIRECTOR OF PUBLIC WORKS, R.C.E. 11026		8-6-76

STORM DRAIN IMPROVEMENTS
FOR ASPEN SOUTH COAST DEVELOPMENT
FROM SANTA ANA GARDENS CHANNEL TO BEAR STREET

DEPARTMENT OF PUBLIC WORKS
CITY OF SANTA ANA

SHEET NO. 5 OF 6





GENERAL NOTES

1. ALL WORK SHOWN HEREON SHALL BE CONSTRUCTEDIN ACCORDANCE WITH THE PROVISIONS OF THE STANDARD SPECIFICATIONS OF THE CITY OF SANTA ANA, CALIFORNIA (SEE NOTE 2 OF 3).
2. 8" V.C.P. & 6" V.C.P. STUB CONNECTIONS SHALL BE CONSTRUCTED FROM SEWER M.H. AT STA. 12+14.97 AND STA. 15+67.64. THE DEVELOPER TO FURNISH THE CITY THE LOCATION OF THE HOUSE CONNECTION FOR EACH BLDG.
3. ALL VCP JOINTS SHALL BE PLASTIC MECHANICAL COMPRESSION JOINTS OR BAND SEALS.
4. IT SHALL BE THE RESPONSIBILITY OF THE SEWER CONTRACTOR TO EXPOSE ALL JOIN POINTS TO EXISTING SEWERS AND TO HAVE THE LOCATION AND ELEVATION VERIFIED BY THE ENGINEER PRIOR TO ANY SEWER STAKES BEING FURNISHED.
5. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL FLOW LINE ELEVATIONS AT ALL SEWER MANHOLES VERIFIED BY THE PRIVATE CIVIL ENGINEER PRIOR TO PLACEMENT OF ANY PIPE BACKFILL.

PRIVATE ENGINEERS NOTICE TO CONTRACTOR

UTILITIES SHOWN ON THESE PLANS ARE CORRECT AND ACCURATE TO THE EXTENT OF AVAILABLE RECORDS AND KNOWLEDGE. THE CONTRACTOR HOWEVER IS REQUIRED TO TAKE STEPS TO ASCERTAIN THE EXACT LOCATION OF ALL UNDERGROUND FACILITIES PRIOR TO DOING WORK THAT MAY DAMAGE SUCH FACILITIES OR INTERFERE WITH THEIR SERVICE.

PLAN SCALE
1" = 40'

CONSTRUCTION NOTES

1 — CONST. 10" V.C.P.
2 — CONST. MANHOLE PER STD. PLAN 201.
3 — CONST. CONC. SEWER ENCASEMENT PER STD. PLAN 203 DETAIL B.

ORANGE COUNTY SANITATION DISTRICT NO. 7 NOTES

1. ALL WORK PERFORMED ON THE DISTRICTS FACILITIES SHALL COMPLY WITH THE DISTRICT STANDARD SPECS AND PERMIT REQUIREMENTS.
2. INSPECTION SERVICES: NOTIFY THE DISTRICTS ENGINEERING DEPT. A MINIMUM OF 24 HRS PRIOR TO COMMENCEMENT OF ANY WORK ON THE FACILITIES. CALL (714) 540-2910.
3. CROWNS OF CONNECTING LATERALS OR STUBS SHALL MATCH THE CROWNS OF THE DISTRICTS TRUNK OR SUB-TRUNK SEWER.
4. ANY DAMAGE TO THE DISTRICTS MANHOLE OR STRUCTURE SHALL BE REPAIRED TO THE SATISFACTION OF THE DISTRICT AT THE CONTRACTOR'S EXPENSE.
5. WORK NOT DONE IN THE PRESENCE OF THE DISTRICT'S INSPECTOR IS SUBJECT TO REJECTION.
6. ANY CONNECTION TO THE DISTRICT'S EXISTING MANHOLES SHALL BE DONE BY CORE DRILLING, CHANNELIZING THE SHELVES AND EPOXYING THE EXPOSED SURFACES.

PM 926
VA 75-43
CUP 75-17

TOUPS CORPORATION - CONSULTING ENGINEERS
1010 N. MAIN ST., SANTA ANA, CAL. 92711 - TEL. 835-4447

FILE NO. 1-90-14

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APP'V'D.

REFERENCES

BENCH MARK: OCS TAG So. END EAST HDWL. DRAIN CHANNEL CROSSING BRISTOL. EL. 33.01
T.B.M. MON. ℄ BRISTOL & MACARTHUR - EL. 31.37

TOPO: BOOK 44 PP 16-19
LEVELS: BOOK 44 PP 16-19
HAMFILE: 29-57
DRAY FILE: 1-58-9
DRAY FILE: 1-13-12
DRAY FILE: 1-36-9
DRAY FILE: 1-57-14

PREPARED UNDER SUPERVISION OF:
JOHN R. HARTUNG RCE 25589

		DATE
DESIGNED	RM	
DRAWN	D.G.	
CHECKED	B.S. Z.M.	8/76
R/W APPROVED	TH	8/76
RECOMMENDED		8-76
APPROVED: DIRECTOR OF PUBLIC WORKS - R.C.E. 11026		8-6-76

SEWER IMPROVEMENTS
PLAZA DRIVE
FROM MACARTHUR BLVD. TO 800' NORTH.

DEPARTMENT OF PUBLIC WORKS
CITY OF SANTA ANA

SHEET NO. 6 OF 6

1-90-14 Mac Arthur Blvd Plaza Drive to 800' North 6 of 6

Attachment 3 – OCFCD Gardens Channel As-Built Plan

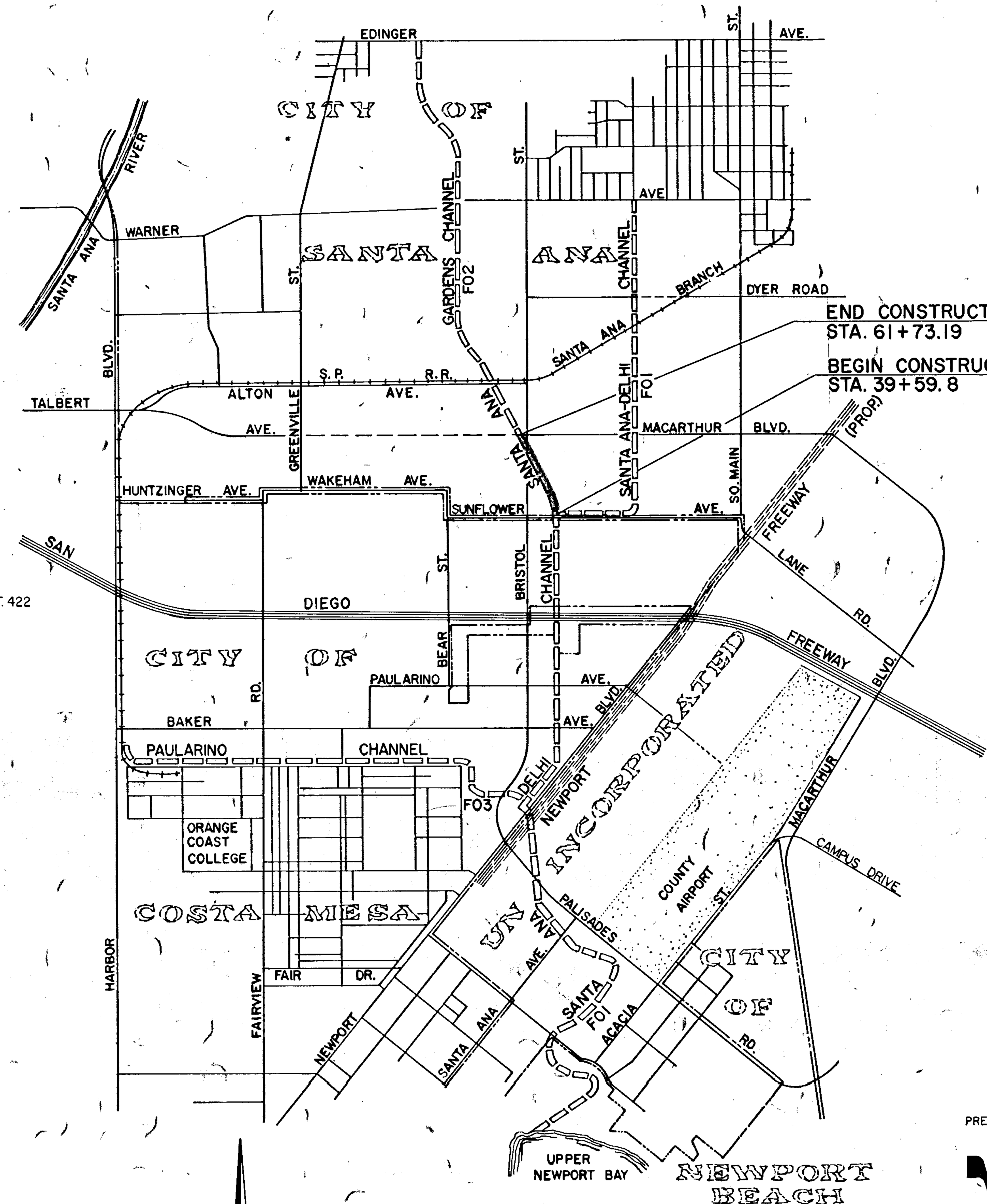
F02-701-1-A 1 of 12

INDEX TO DRAWINGS

SHEET NO.	TITLE
1	TITLE SHEET
2	PLAN & PROFILE STA. 39+59.8 TO STA. 47+00.
3	PLAN & PROFILE STA. 47+00 TO STA. 57+00.
4	PLAN & PROFILE STA. 57+00 TO STA. 61+73.19.
5	BRISTOL STREET CROSSING.
6	STRUCTURAL DETAILS.
7	TRIPLE R.C. BOX, STRUCTURAL & EARTHWORK DETAILS.
8	TRANSITION DETAIL AT SUNFLOWER AVE., MACARTHUR BLVD., STRUCTURAL AND MISCELLANEOUS DETAILS.
9	TRANSITION DETAIL AT DOWNSTREAM END OF TRIPLE 12'x10' R.C.B., EARTHWORK DETAILS & LOG OF TEST BORINGS.
10	BRISTOL STREET DETOUR.
11	TYPICAL FENCE AND GATE DETAILS.
12	OPTIONAL TRANSITION DETAIL AT DOWNSTREAM END OF TRIPLE 12'(W) X 10'(H) R.C.B. AND RETAINING WALL DETAILS.

UTILITY LEGEND

UTILITY	SYMBOL	PHONE NO.
ORANGE CO. SANITATION DIST.	——S——	714-540-2910
PACIFIC TELEPHONE CO.	——T——	714-557-1226
MR. JOSEPH CALLENS	IRRIG. PIPE / O STAND PIPE	714-962-1212
METROPOLITAN WATER DIST.	EX. 36" M.W.D. / EXIST. VENT	213-626-4282 EXT. 422
CITY OF SANTA ANA	——W——	714-834-4922
SOUTHERN CALIF. GAS CO.	——G——	714-542-4121



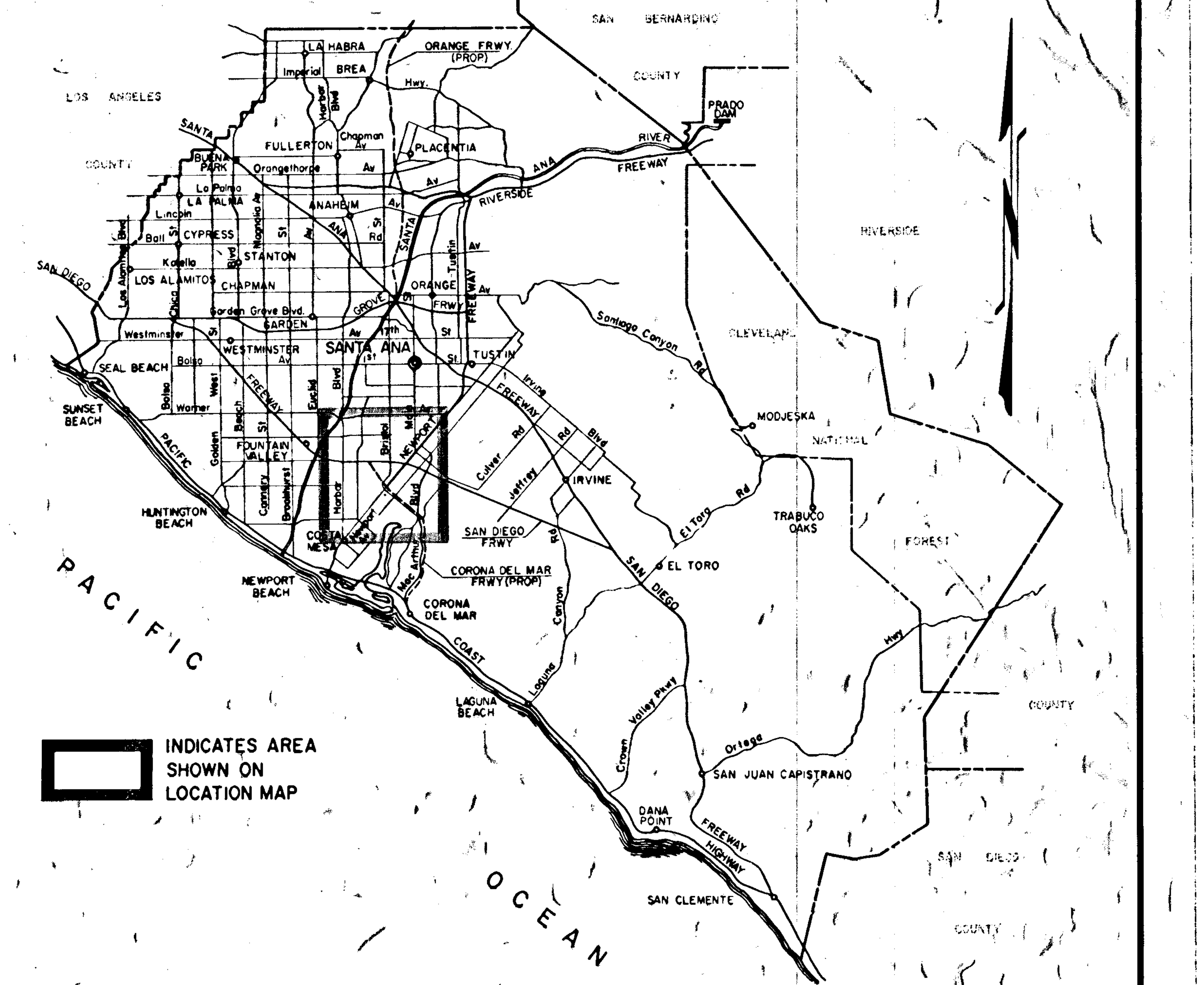
0 1 2 3

3 INCHES ON ORIGINAL PLAN

N

LOCATION MAP

SCALE: 1" = 2000'



INDICATES AREA SHOWN ON LOCATION MAP

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

SANTA ANA - GARDENS CHANNEL

FROM SUNFLOWER AVENUE TO MACARTHUR BLVD.

FACILITY NO. F02

MARCH 1972

APPROVED: H.G. Osborne
CHIEF ENGINEER

APPROVED: R.E. Wolford
FOR THE CITY OF SANTA ANA

PREPARED IN THE OFFICES OF:
vtn orange county
ENGINEERS ARCHITECTS PLANNERS
2301 CAMPUS DRIVE, IRVINE, CALIFORNIA 92664
(714) 833-2450

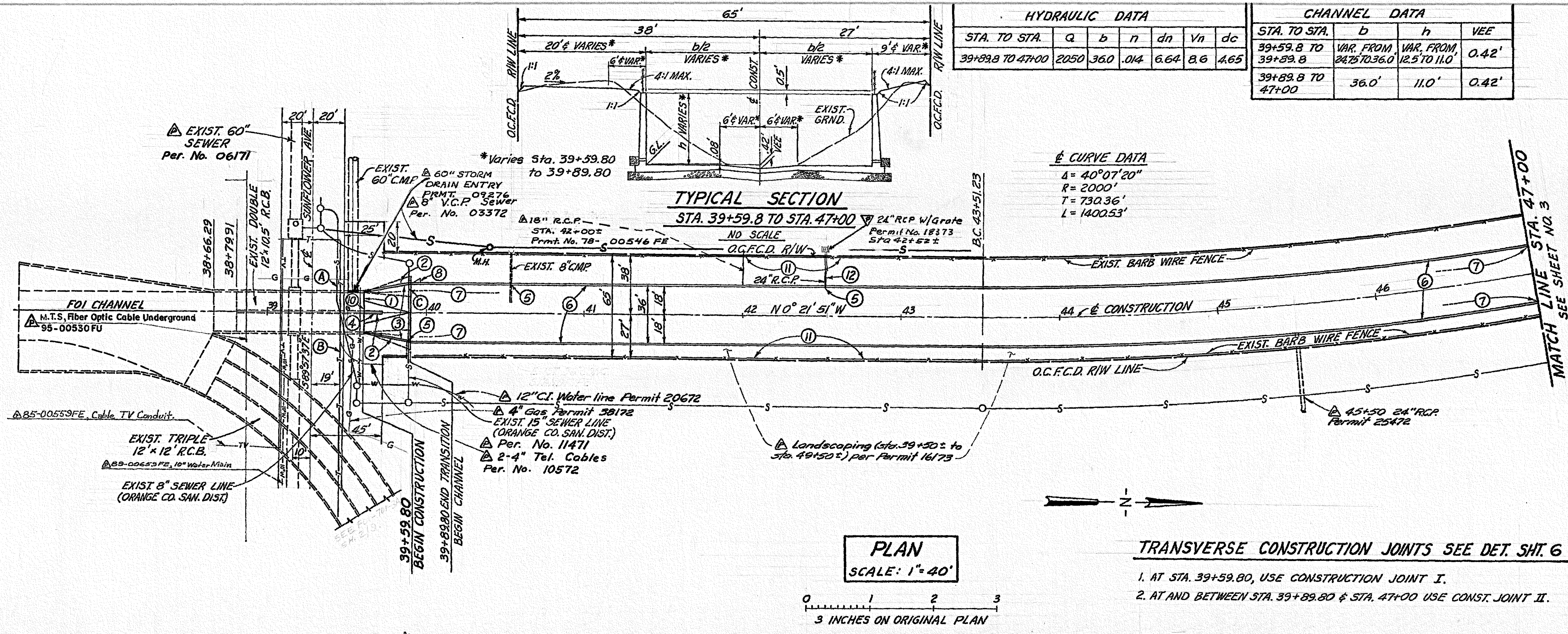
SUBMITTED BY:
R.C.E. NO. 18046 2/25/72 DATE

REVISIONS		
MARK	DATE	DESCRIPTION
1	7/15/03	2003-01834

ORANGE COUNTY FLOOD CONTROL DISTRICT
SANTA ANA CALIFORNIA

DWG. NO. F02-701-1-A

SHEET 1 OF 12 SHEETS



HYDRAULIC DATA

STA. TO STA.	Q	b	n	dn	Vn	dc
39+89.8 TO 47+00	2050	36.0	.014	6.64	8.6	4.65

CHANNEL DATA

STA. TO STA.	b	h	VEE
39+59.8 TO 39+89.8	VAR. FROM 24.75' TO 36.0'	VAR. FROM 12.5' TO 11.0'	0.42'
39+89.8 TO 47+00	36.0'	11.0'	0.42'

CONSTRUCTION NOTES

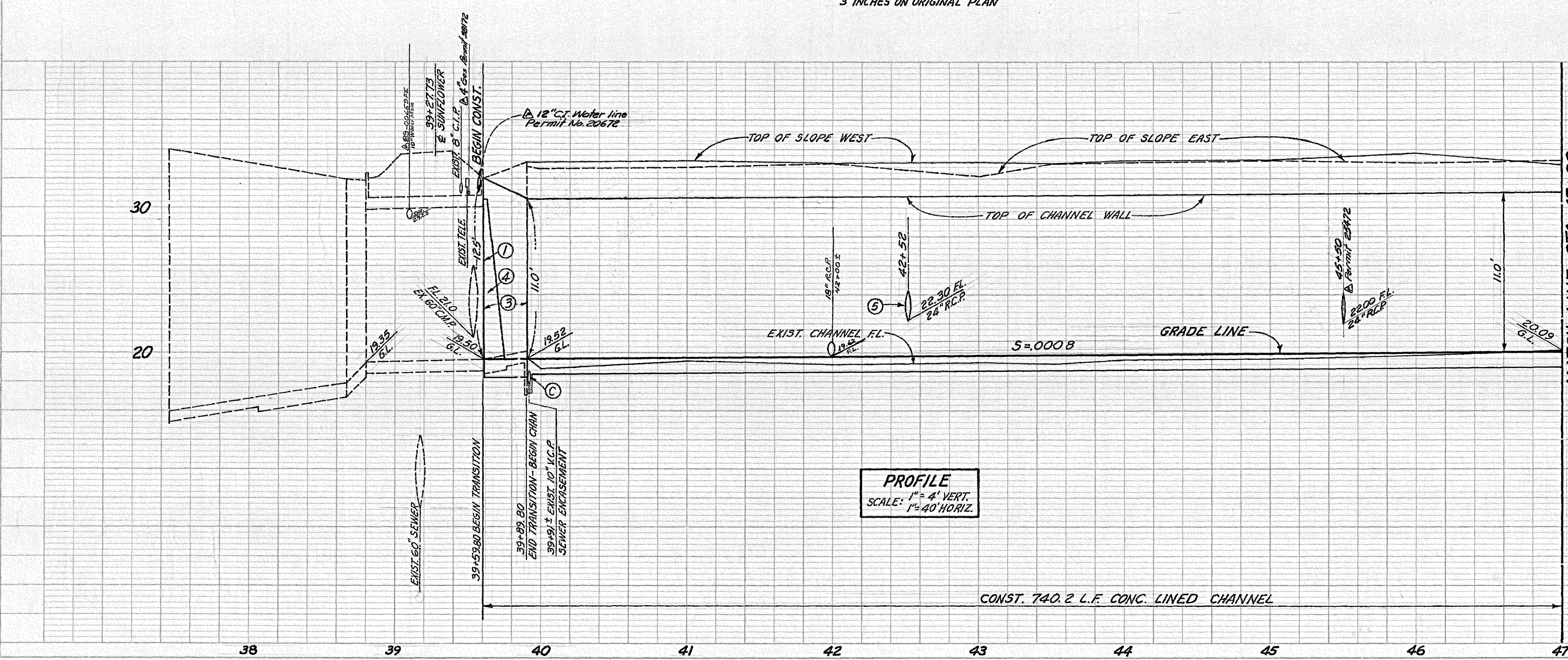
1. JOIN EXISTING DOUBLE 12'×10.5' R.C.B., SEE SHEET NO. 8.
2. REMOVE EXISTING CONC. TRANSITION & DEBRIS WALL, SEE SHEET NO. 8.
3. CONSTRUCT CHANNEL TRANSITION, SEE SHEET NO. 8.
4. CONSTRUCT DEBRIS WALL, SEE SHEET NO. 8.
5. CONSTRUCT CHANNEL INLET, SEE SHEET NO. 8.
6. CONSTRUCT RECTANGULAR REINF. CONC. CHANNEL, SEE SHEET NO. 6 FOR STRUCTURAL DETAILS.
7. CONSTRUCT TYPE I CHAIN LINK FENCE, SEE SHEETS NO. 11 & 8.
8. CONSTRUCT 4' WIDE CHAIN LINK GATE, SEE DETAIL ON SHEETS NO. 11 & 8.
9. PROTECT IN PLACE EXIST. CHAIN LINK FENCE AND GATES. SEE SHEET NO. 8.
10. PROTECT IN PLACE EXISTING FENCE, SEE SHEET NO. 8.
11. REMOVE EXIST. BARB WIRE FENCE
12. CONST. 8 L.F. R.C.P. CLASS IV, 2000 D STUB, SLOPE = .04. SEAL OPEN END WITH 8" BRICK AND MORTAR.

UTILITY NOTES

A. PROTECT IN PLACE EXISTING 8" C.I.P.
B. PROTECT IN PLACE EXISTING TELEPHONE CABLE
C. PROTECT IN PLACE EXISTING 10" V.C.P. TO BE ENCASED WITH CHANNEL SLAB, SEE SHEET NO. 8.

TRANSVERSE CONSTRUCTION JOINTS SEE DET. SHT. 6

1. AT STA. 39+59.80, USE CONSTRUCTION JOINT I.
2. AT AND BETWEEN STA. 39+89.80 & STA. 47+00 USE CONST. JOINT II.



DATUM = O.C.F.C.D. = O.C.S. ADJUSTED 1957
BENCH MARK NO. F2-2 ELEV. 34.70
A SPIKE IN P.P. #599104E, ON SOUTH SIDE OF SUNFLOWER AVE, APPROX. 100' EAST OF EXISTING F02 R.C.B. AND 700' EAST OF BRISTOL STREET.

P	9-76	PERMIT 09276
P	8-94	85-00559FE
P	4-95	89-00659FE

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS

MARK	DATE	DESCRIPTION
P	8-72	Per. No.'s 06171, 11471, 03372, 10572
P	9-72	Permit #20672
P	2-73	Permits 25472, 38172
A	1-74	As Built
P	3-74	No 18373
P	10-78	Prmt. 78-00546 FE

DESIGNED U.G.F.
DRAWN G.E.V. CHECKED R.E.M.
SUBMITTED V.T.N. ORANGE CO.

ORANGE COUNTY FLOOD CONTROL DISTRICT

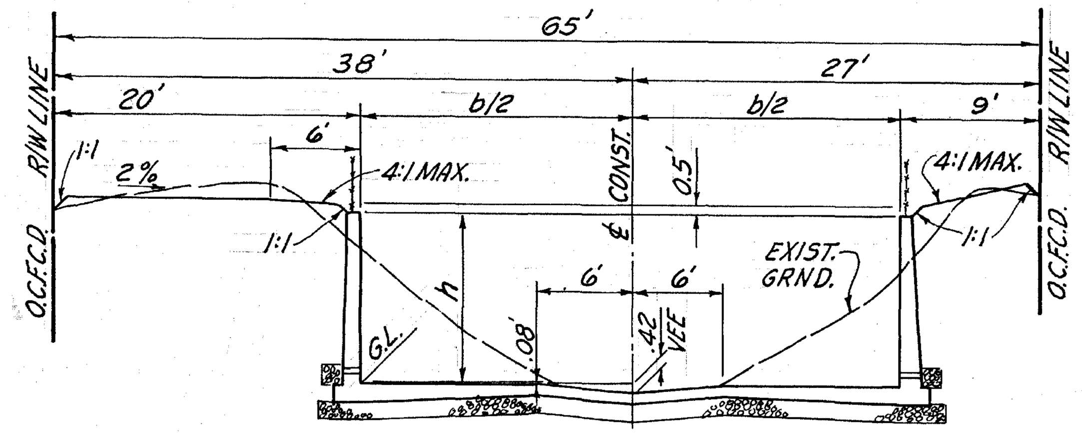
SANTA ANA-GARDENS CHANNEL

PLAN AND PROFILE STA. 39+59.8 TO STA. 47+00

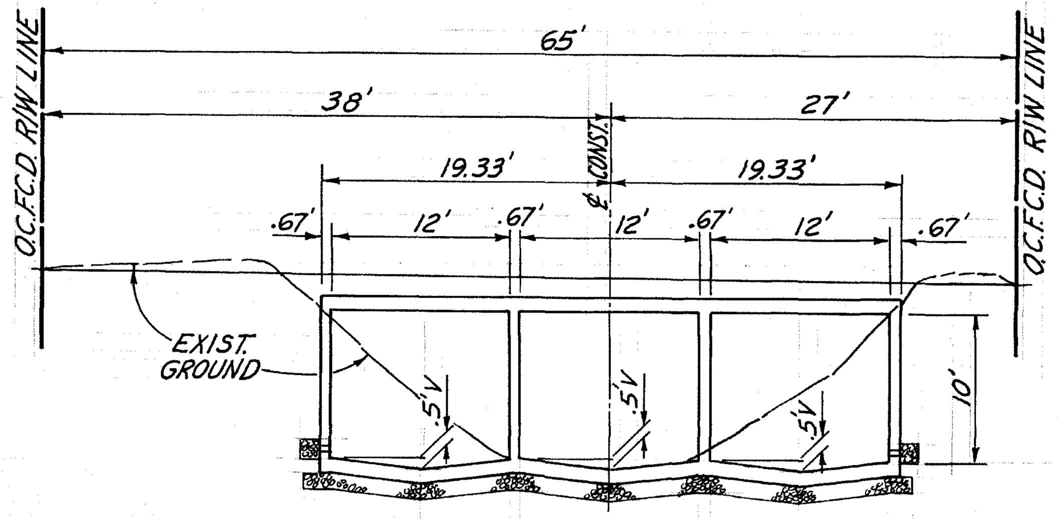
RECOMMENDED

SCALE	DATE	DWG. NO.
AS SHOWN	MAR. 1972	F02 - 701 - 1-A

SHEET 2 OF 12



TYPICAL SECTION
STA. 47+00 TO STA. 56+72.02
NO SCALE



TYPICAL SECTION
STA. 56+72.02 TO STA. 57+00
NO SCALE

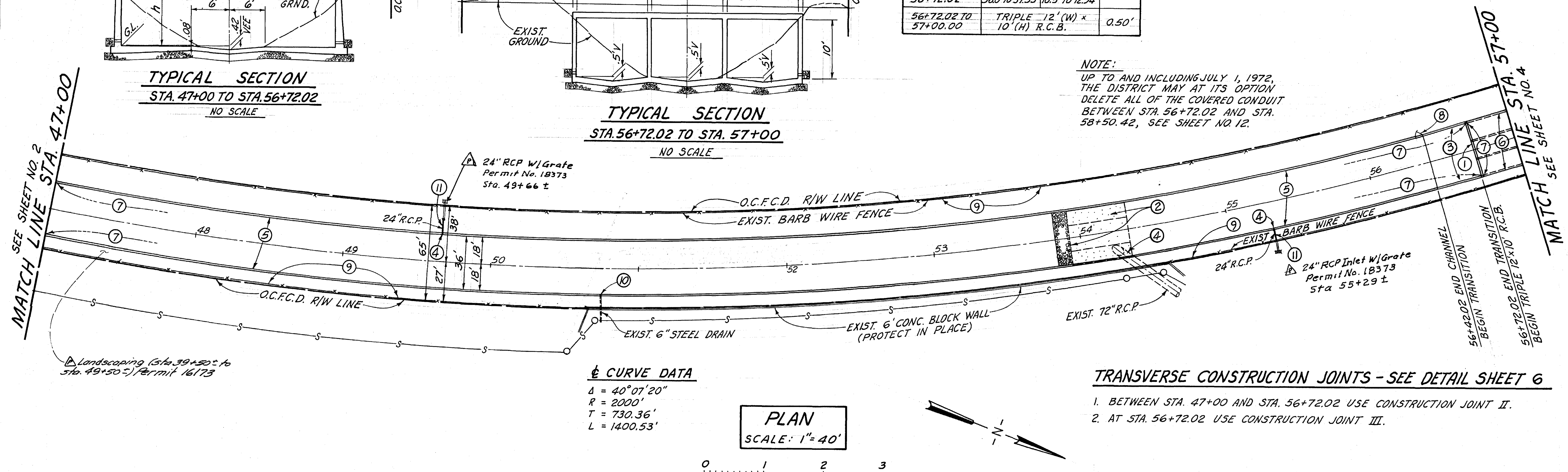
CHANNEL DATA			
STA. TO STA.	b	h	VEE
47+00.00 TO 47+15.00	36.0'	VARIES 11.0' TO 10.5'	0.42'
47+15.00 TO 56+42.02	36.0'	10.5'	0.42'
56+42.02 TO 56+72.02	VARIES 36.0' TO 37.33'	VARIES 10.5' TO 12.54'	0.42'
56+72.02 TO 57+00.00	TRIPLE 12'(W) × 10'(H) R.C.B.		0.50'

HYDRAULIC DATA							
STA. TO STA.		Q	b	n	dn	Vn	dc
47+00.00	56+52.02	2050	36'	.014	6.64	8.6	4.65
56+52.02	57+00.00	2050	TRIPLE 12'×10' R.C.B.	.014	8.26	6.89	4.65

NOTE:
UP TO AND INCLUDING JULY 1, 1972, THE DISTRICT MAY AT ITS OPTION DELETE ALL OF THE COVERED CONDUIT BETWEEN STA. 56+72.02 AND STA. 58+50.42, SEE SHEET NO. 12.

CONSTRUCTION NOTES

1. JOIN PROPOSED TRIPLE 12'×10' R.C.B., SEE SHEET NO. 9.
2. REMOVE EXISTING CONC. CHANNEL AND RIP-RAP.
3. CONSTRUCT CHANNEL TRANSITION, SEE SHEET NO. 9.
4. CONSTRUCT CHANNEL INLET, SEE SHEET NO. 8.
5. CONSTRUCT RECTANGULAR REINF. CONCRETE CHANNEL, SEE SHEET NO. 6 FOR STRUCTURAL DETAILS.
6. CONSTRUCT TRIPLE 12'(W) × 10'(H) R.C.B., SEE SHEET NO. 7 FOR STRUCTURAL DETAILS.
7. CONSTRUCT TYPE I CHAIN LINK FENCE, SEE SHTS. NO. 11 & 9.
8. CONSTRUCT 4' WIDE CHAIN LINK GATE, SEE SHEETS NO. 11 & 9.
9. REMOVE EXIST. BARB WIRE FENCE.
10. REMOVE INTERFERING PORTION OF EXIST. 6" STEEL DRAIN PIPE.
11. CONST. 8 L.F. R.C.P. CLASS IV, 2000 D STUB, S=.04. SEAL OPEN END WITH 8" BRICK & MORTAR.



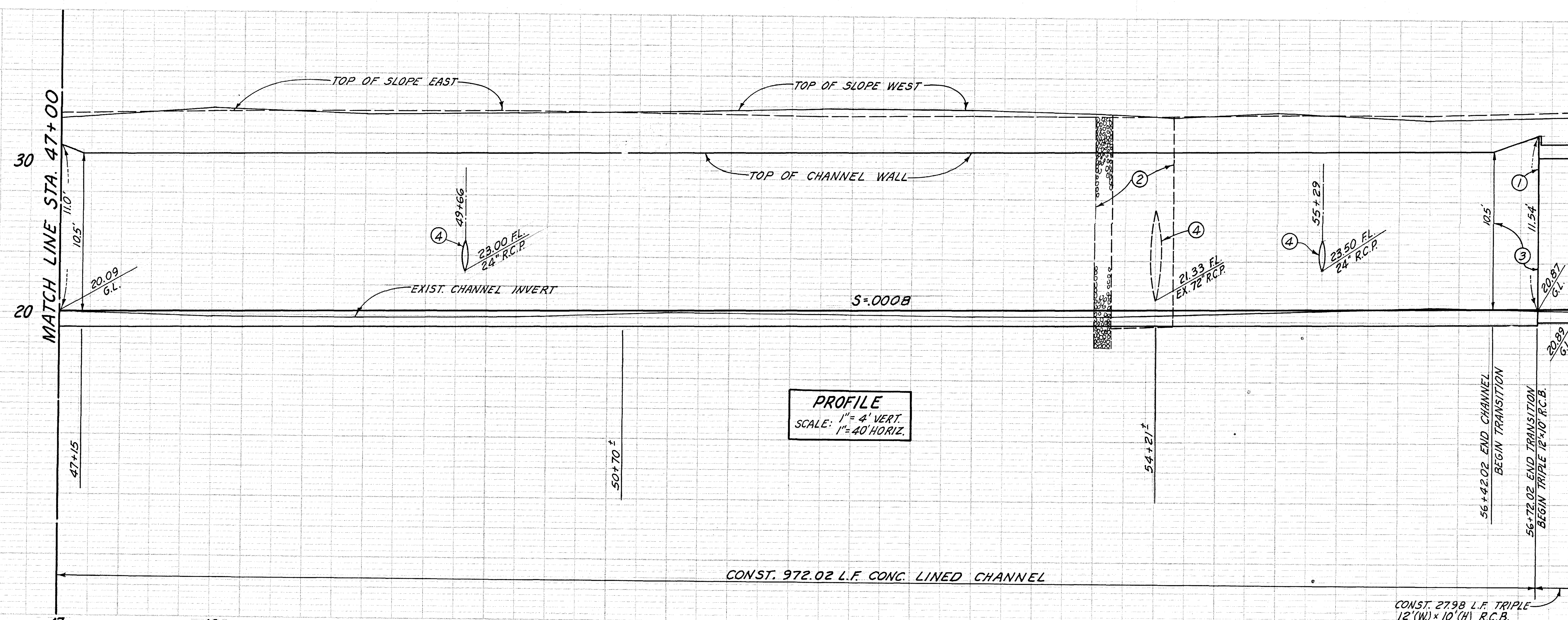
℄ CURVE DATA
Δ = 40°07'20"
R = 2000'
T = 730.36'
L = 1400.53'

PLAN
SCALE: 1" = 40'

0 1 2 3
3 INCHES ON ORIGINAL PLAN

TRANSVERSE CONSTRUCTION JOINTS - SEE DETAIL SHEET 6

1. BETWEEN STA. 47+00 AND STA. 56+72.02 USE CONSTRUCTION JOINT II.
2. AT STA. 56+72.02 USE CONSTRUCTION JOINT III.



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

DATUM = O.C.F.C.D. = O.C.S. ADJUSTED 1957
BENCH MARK NO. F2-2 ELEV. 34.70
A SPIKE IN P.P. #599104E, ON SOUTH SIDE OF SUNFLOWER AVE., APPROX. 100' EAST OF EXISTING F02 R.C.B. AND 700' EAST OF BRISTOL STREET.

BENCH MARK NO. F2-8 ELEV. 34.87
THE N.'E. CORNER OF SQUARE MANHOLE RIM ON THE NORTH SIDE OF ALTON AVE. APPROX. 50' WEST OF F02 CHANNEL.

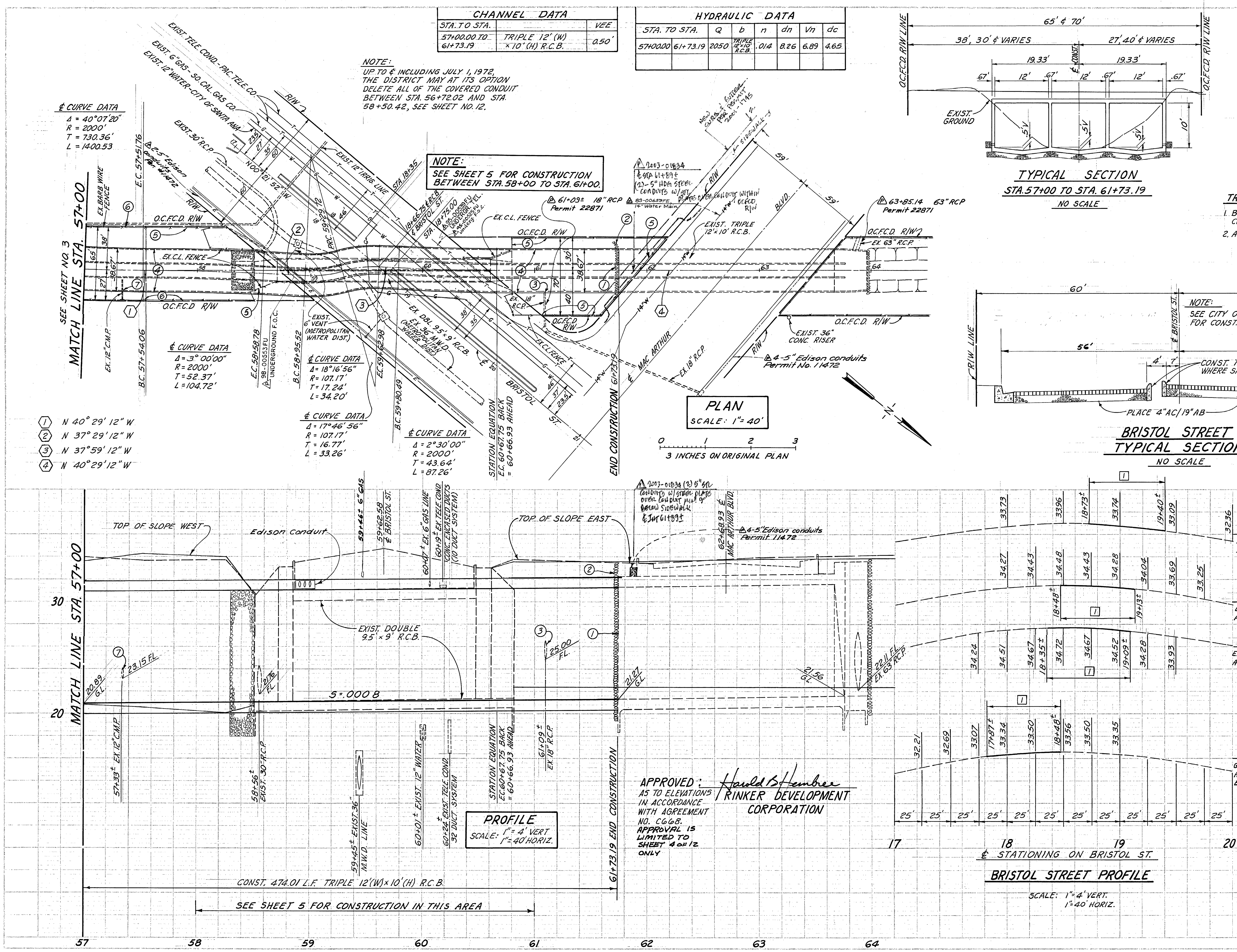
PRELIMINARY REVISION CODE Disregard Prints Bearing Earlier Codes		
REVISIONS		
MARK	DATE	DESCRIPTION
P	10-73	Per. #16173
A	1-74	As Built
P	3-74	No. 18373

ORANGE COUNTY FLOOD CONTROL DISTRICT
SANTA ANA-GARDENS CHANNEL
PLAN AND PROFILE
STA. 47+00 TO STA. 57+00

DESIGNED U.G.F.
DRAWN G.E.V. CHECKED R.E.M.
SUBMITTED V.T.N. ORANGE CO.
RECOMMENDED

SCALE	DATE	DWG. NO.
AS SHOWN	MAR. 1972	F02-701-1-A

3



CHANNEL DATA

STA. TO STA.		VEE
57+00.00 TO 61+73.19	TRIPLE 12' (W) × 10' (H) R.C.B.	0.50'

HYDRAULIC DATA

STA. TO STA.		Q	b	n	dn	Vn	dc
57+00.00	61+73.19	2050	TRIPLE 12'×10' R.C.B.	.014	8.26	6.89	4.65

NOTE: UP TO ℄ INCLUDING JULY 1, 1972, THE DISTRICT MAY AT ITS OPTION DELETE ALL OF THE COVERED CONDUIT BETWEEN STA. 56+72.02 AND STA. 58+50.42, SEE SHEET NO. 12.

NOTE: SEE SHEET 5 FOR CONSTRUCTION BETWEEN STA. 58+00 TO STA. 61+00.

℄ CURVE DATA: Δ = 40°07'20", R = 2000', T = 730.36', L = 1400.53

℄ CURVE DATA: Δ = 3°00'00", R = 2000', T = 52.37', L = 104.72'

℄ CURVE DATA: Δ = 18°16'56", R = 107.17', T = 17.24', L = 34.20'

℄ CURVE DATA: Δ = 17°46'56", R = 107.17', T = 16.77', L = 33.26'

℄ CURVE DATA: Δ = 2°30'00", R = 2000', T = 43.64', L = 87.26'

1. N 40°29'12" W
2. N 37°29'12" W
3. N 37°59'12" W
4. N 40°29'12" W

CONSTRUCTION NOTES

1. JOIN EXISTING TRIPLE 12'×10' R.C.B., SEE SHEET NO. 8.
2. REMOVE EXISTING BULKHEAD PLANKS.
3. CONSTRUCT CHANNEL INLET, SEE SHEET NO. 8.
4. CONSTRUCT TRIPLE 12'(W)×10'(H) R.C.B., SEE SHEET NO. 7 FOR STRUCTURAL DETAILS.
5. SALVAGE EX. C.L. FENCE. (TO BE PICKED UP BY THE DISTRICT.)
6. REMOVE EXIST. BARB WIRE FENCE.
7. REMOVE INTERFERING PORTION OF 12" C.M.P.

TRANSVERSE CONSTRUCTION JOINTS - SEE DETAIL SHTS. 7 & 8

1. BETWEEN STA. 57+00 AND STA. 61+73.19 USE R.C. BOX CULVERT CONSTRUCTION JOINT.
2. AT STA. 61+73.19 USE CONSTRUCTION JOINT IV, SEE SHEET NO. 8.

NOTE: SEE CITY OF SANTA ANA STD. DWG. 101 IN SPECS. FOR CONST. OF CURB B-1 & A-2

1 APPROX. LIMIT OF R.C.B. EARTHWORK AND RECONSTRUCTION OF BRISTOL STREET IMPROVEMENTS.

DATUM = O.C.F.C.D. = O.C.S. ADJUSTED 1957.

BENCH MARK NO. F2-2 ELEV. 34.70
A SPIKE IN P.P. #599104E, ON SOUTH SIDE OF SUNFLOWER AVE., APPROX. 100' EAST OF EXISTING F02 R.C.B. AND 700' EAST OF BRISTOL STREET.

BENCH MARK NO. F2-8 ELEV. 34.87
THE N.E. CORNER OF SQUARE MANHOLE RIM ON THE NORTH SIDE OF ALTON AVE. APPROX. 50' WEST OF F02 CHANNEL.

APPROVED: AS TO ELEVATIONS IN ACCORDANCE WITH AGREEMENT NO. C668. APPROVAL IS LIMITED TO SHEET 4 OF 12 ONLY
Harold B Hembree
RINKER DEVELOPMENT CORPORATION

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS

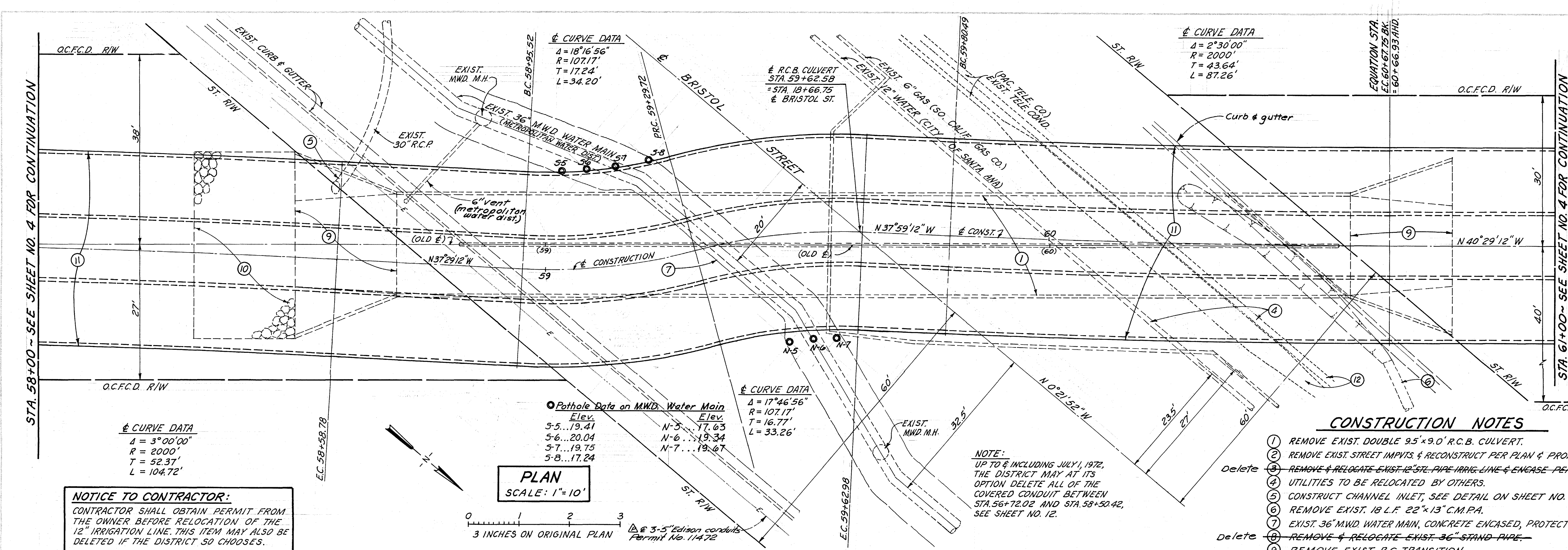
MARK	DATE	DESCRIPTION
1	11-72	Permit No. 11472
2	7-73	Permit No. 22871
3	1-74	As Built
	4/95	89-00659FE
	03-01	98-00553FU: F.OPTIC. C.
	06-01	95-00531FU: Underg. Tel.
	02-01	98-00525FU: Underg. F.O.C.
	9/16/03	2003-01834

DESIGNED U.G.F. DRAWN G.E.V. CHECKED R.E.M.
SUBMITTED V.T.N. ORANGE CO.

ORANGE COUNTY FLOOD CONTROL DISTRICT
SANTA ANA-GARDENS CHANNEL
PLAN AND PROFILE
STA. 57+00 TO STA. 61+73.19

RECOMMENDED
SCALE AS SHOWN | DATE MAR. 1972 | DWG. NO. F02-701-1-4

SHEET 4 OF 12



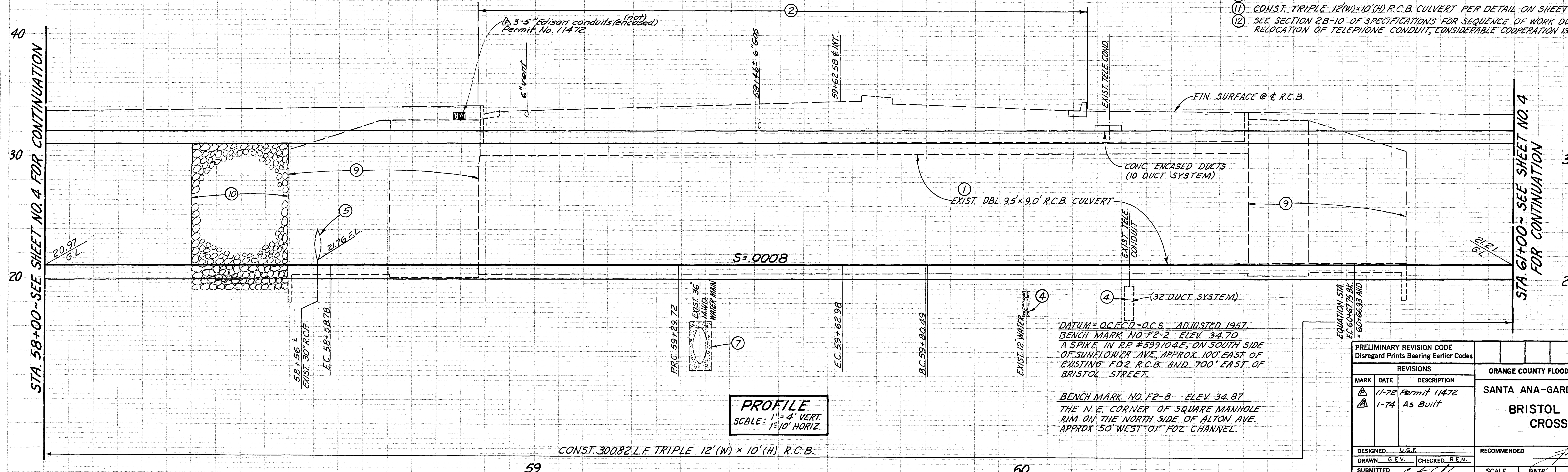
NOTICE TO CONTRACTOR:

CONTRACTOR SHALL OBTAIN PERMIT FROM THE OWNER BEFORE RELOCATION OF THE 12" IRRIGATION LINE. THIS ITEM MAY ALSO BE DELETED IF THE DISTRICT SO CHOOSES.

OWNER MR. JOSEPH CALLENS

CONSTRUCTION NOTES

1. REMOVE EXIST. DOUBLE 9.5'×9.0' R.C.B. CULVERT.
2. REMOVE EXIST. STREET IMPVTS. & RECONSTRUCT PER PLAN & PROFILE ON SHEET NO. 4
3. Delete ~~REMOVE & RELOCATE EXIST. 12" STL. PIPE IRRIG. LINE & ENCASE PER DETAIL ON SHEET NO. 7~~
4. UTILITIES TO BE RELOCATED BY OTHERS.
5. CONSTRUCT CHANNEL INLET, SEE DETAIL ON SHEET NO. 8
6. REMOVE EXIST. 18 L.F. 22"×13" C.M.P.A.
7. EXIST. 36" M.W.D. WATER MAIN, CONCRETE ENCASED, PROTECT IN PLACE.
8. Delete ~~REMOVE & RELOCATE EXIST. 36" STAND PIPE.~~
9. REMOVE EXIST. R.C. TRANSITION.
10. REMOVE EXIST. ROCK RIP-RAP.
11. CONST. TRIPLE 12'(W)×10'(H) R.C.B. CULVERT PER DETAIL ON SHEET NO. 7.
12. SEE SECTION 2B-10 OF SPECIFICATIONS FOR SEQUENCE OF WORK DURING RELOCATION OF TELEPHONE CONDUIT, CONSIDERABLE COOPERATION IS NECESSARY.



DATUM = O.C.F.C.D. = O.C.S. ADJUSTED 1957.
BENCH MARK NO F2-2 ELEV. 34.70
A SPIKE IN P.P. #599104E, ON SOUTH SIDE OF SUNFLOWER AVE., APPROX. 100' EAST OF EXISTING F02 R.C.B. AND 700' EAST OF BRISTOL STREET.

BENCH MARK NO. F2-8 ELEV. 34.87
THE N.E. CORNER OF SQUARE MANHOLE RIM ON THE NORTH SIDE OF ALTON AVE. APPROX 50' WEST OF F02 CHANNEL.

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS		
MARK	DATE	DESCRIPTION
P	11-72	Permit 11472
A	1-74	As Built

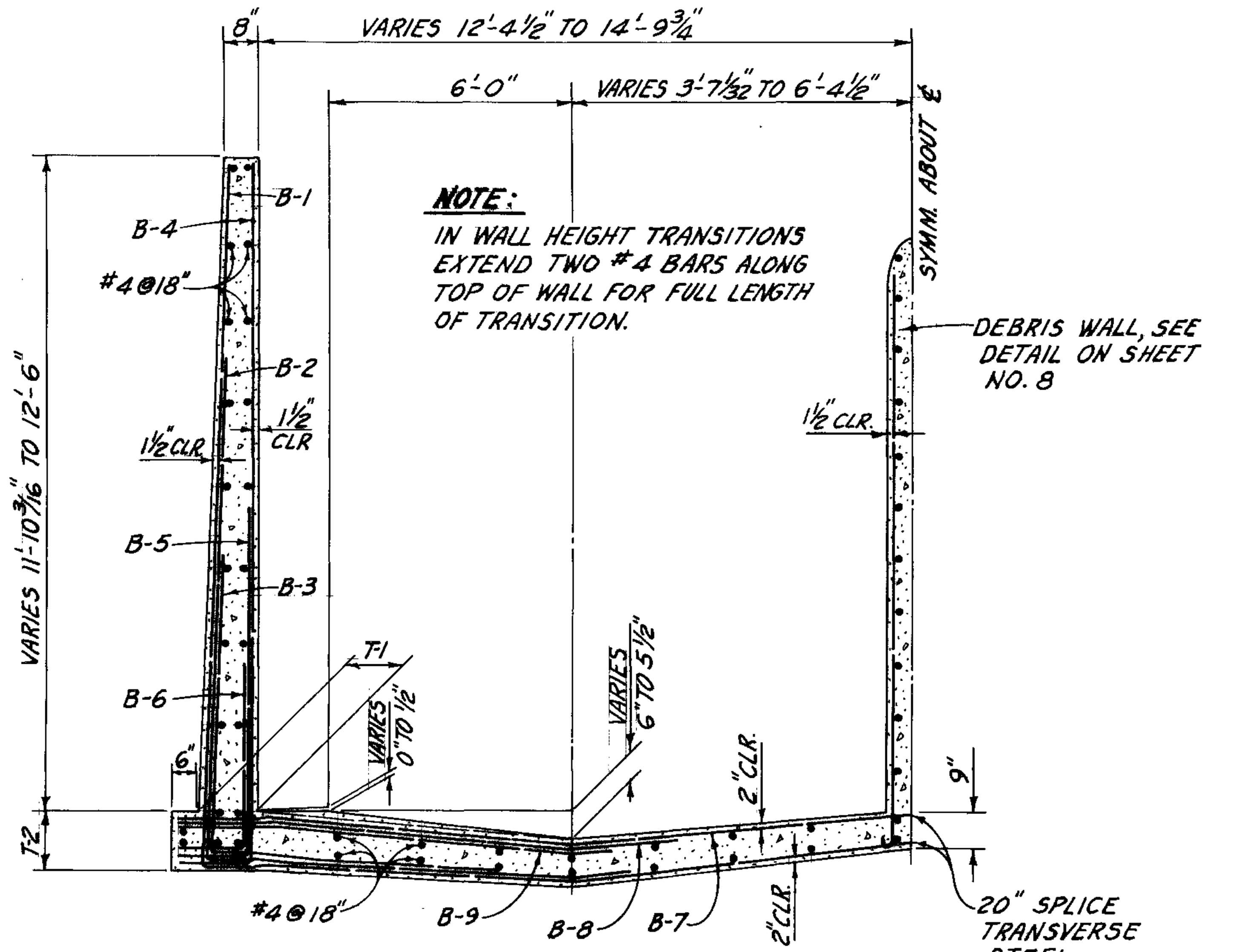
ORANGE COUNTY FLOOD CONTROL DISTRICT

SANTA ANA-GARDENS CHANNEL

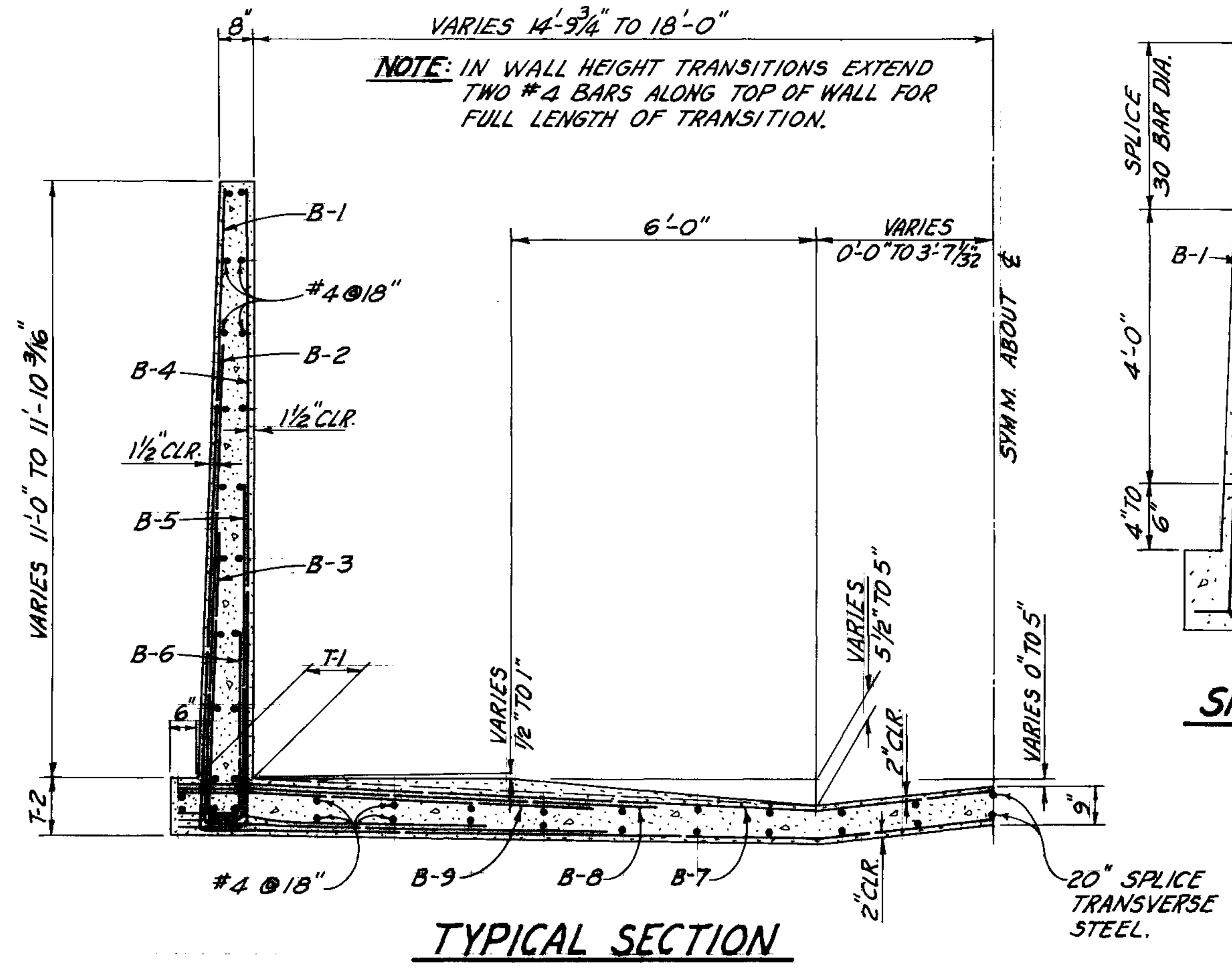
BRISTOL STREET CROSSING

DESIGNED U.G.F.
DRAWN G.E.V. CHECKED R.E.M.
SUBMITTED V.T.N. ORANGE CO.
RECOMMENDED

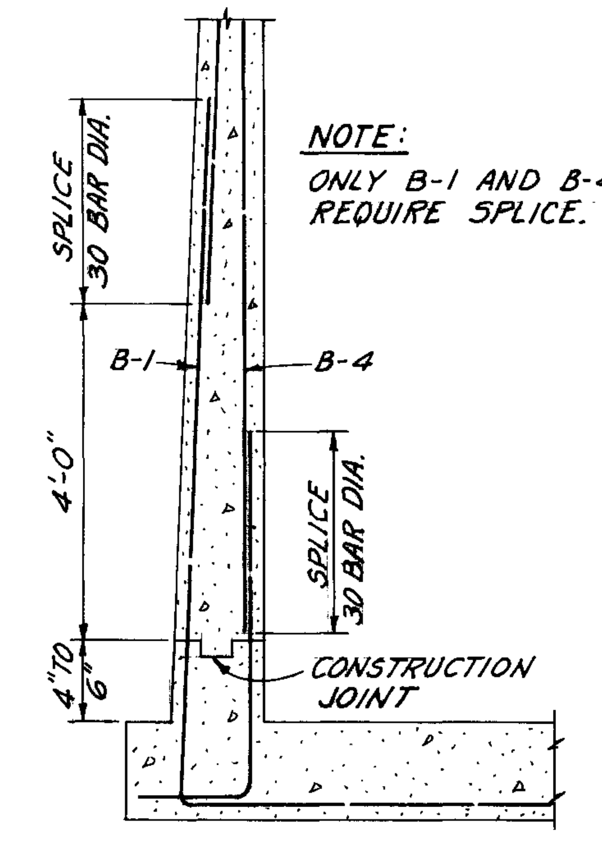
SCALE	DATE	DWG. NO.
AS SHOWN	MAR. 1972	F02 - 701 - 1 - 4



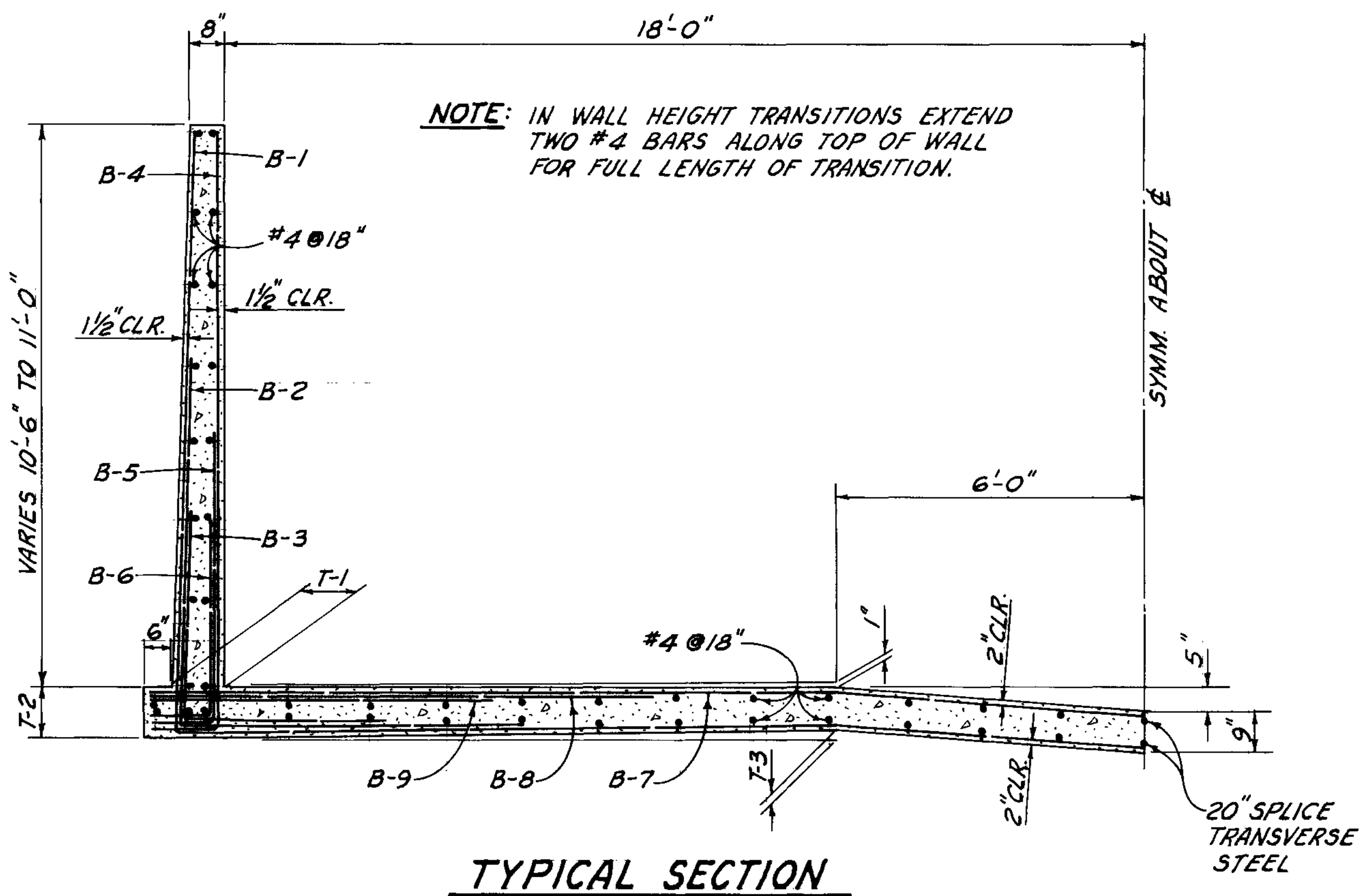
TYPICAL SECTION
STA. 39+59.8 TO STA. 39+72.8
SCALE: 3/8"=1'-0"



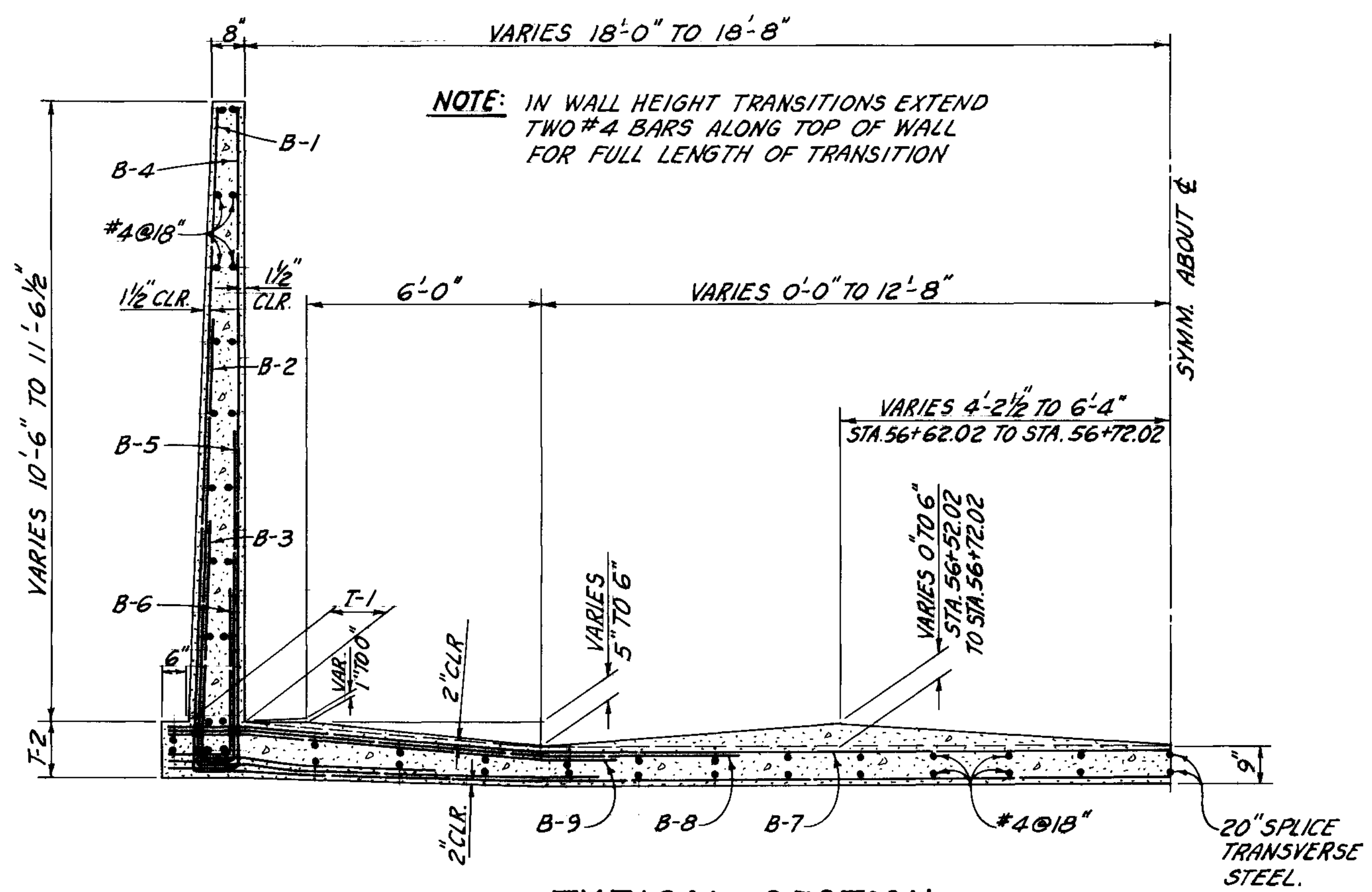
TYPICAL SECTION
STA. 39+72.8 TO STA. 39+89.8
SCALE: 3/8"=1'-0"



SPLICING DETAIL
NO SCALE



TYPICAL SECTION
STA. 39+89.8 TO STA. 56+42.02
SCALE: 3/8"=1'-0"



TYPICAL SECTION
STA. 56+42.02 TO STA. 56+72.02
SCALE: 3/8"=1'-0"

STRUCTURAL DATA

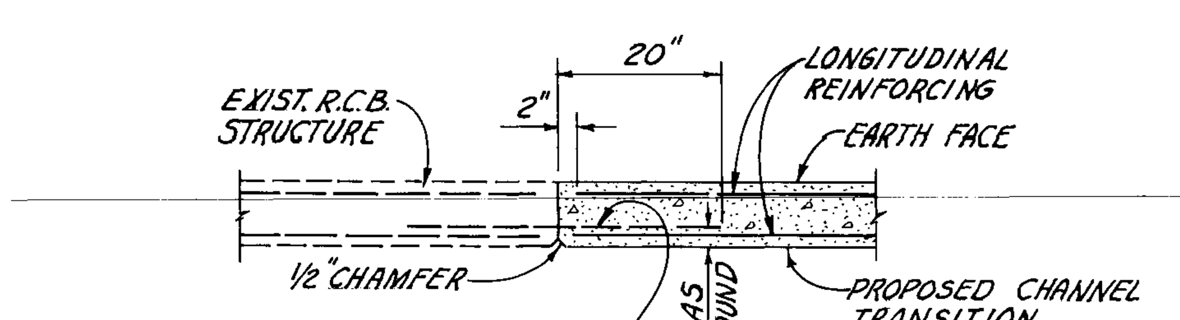
	REINFORCING STEEL									THICKNESS		
	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	T-1	T-2	T-3
STA. 39+59.8 TO STA. 39+72.8	#4@10"	#6@10"	#7@10"	#4@13"	#5@13"	#5@13"	#5@13"	#4@13"	#6@13"	1'-2"	1'-2"	—
HORIZONTAL LENGTH	VARIES 15'-0" TO 17'-5"	8'-3"	5'-6"	1'-4"	1'-4"	1'-4"	VARIES 15'-6" TO 17'-11"	9'-7"	8'-3"			
VERTICAL LENGTH	VARIES 12'-8" TO 13'-4"	9'-8"	5'-10"	VARIES 12'-8" TO 13'-4"	6'-10"	3'-9"	—	—	—			
STA. 39+72.8 TO STA. 39+89.8	#4@10"	#6@10"	#7@10"	#4@13"	#5@13"	#5@13"	#5@13"	#4@13"	#6@13"	1'-2"	1'-2"	—
HORIZONTAL LENGTH	VARIES 17'-5" TO 20'-8"	8'-3"	5'-6"	1'-4"	1'-4"	1'-4"	VARIES 17'-11" TO 21'-2"	9'-7"	8'-3"			
VERTICAL LENGTH	VARIES 11'-10" TO 12'-8"	9'-8"	5'-10"	VARIES 11'-10" TO 12'-8"	6'-10"	3'-9"	—	—	—			
STA. 39+89.8 TO STA. 47+00	#5@11"	#6@11"	#6@11"	#4@17"	#4@17"	#6@17"	#4@14"	#5@14"	#5@14"	1'-0"	1'-1"	2"
HORIZONTAL LENGTH	20'-6"	6'-9"	4'-1"	1'-3"	1'-3"	1'-3"	21'-0"	9'-11"	6'-9"			
VERTICAL LENGTH	11'-9"	7'-3"	4'-1"	11'-9"	5'-10"	4'-4"	—	—	—			
STA. 47+00 TO STA. 47+15	#5@11"	#6@11"	#6@11"	#4@17"	#4@17"	#6@17"	#4@14"	#5@14"	#5@14"	1'-0"	1'-1"	2"
HORIZONTAL LENGTH	20'-6"	6'-9"	4'-1"	1'-3"	1'-3"	1'-3"	21'-0"	9'-11"	6'-9"			
VERTICAL LENGTH	VARIES 11'-3" TO 11'-9"	7'-3"	4'-1"	VARIES 11'-3" TO 11'-9"	5'-10"	4'-4"	—	—	—			
STA. 47+15 TO STA. 56+42.02	#5@9"	#5@9"	#5@9"	#4@18"	#5@18"	#5@18"	#4@15"	#5@15"	#5@15"	1'-0"	1'-0"	2"
HORIZONTAL LENGTH	20'-6"	5'-9"	3'-7"	1'-2"	1'-2"	1'-2"	21'-0"	9'-7"	6'-5"			
VERTICAL LENGTH	11'-2"	6'-0"	3'-6"	11'-2	5'-8"	3'-2"	—	—	—			
STA. 56+42.02 TO STA. 56+72.02	#5@12"	#7@12"	#7@12"	#4@13"	#5@13"	#5@13"	#4@15"	#5@15"	#7@15"	1'-2"	1'-2"	—
HORIZONTAL LENGTH	VARIES 20'-8" TO 21'-4"	8'-2"	4'-10"	1'-4"	1'-4"	1'-4"	VARIES 21'-2" TO 21'-10"	11'-6"	9'-0"			
VERTICAL LENGTH	VARIES 11'-4" TO 12'-5"	9'-2"	5'-0"	VARIES 11'-4" TO 12'-5"	6'-10"	3'-9"	—	—	—			

CONSTRUCTION NOTES

1. SPLICES IN REINFORCING STEEL SHALL BE 30 BAR DIAMETERS UNLESS OTHERWISE SHOWN
2. ALL EXPOSED EDGES SHALL HAVE A 3/4" CHAMFER.
3. MIN. WAITING PERIOD BETWEEN ADJACENT R.C. INVERT POURS SHALL BE 4 HOURS.
4. TRANSVERSE CONSTRUCTION JOINTS SHALL BE PLACED AT ALL GRADE BREAKS, CHANGES IN BASE WIDTH AND CHANGES IN WALL HEIGHT.
5. TRANSVERSE CONSTRUCTION JOINTS SHALL BE IN THE SAME PLANE ACROSS ENTIRE STRUCTURE.
6. BUNDLE REINFORCING BARS TO CLEAR WEEPHOLES BY 1½".

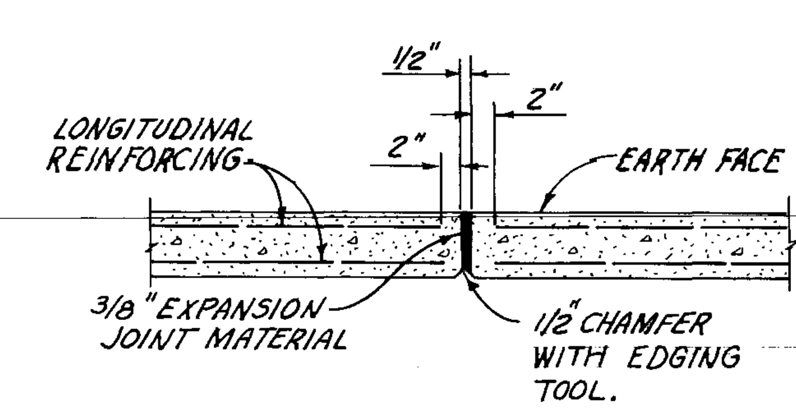
DESIGN CRITERIA FOR ALL REINFORCED CONCRETE:

$f'c$ = 3,000 PSI
fc = 1,200 PSI
fs = 20,000 PSI
v = 90 PSI SHEAR
u = 300 PSI BOND



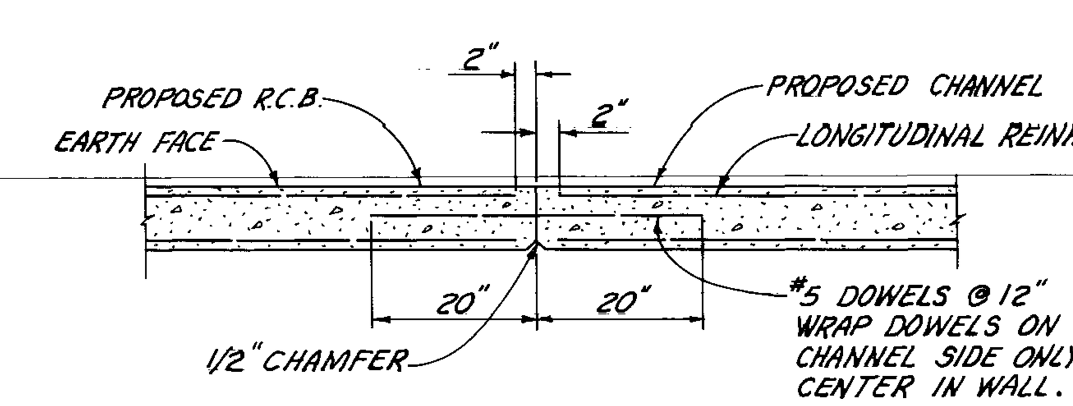
WHEN REMOVING EXIST. CONC. TRANS. SALVAGE 20"± OF EXIST. #5 DOWELS, CLEAN AND WRAP DOWELS.

CONSTRUCTION JOINT I DETAIL
NO SCALE



CONSTRUCTION JOINT II DETAIL
NO SCALE

NOTE:
CONST. JOINT II TO BE AT INTERVALS OF NOT LESS THAN 10' NOR MORE THAN 50'. JOINT TO BE IN THE SAME PLANE ACROSS ENTIRE STRUCTURE. TRANSVERSE CONST. JOINTS SHALL NOT BE PLACED WITHIN 30' OF INLET OPENING. ONLY VERTICAL WALL JOINTS SHALL BE PAINTED WITH A TACK COAT OF ASPHALT PAINT.



CONSTRUCTION JOINT III DETAIL
NO SCALE

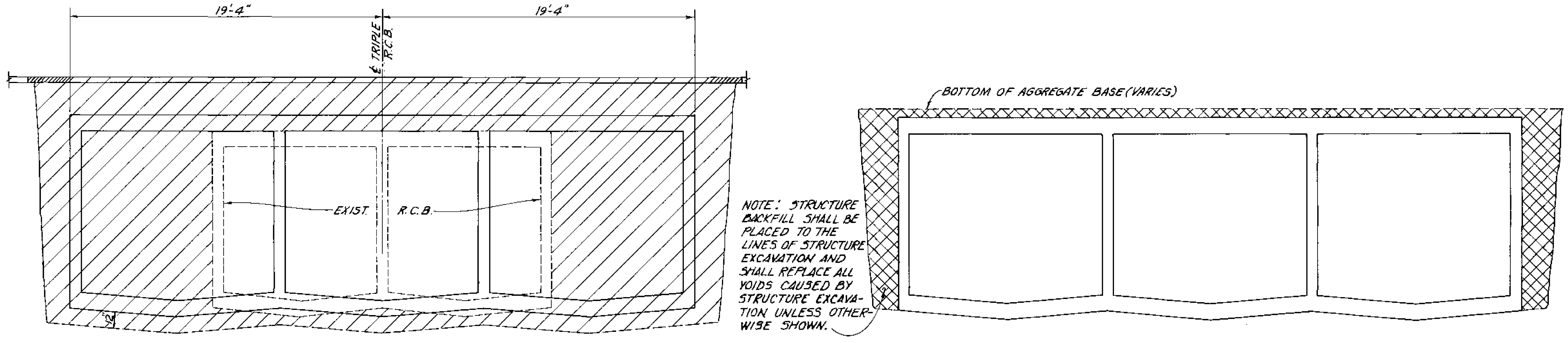
0 1 2 3
3 INCHES ON ORIGINAL PLAN

PRELIMINARY REVISION CODE Disregard Prints Bearing Earlier Codes		
REVISIONS		**ORANGE COUNTY FLOOD CONTROL DISTRICT**
MARK	DATE	DESCRIPTION
A	1-74	As Built
DESIGNED U.G.F.		SANTA ANA-GARDENS CHANNEL
DRAWN G.E.V.	CHECKED R.E.M.	STRUCTURAL DETAILS
SUBMITTED V.T.N. ORANGE CO.		RECOMMENDED
SCALE AS SHOWN	DATE MAR. 1972	DWG. NO. F02-701-1-A

F0001-176

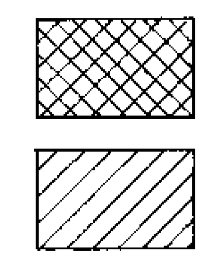
R.C. BOX CULVERT GENERAL NOTES

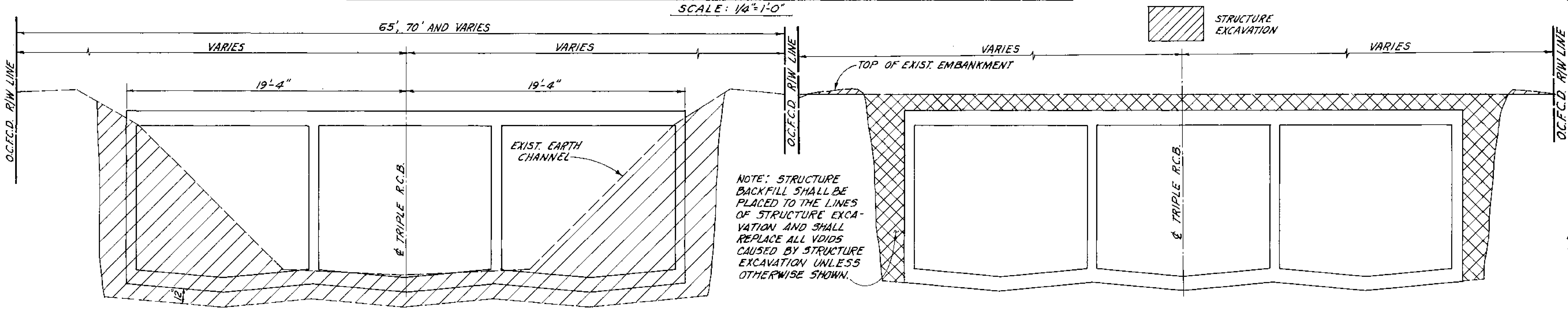
1. ALL EXPOSED EDGES SHALL HAVE 3/4" CHAMFER.
2. ALL REINF. BARS SHALL BE PLACED SYMMETRICAL ABOUT ℄ OF CULVERT.
3. REINFORCEMENT EMBEDMENT IS 1½" CLEAR, EXCEPT AS NOTED.
4. SPLICES IN REINFORCING SHALL BE 30 BAR DIAMETERS UNLESS OTHERWISE SHOWN.
5. WHEN THE SIDE WALLS & DECK ARE POURED MONOLITHICALLY, THE SIDE WALLS SHALL BE POURED COMPLETELY FIRST. AFTER A SUITABLE TIME, TO BE DETERMINED BY THE ENGINEER (30 MINUTES MINIMUM), THE DECK MAY BE POURED.
6. BUNDLE REINF. BARS TO CLEAR WEEPHOLES BY 1½".



EARTHWORK LIMITS AT EXISTING R.C. BOX

SCALE: 1/4" = 1'-0"

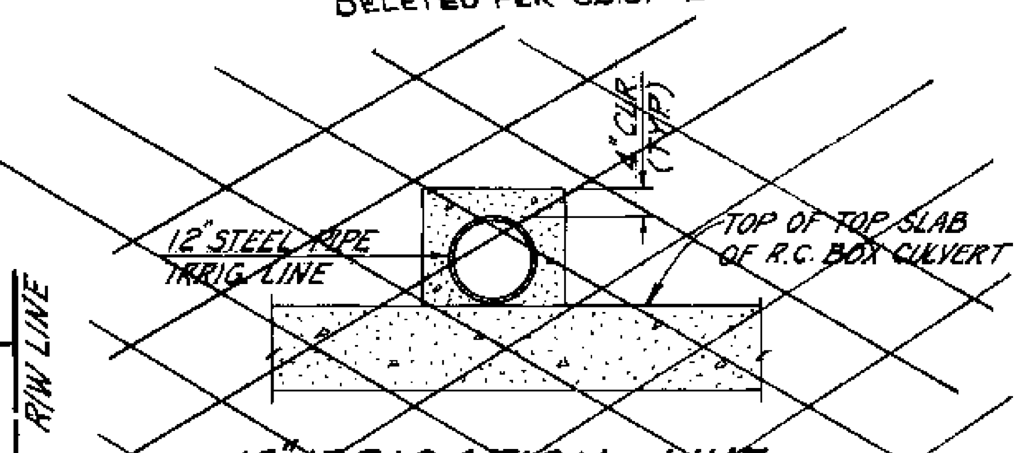




EARTHWORK LIMITS AT EXISTING EARTH CHANNEL

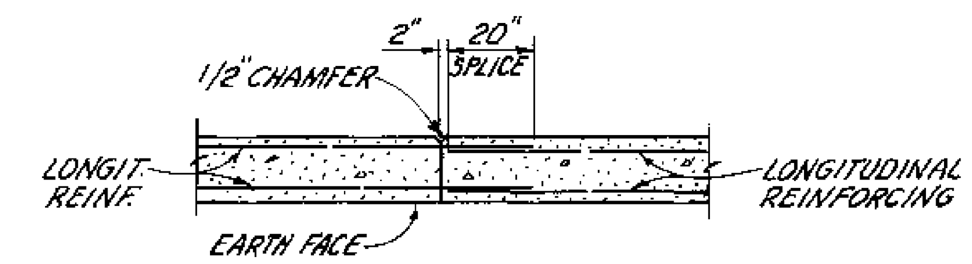
SCALE: 1/2" = 1'-0"

DELETED PER C.C.O. #2



12" IRRIGATION LINE ENCASEMENT DETAIL

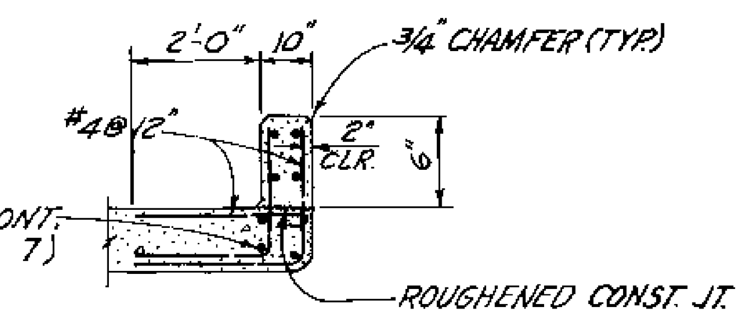
SCALE: 1/2" = 1'-0"



NOTE: CONST. JOINT TO BE AT INTERVALS NOT LESS THAN 10' NOR MORE THAN 50'. JOINT TO BE IN THE SAME PLANE ACROSS ENTIRE STRUCTURE.

R.C. BOX CULVERT TRANSVERSE CONST. JOINT DETAIL

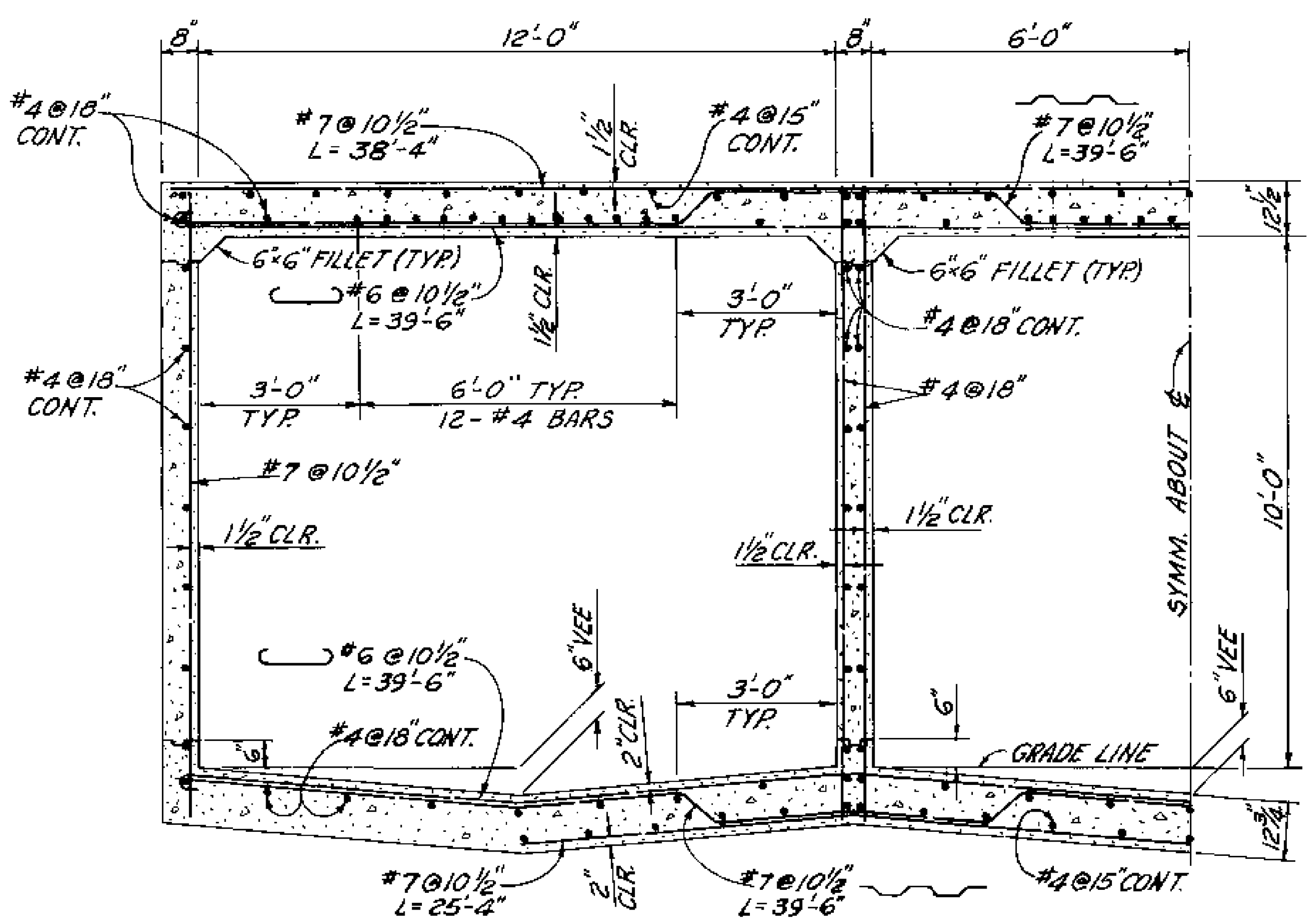
NO SCALE



NOTE: CULVERT REINF. NOT SHOWN

PARAPET SECTION

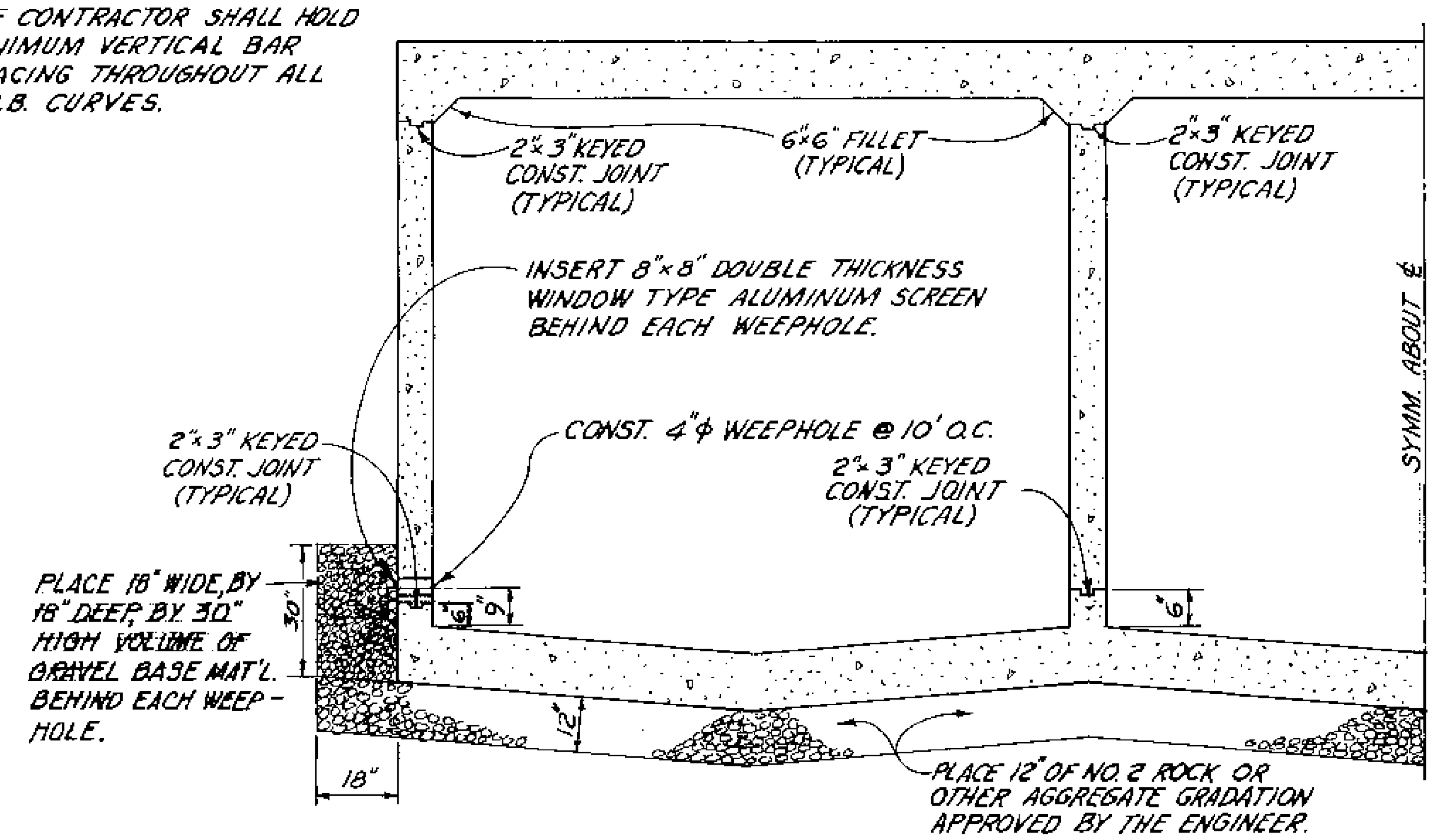
NO SCALE



TYPICAL SECTION TRIPLE 12'-0"(W) × 10'-0"(H) R.C.B.

SCALE: 3/8" = 1'-0"

NOTE:
THE CONTRACTOR SHALL HOLD MINIMUM VERTICAL BAR SPACING THROUGHOUT ALL R.C.B. CURVES.



TYPICAL BEDDING & CONST. JOINT DETAIL

SCALE: 3/8" = 1'-0"

DESIGN CRITERIA FOR ALL REINFORCED CONCRETE:

f'_c = 3,000 PSI
f_c = 1,200 PSI
f_s = 20,000 PSI
v = 90 PSI SHEAR
u = 300 PSI BOND

3 INCHES ON ORIGINAL PLAN

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS

MARK	DATE	DESCRIPTION
A	1-74	As Built

ORANGE COUNTY FLOOD CONTROL DISTRICT

SANTA ANA-GARDENS CHANNEL

TRIPLE R.C. BOX STRUCTURAL & EARTHWORK DETAILS

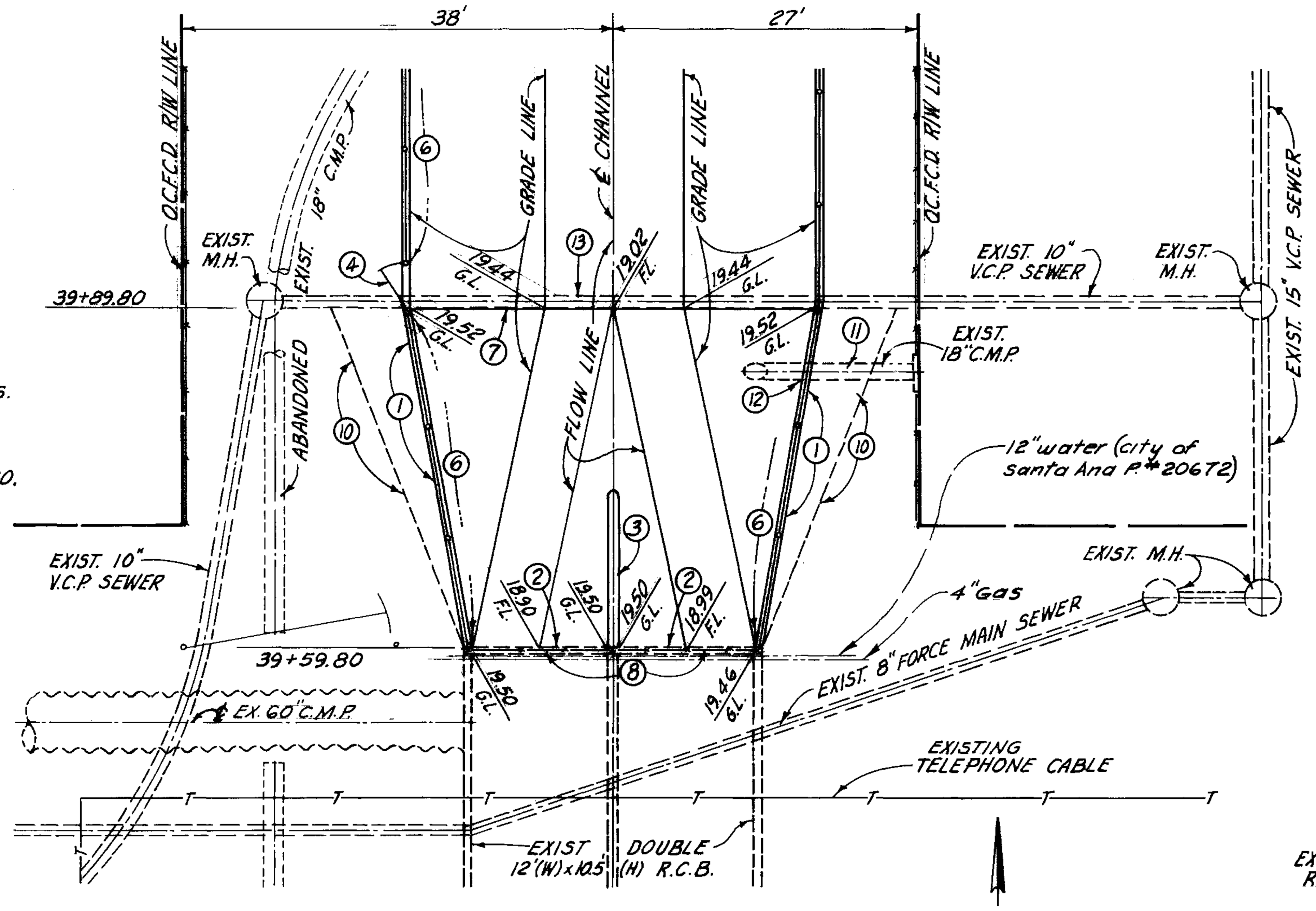
DESIGNED U.G.F.
DRAWN G.E.V. CHECKED R.E.M.
SUBMITTED V.T.N. ORANGE CO.
RECOMMENDED

SCALE	DATE	DWG. NO.
AS SHOWN	MAR 1972	F02-701-1-A

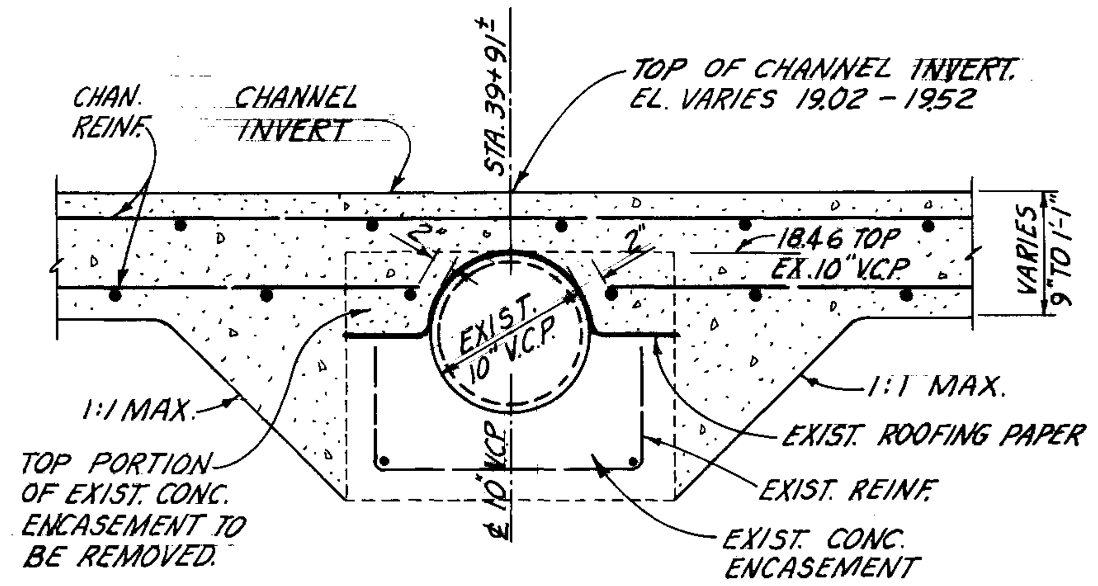
F0001-176

CONSTRUCTION NOTES

1. CONST. 30 L.F. R.C. TRANSITION, SEE SHEET 6 FOR REINF. DETAILS.
2. JOIN EXIST. R.C.B. STRUCTURE, SEE CONSTRUCTION JOINT I DETAIL ON SHEET 6.
3. CONST. R.C. DEBRIS WALL, SEE DETAIL ON THIS SHEET.
4. CONST. 4' WIDE, SINGLE FRAME CHAIN LINK GATE, SEE DETAIL ON SHEET 11.
5. JOIN EXIST. R.C.B. STRUCTURE, SEE CONSTRUCTION JOINT IV DETAIL ON THIS SHEET.
6. CONST. TYPE I CHAIN LINK FENCE, SEE DETAILS ON SHEET 11.
7. CONST. JOINT II, SEE DETAIL ON SHEET 6.
8. EXISTING CHAIN LINK FENCE, PROTECT IN PLACE.
9. PROTECT IN PLACE EXISTING CHAIN LINK FENCE AND GATES. REMOVE EXISTING BARB WIRE FENCE.
10. REMOVE EXIST. CONC. TRANSITION.
11. CONST. NEW 18" C.M.P. TO JOIN CHANNEL WALL AT F.L. ELEV. 28.30. REMOVE EXISTING PIPE AS REQUIRED AND JOIN.
12. JOIN INLET TO CONC. WALL, SEE DETAIL ON THIS SHEET.
13. ENCASE EXIST. 10" V.C.P. SEWER INTO CHANNEL SLAB PER DETAIL ON THIS SHEET.
14. REMOVE EXIST. BULKHEAD PLANKS.



PLAN
TRANSITION AT SUNFLOWER AVENUE
SCALE: 1" = 10'

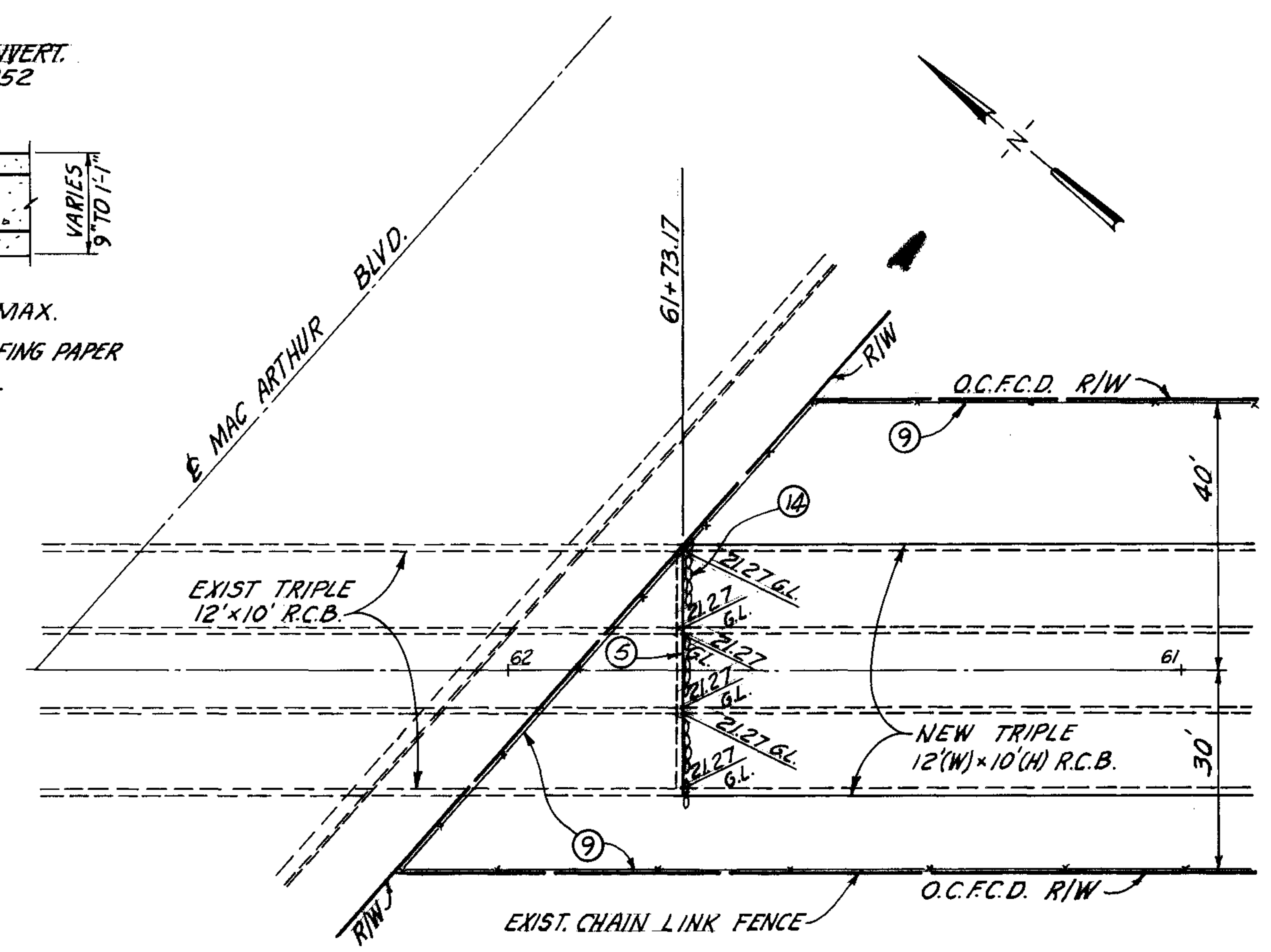


NOTES:

CAREFULLY REMOVE TOP PORTION OF EXIST. ENCASEMENT AS SHOWN.

CUT LONGITUDINAL CHANNEL SLAB REINFORCING TO CLEAR EXIST. 10" V.C.P. BY 2"

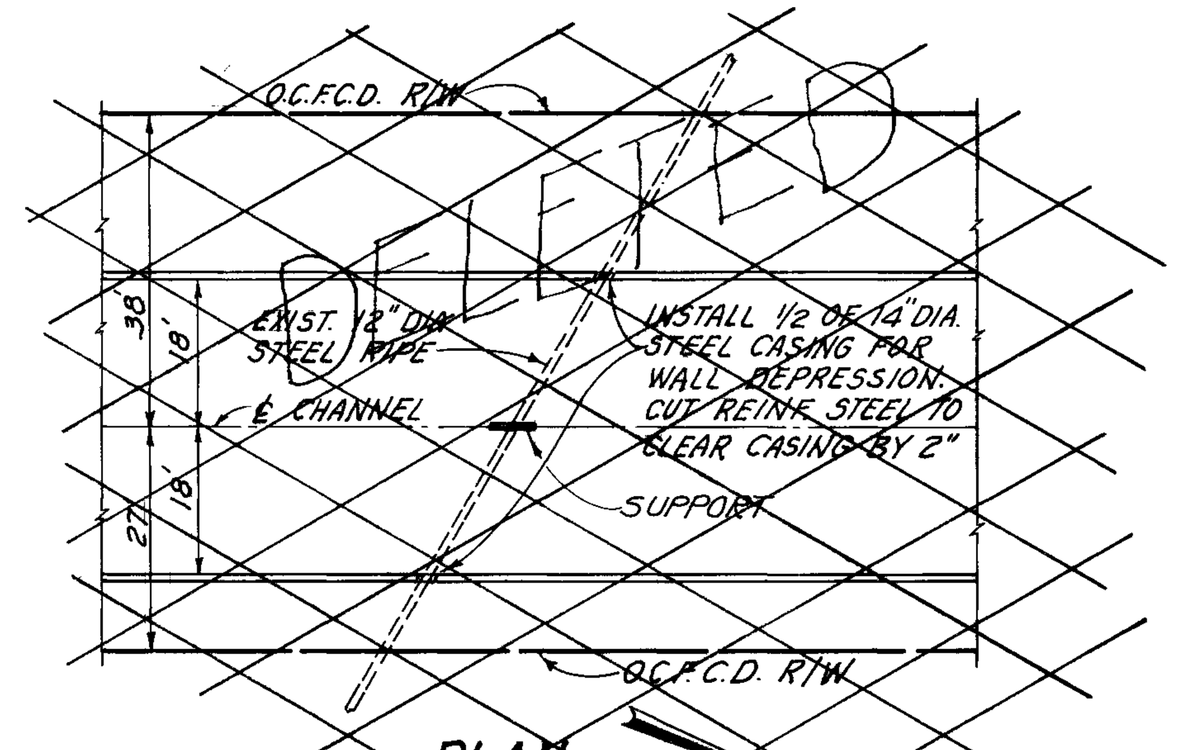
10" V.C.P. ENCASEMENT DETAIL
NO SCALE



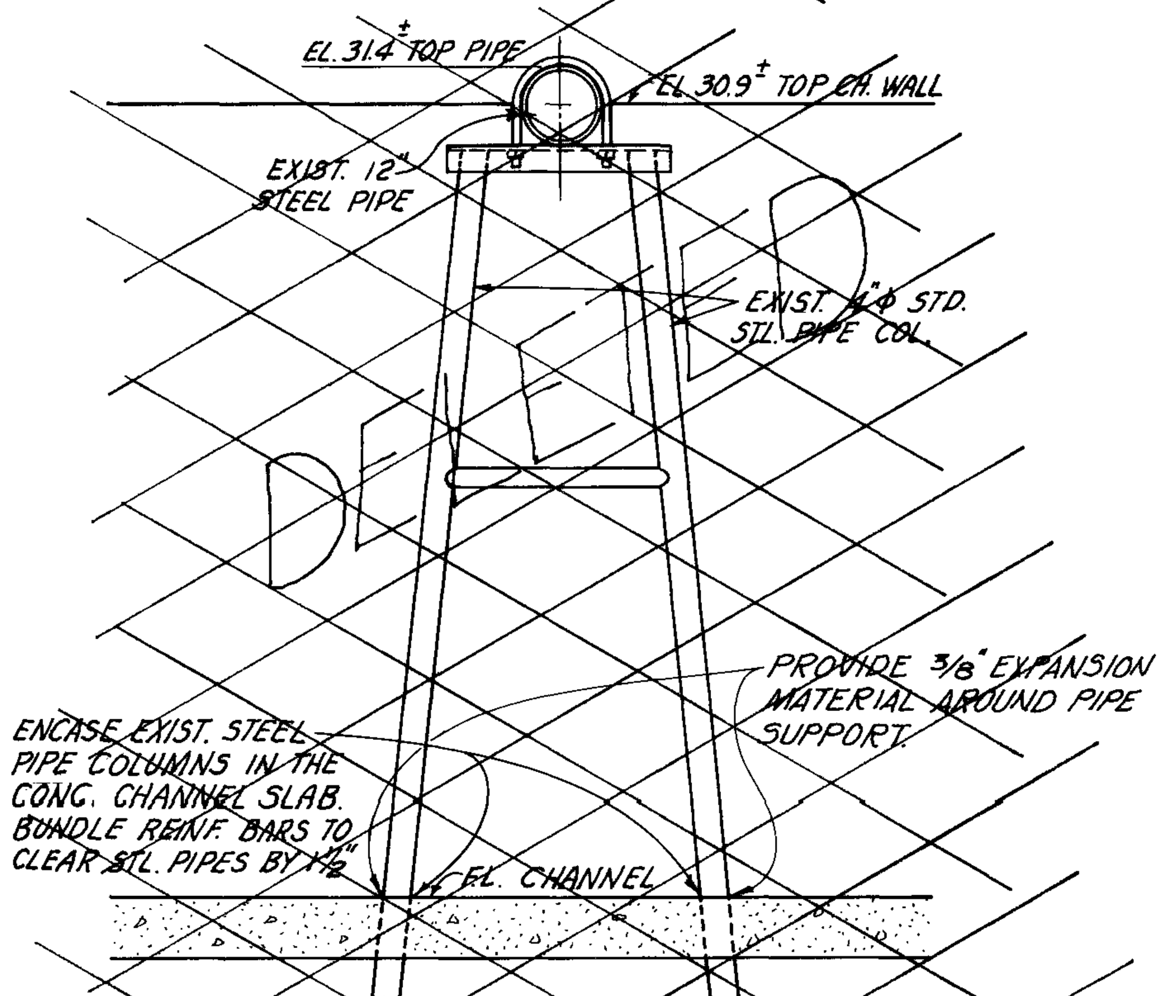
PLAN
SCALE: 1" = 20'

NOTE:

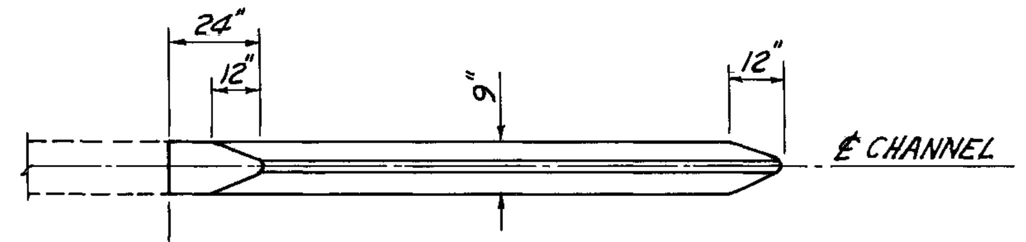
TRANSVERSE REINF. NOT SHOWN. THE EXIST. REINF. SHALL BE THOROUGHLY CLEANED AND EXIST. METAL SHALL BE FREE FROM RUST, MUD, OIL OR ANY FOREIGN MATTER THAT WILL DESTROY OR REDUCE THE BOND.



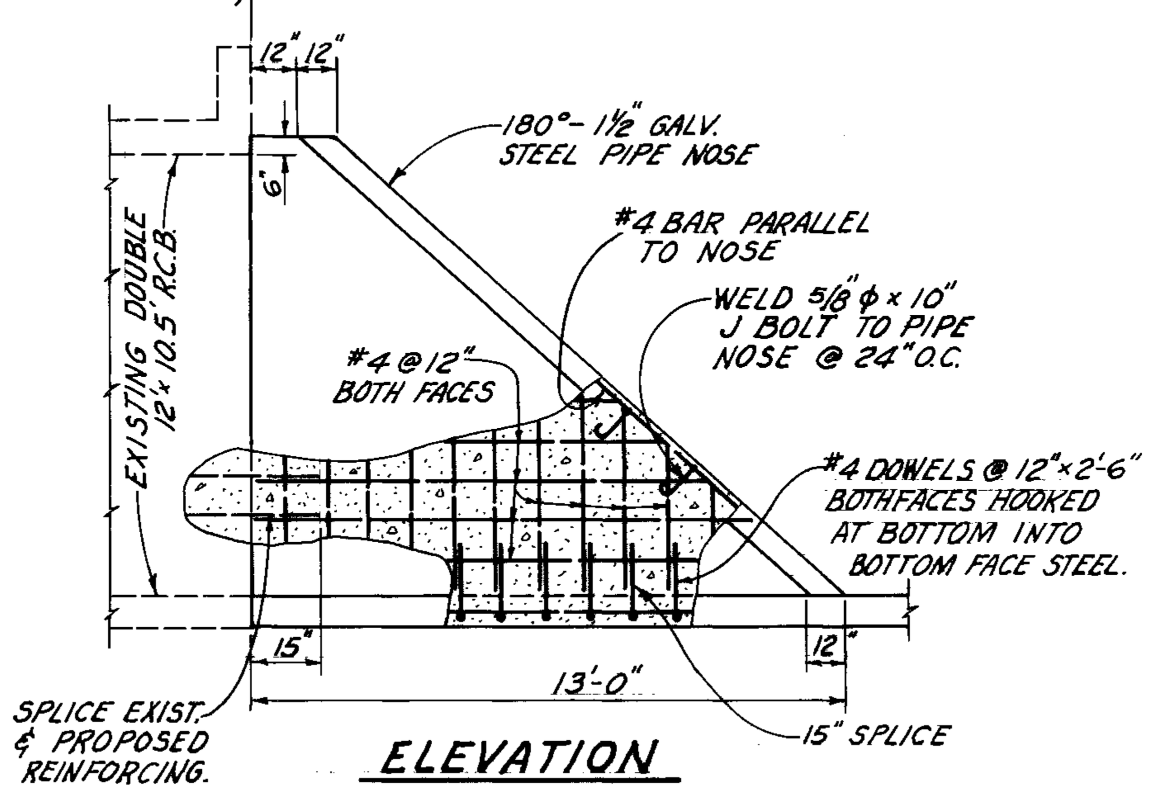
PLAN



ELEVATION
DETAIL IRRIGATION CROSSING
STA. 50+70±
NO SCALE



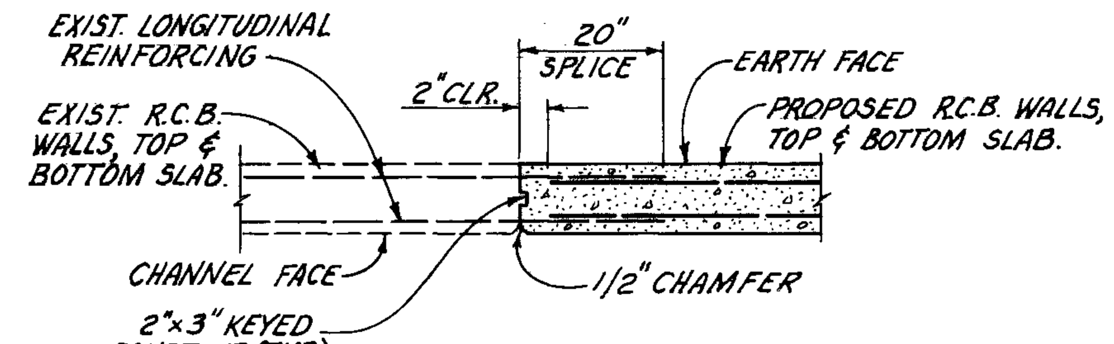
PLAN



ELEVATION
DEBRIS WALL
NO SCALE

NOTE

WHEN REMOVING EXIST. DEBRIS WALL 15" (AS SHOWN) OF THE EXIST. REINFORCING, SHALL BE THOROUGHLY CLEANED & EXIST. METAL SHALL BE FREE FROM RUST, MUD, OIL OR ANY FOREIGN MATTER THAT WILL DESTROY OR REDUCE THE BOND.

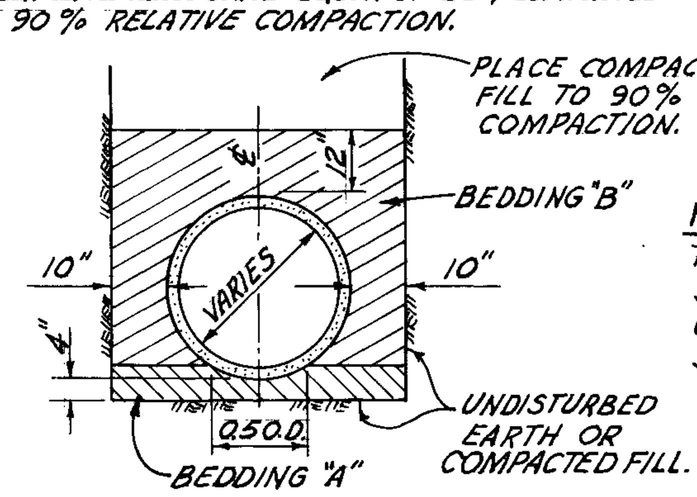


TYPE IV CONSTRUCTION JOINT DETAIL
NO SCALE

NOTE:

BEDDING "A" SHALL BE COMPOSED OF SAND, NO 3 CRUSHED ROCK OR GRAVEL OR OTHER GRANULAR MATL. APPVD. BY THE ENGR. W/MIN. SAND EQUIV. OF 60 & COMPACTED TO 90% RELATIVE COMPACTION.

BEDDING "B" SHALL BE COMPOSED OF SAND OR OTHER GRANULAR MATERIAL APPROVED BY THE ENGR. WITH MIN. SAND EQUIV. OF 30 & COMPACTED TO 90% RELATIVE COMPACTION.



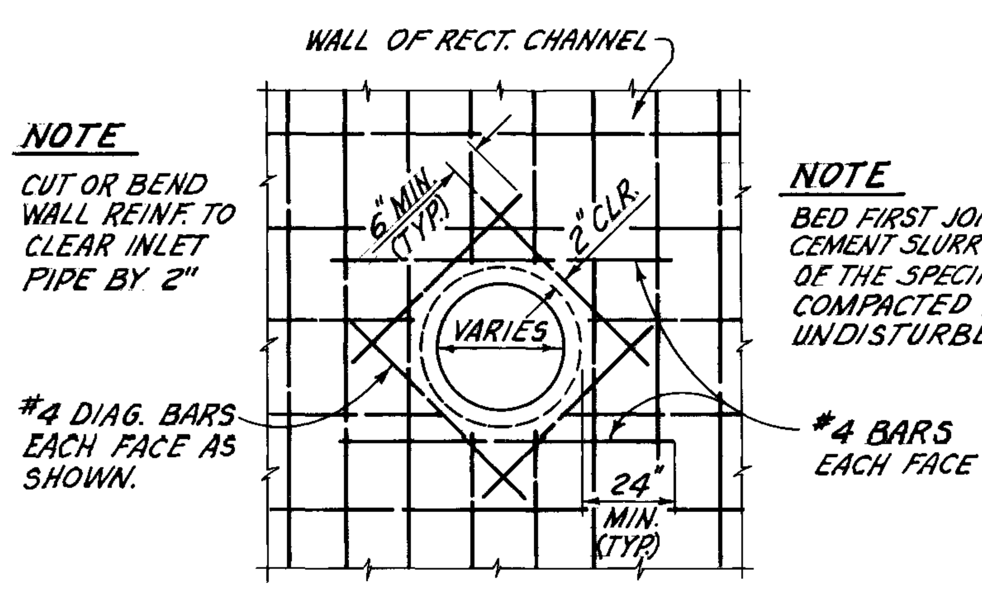
BEDDING DETAIL
NO SCALE

NOTE:

THE CONTRACTOR MAY AS AN OPTION USE SAND - CEMENT SLURRY BACKFILL CASE I PER SECTION 28-23 OF THE SPECIFICATIONS.

NOTE

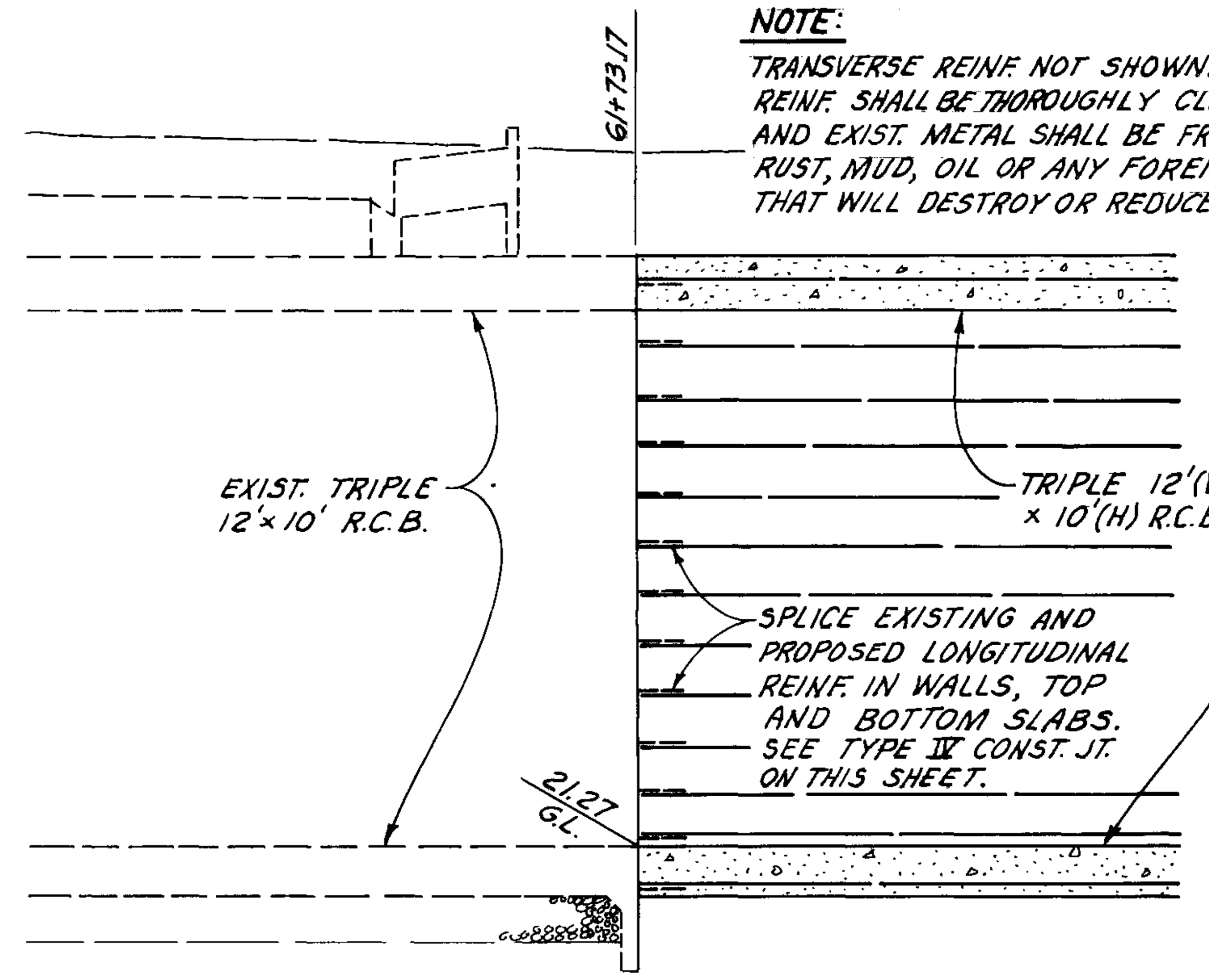
CUT OR BEND WALL REINF. TO CLEAR INLET PIPE BY 2"



TYPICAL INLET DETAIL
NO SCALE

NOTE

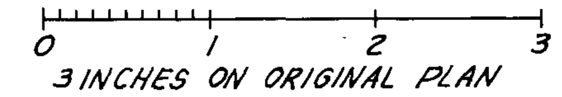
BED FIRST JOINT OF PIPE IN SAND-CEMENT SLURRY PER CASE I SECT. 28-23 OF THE SPECIFICATIONS, ON ROCK COMPACTED FILL OR UNDISTURBED EARTH.



PROFILE
NO SCALE

MAC ARTHUR BLVD. R.C.B.

(CONSTRUCTION NOTES - UPPER LEFT CORNER)



DATUM = O.C.F.C.D. = O.C.S. ADJUSTED 1957

BENCH MARK NO. F2-2 ELEV. 34.70.

A SPIKE IN P.P. #599104E, ON SOUTH SIDE OF SUNFLOWER AVE., APPROX. 100' EAST OF EXISTING F02 R.C.B. AND 700' EAST OF BRISTOL STREET.

BENCH MARK NO. F2-8 ELEV. 34.87

THE N.E. CORNER OF SQUARE MANHOLE RIM ON THE NORTH SIDE OF ALTON AVE. APPROX. 50' WEST OF F02 CHANNEL.

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS

MARK	DATE	DESCRIPTION
A	1-74	As Built

ORANGE COUNTY FLOOD CONTROL DISTRICT

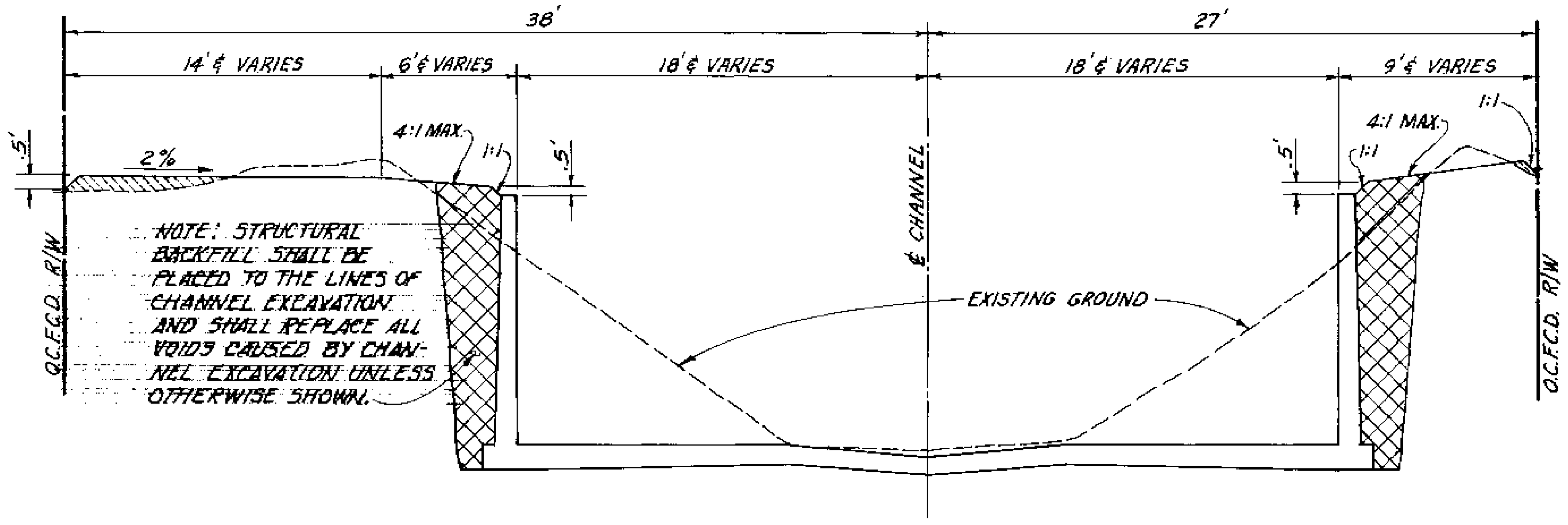
SANTA ANA - GARDENS CHANNEL

TRANSITION DETAIL AT SUNFLOWER AVE., MACARTHUR BLVD., STRUCTURAL AND MISCELLANEOUS DETAILS

DESIGNED U.G.F.
DRAWN G.E.V. CHECKED R.E.M.
SUBMITTED V.T.N. ORANGE CO.
RECOMMENDED

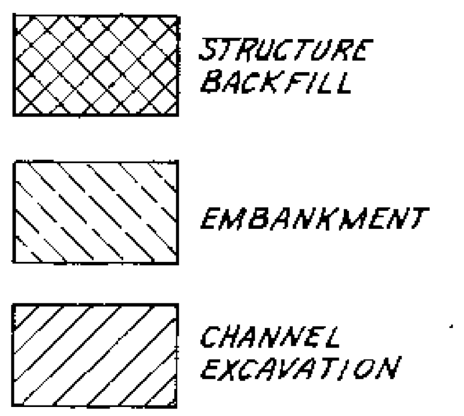
SCALE	DATE	DWG. NO.
AS SHOWN	MAR. 1972	F02 - 701 - 1 - A

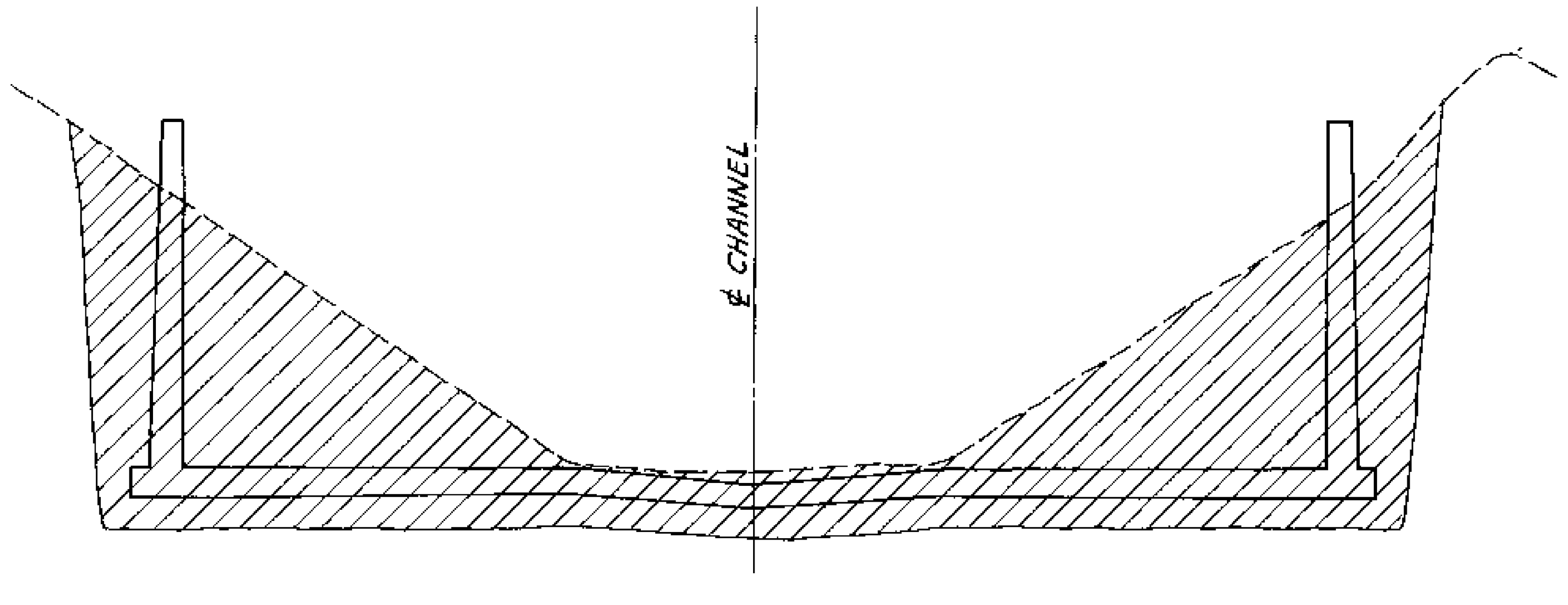
F0001-176



EARTHWORK LIMITS

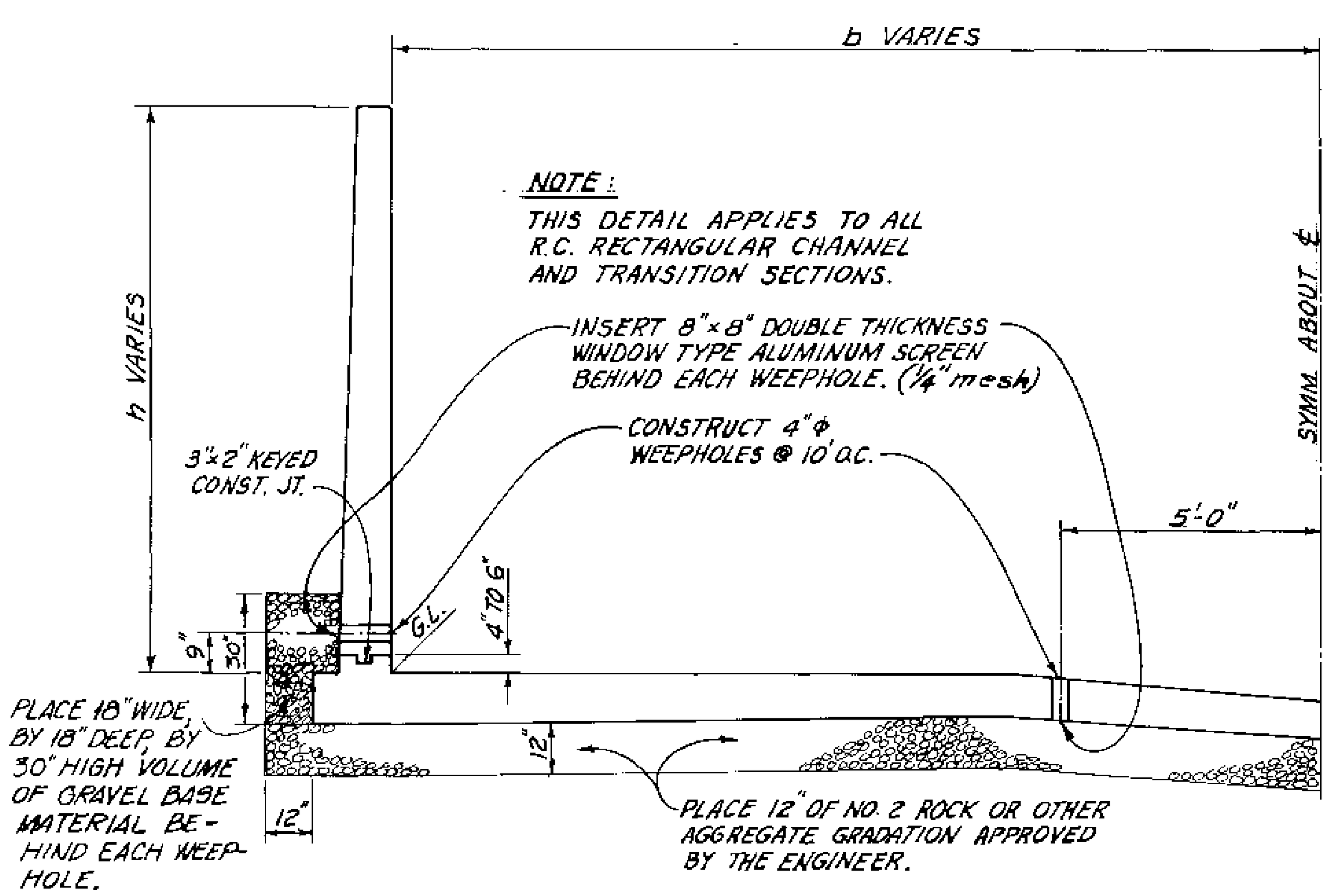
SCALE: 1"=5'





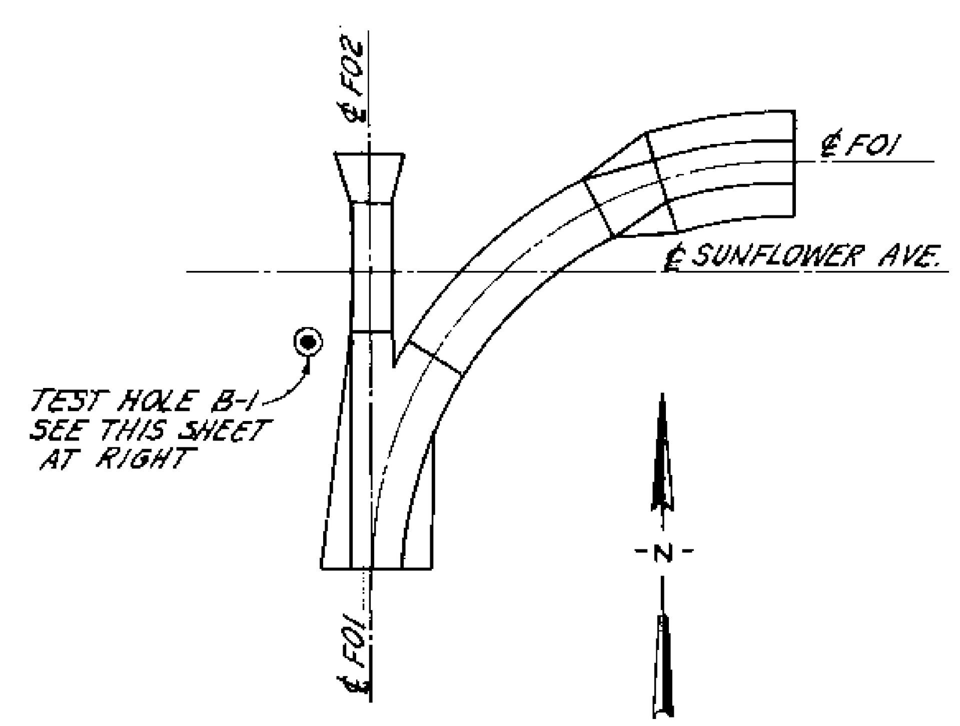
EARTHWORK LIMITS

SCALE: 1"=5'



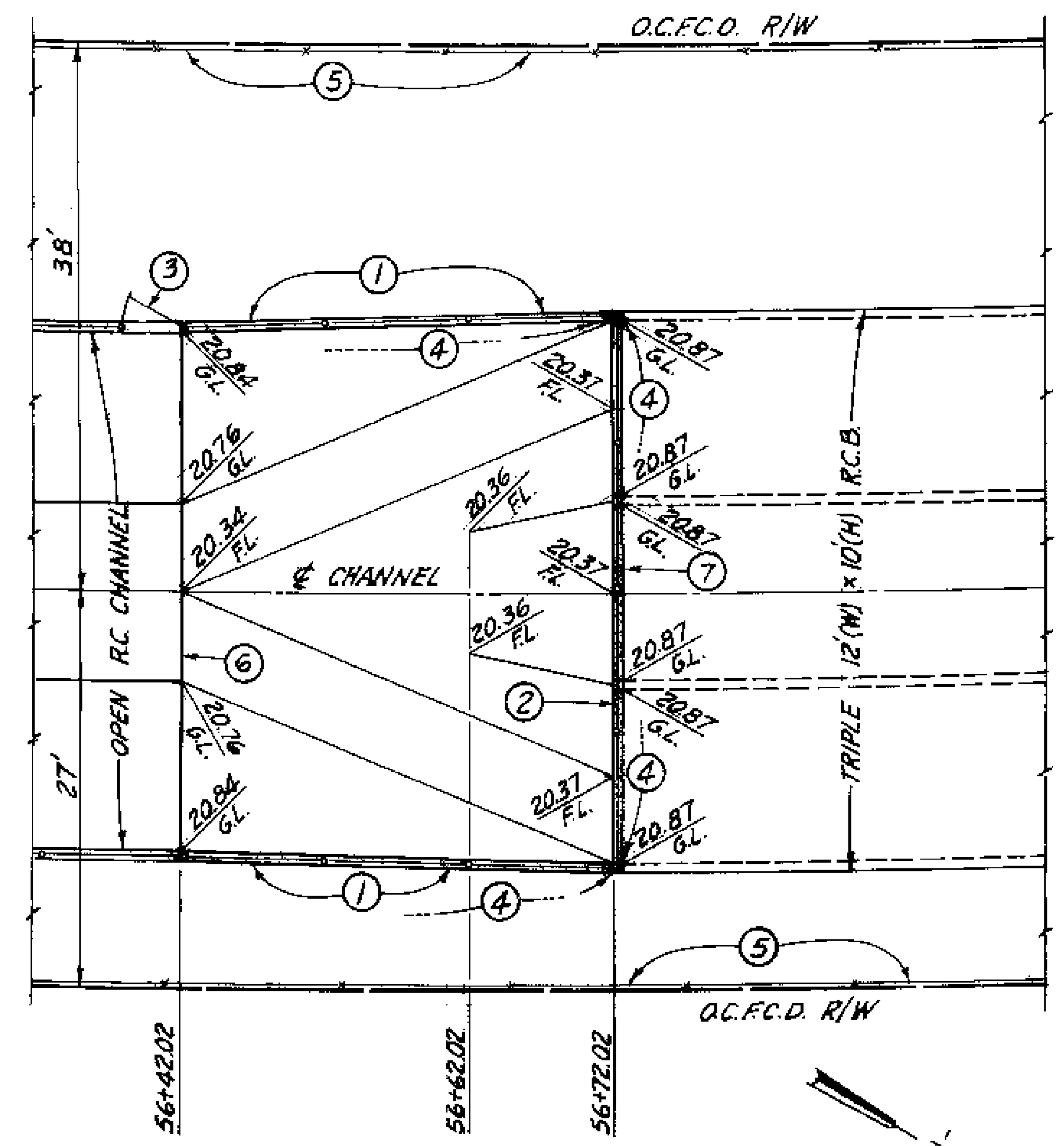
TYP. BEDDING & CONST JOINT DETAIL

SCALE: 3/8"=1'-0"



PLAN

SCALE: 1"=100'

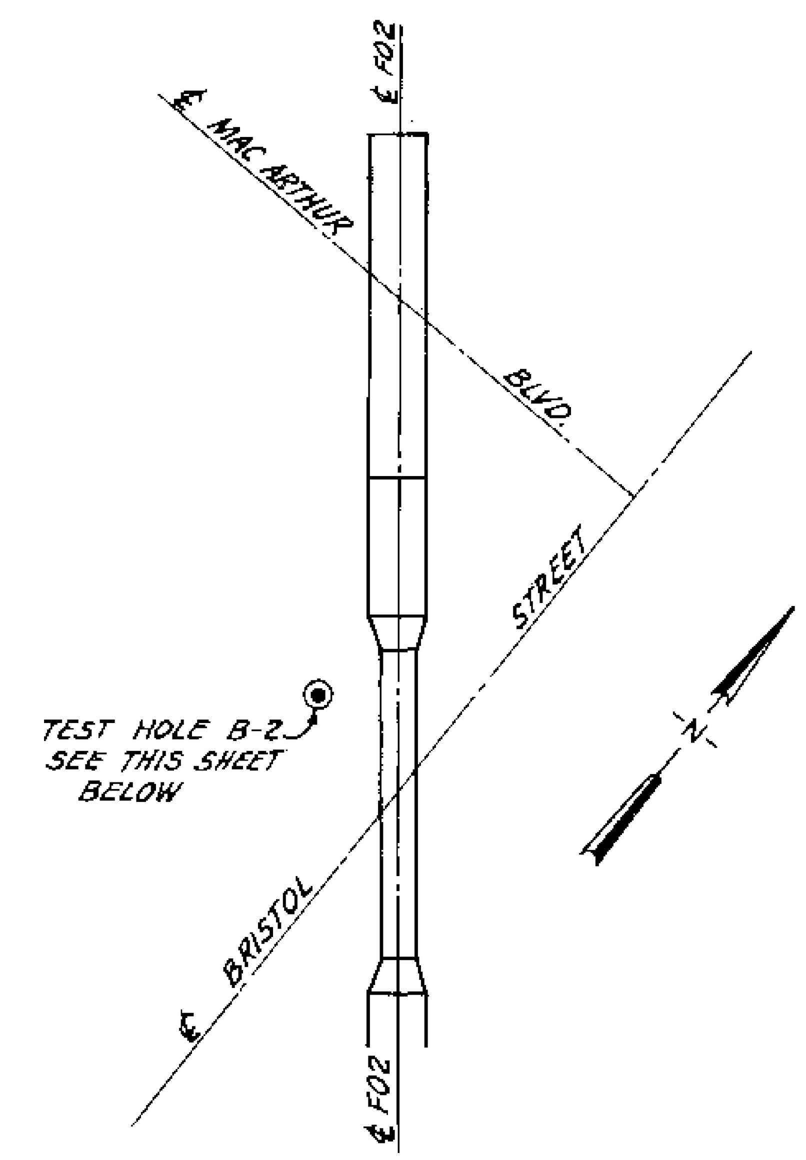


PLAN
TRANSITION AT DOWNSTREAM END OF TRIPLE 12'(W)×10'(H) R.C.B.

SCALE: 1"=10'

CONSTRUCTION NOTES

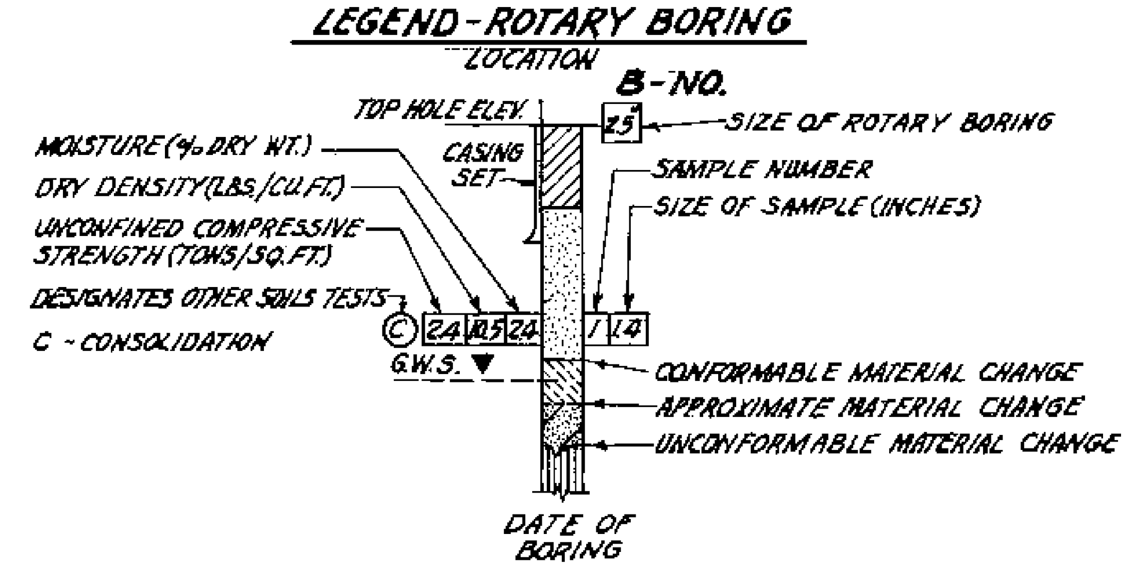
1. CONST. 30 L.F. OF R.C. TRANSITION, SEE SHEET NO.6 FOR REINF. DETAILS.
2. JOIN TRIPLE 12'(W)×10'(H) R.C.B. STRUCTURE, SEE CONSTRUCTION JOINT III DETAIL ON SHEET NO. 6.
3. CONST. 4' WIDE SINGLE FRAME CHAIN LINK GATE, SEE DETAIL ON SHT. NO. 11.
4. CONST. TYPE I CHAIN LINK FENCE, SEE DETAILS ON SHEET NO. 11.
5. REMOVE EXIST. BARB. WIRE FENCE.
6. CONSTRUCTION JOINT II, SEE DETAIL ON SHEET NO. 6.
7. CONST. PARAPET WALL, SEE DETAIL ON SHEET NO. 7.

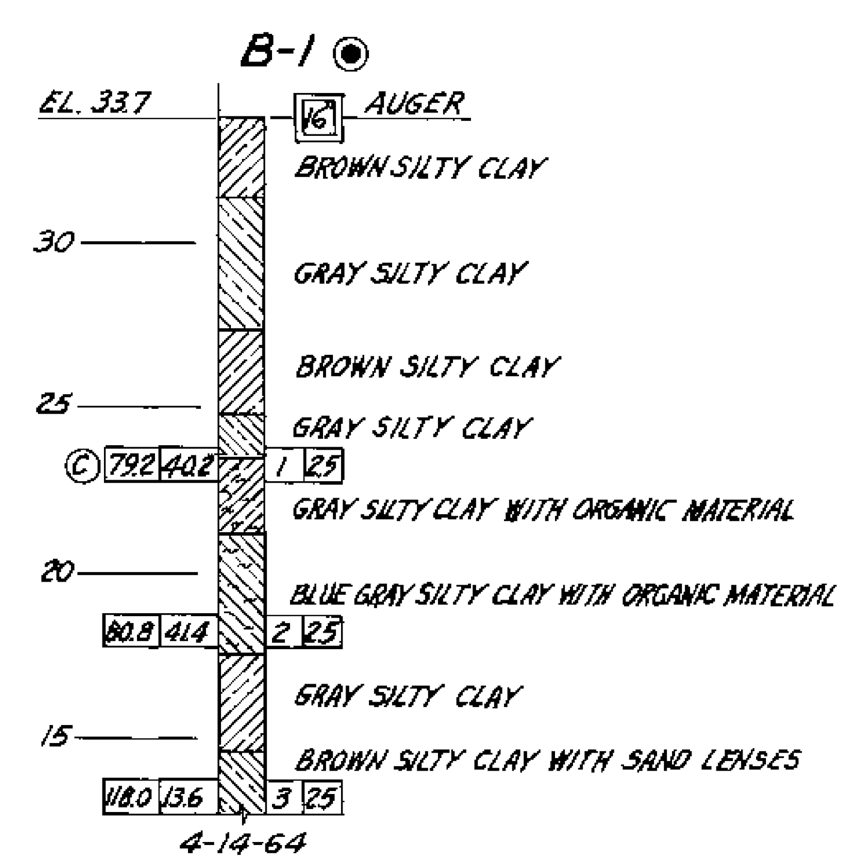


PLAN

SCALE: 1"=100'

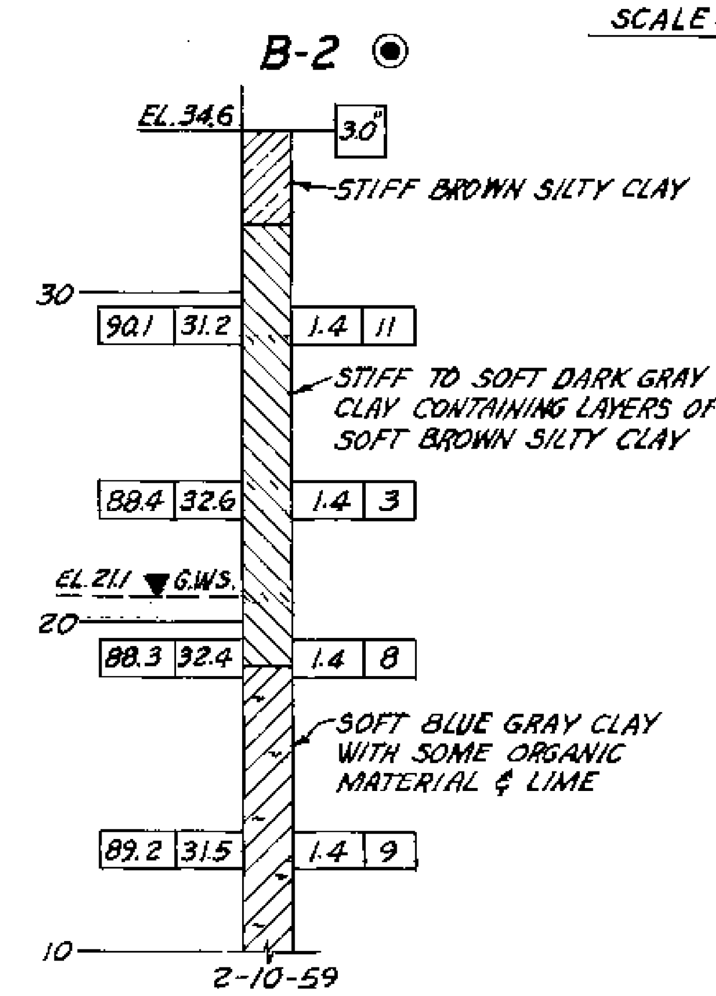
LEGEND-ROTARY BORING





LOG OF TEST BORINGS
PROFILE

VERT. SCALE: 1"=5'



LOG OF TEST BORINGS
PROFILE

VERT. SCALE: 1"=5'

DATUM = O.C.F.C.D. = O.C.S. ADJUSTED 1957.

BENCH MARK NO. F2-2 ELEV. 34.70.

A SPIKE IN P.P. #599104E, ON SOUTH SIDE OF SUNFLOWER AVE. APPROX. 100' EAST OF EXISTING F02 R.C.B. AND 700' EAST OF BRISTOL STREET.

BENCH MARK NO. F2-8 ELEV. 34.87

THE N.E. CORNER OF SQUARE MANHOLE RIM ON THE NORTH SIDE OF ALTON AVE. APPROX. 50' WEST OF F02 CHANNEL.

0 1 2 3
INCHES ON ORIGINAL PLAN

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS

MARK	DATE	DESCRIPTION
A	1-74	As Built

ORANGE COUNTY FLOOD CONTROL DISTRICT

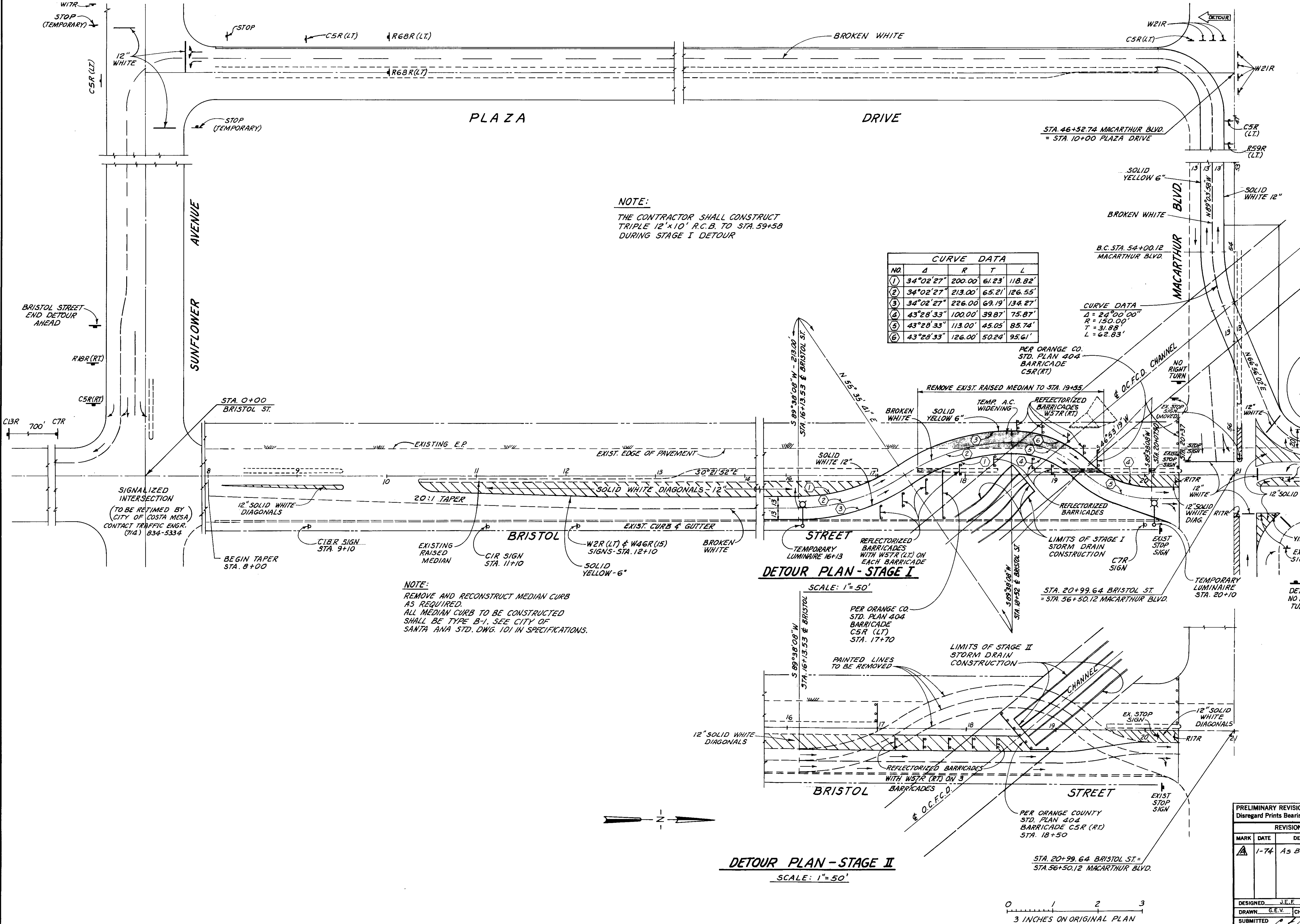
SANTA ANA-GARDENS CHANNEL

TRANSITION DETAIL AT DOWNSTREAM END OF TRIPLE 12' × 10' R.C.B., EARTHWORK DTLS. & LOG OF TEST BORINGS.

DESIGNED U.G.F.
DRAWN G.E.V. CHECKED R.E.M.
SUBMITTED V.T.N. ORANGE CO.
RECOMMENDED

SCALE	DATE	DWG. NO.
AS SHOWN	MAR. 1972	F02-701-1-A

F0001-176



DETOUR PLAN - STAGE I

SCALE: 1" = 50'

DETOUR PLAN - STAGE II

SCALE: 1" = 50'

NOTE:

THE CONTRACTOR SHALL CONSTRUCT TRIPLE 12'x10' R.C.B. TO STA. 59+58 DURING STAGE I DETOUR

NOTE:

REMOVE AND RECONSTRUCT MEDIAN CURB AS REQUIRED.
ALL MEDIAN CURB TO BE CONSTRUCTED SHALL BE TYPE B-1. SEE CITY OF SANTA ANA STD. DWG. 101 IN SPECIFICATIONS.

CURVE DATA				
NO.	Δ	R	T	L
1	34°02'27"	200.00'	61.23'	118.82'
2	34°02'27"	213.00'	65.21'	126.55'
3	34°02'27"	226.00	69.19'	134.27'
4	43°28'33"	100.00'	39.87'	75.87'
5	43°28'33"	113.00'	45.05'	85.74'
6	43°28'33"	126.00'	50.24'	95.61'

GENERAL NOTES

1. PLACE SIGNS & BARRICADES IN ACCORDANCE WITH ORANGE COUNTY STD. PLANS 403 & 404
2. PLACE REFLECTORIZED BARRICADES WITH FLASHERS ALONG ALL DETOUR TAPERS.
3. PLACE ONE WAY SIGNS ON ALL DRIVEWAYS ON WEST SIDE OF BRISTOL ST. DURING BOTH STAGES.
4. INSTALL SAFETY LIGHTING PER ORANGE COUNTY STD. PLAN 403 AT STA. 16+13 AND STA. 20+10 BRISTOL STREET.
5. FOUR TEMP. 400 W.M.V. LUMINAIRES SHALL BE INSTALLED ON BRISTOL STREET BY THE CONTRACTOR.
6. CONTRACTOR SHALL SUPPLY ELECTRICAL ENERGY BY MEANS OF PORTABLE GENERATOR OR TEMP. LINES FROM SO. CALIF. EDISON POLE LOCATED 600' EAST OF MACARTHUR BLVD. TEMPORARY PERMIT TO RUN LINES OVERHEAD MUST BE OBTAINED FROM CITY OF SANTA ANA. CONTRACTOR TO NOTIFY MR. BOB SCHAEFER, SO. CALIF. EDISON 835-3833 EXT. 354 (3) WEEKS PRIOR TO NEED IF EDISON POWER USED. CONTRACTOR TO DETERMINE LOCATION OF POLES SUBJECT TO APPROVAL OF CITY OF SANTA ANA.
7. ALL DETOUR MATERIALS TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR, INCLUDING SIGNS, BARRICADES, LUMINAIRES AND STRIPING.
8. THE CONTRACTOR IS TO BE AWARE OF THE CITY OF SANTA ANA PROPOSED TRAFFIC INSTALLATION AT BRISTOL ST. AND MACARTHUR BLVD. SCHEDULED FOR CONSTRUCTION IN SUMMER 1972 (APPROX. AUGUST). REMOVE TEMPORARY LUMINAIRES UPON INSTALLATION OF TRAFFIC SIGNALS

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS		
MARK	DATE	DESCRIPTION
A	1-74	As Built

ORANGE COUNTY FLOOD CONTROL DISTRICT

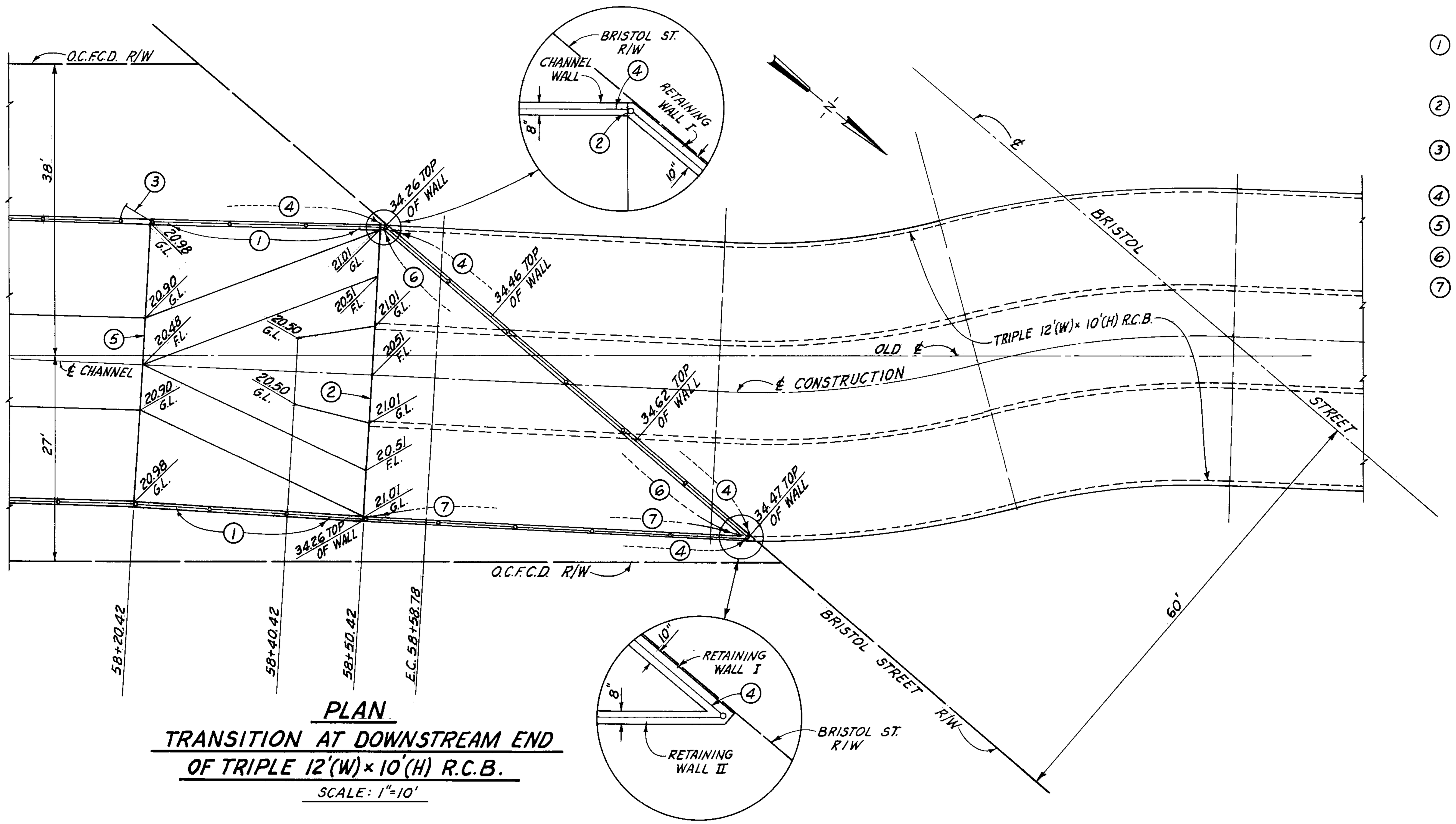
SANTA ANA-GARDENS CHANNEL

BRISTOL STREET DETOUR

DESIGNED J.E.F.
DRAWN G.E.V. CHECKED R.E.M.
SUBMITTED V.T.N. ORANGE CO.
RECOMMENDED

SCALE	DATE	DWG. NO.
AS SHOWN	MAR. 1972	F02 - 701 - 1 - A

F0001-176



PLAN

TRANSITION AT DOWNSTREAM END OF TRIPLE 12'(W) × 10'(H) R.C.B.

SCALE: 1"=10'

NOTE:
SEE SHEET NO. 5 FOR COMPLETE UTILITY INFORMATION.

CONSTRUCTION NOTES

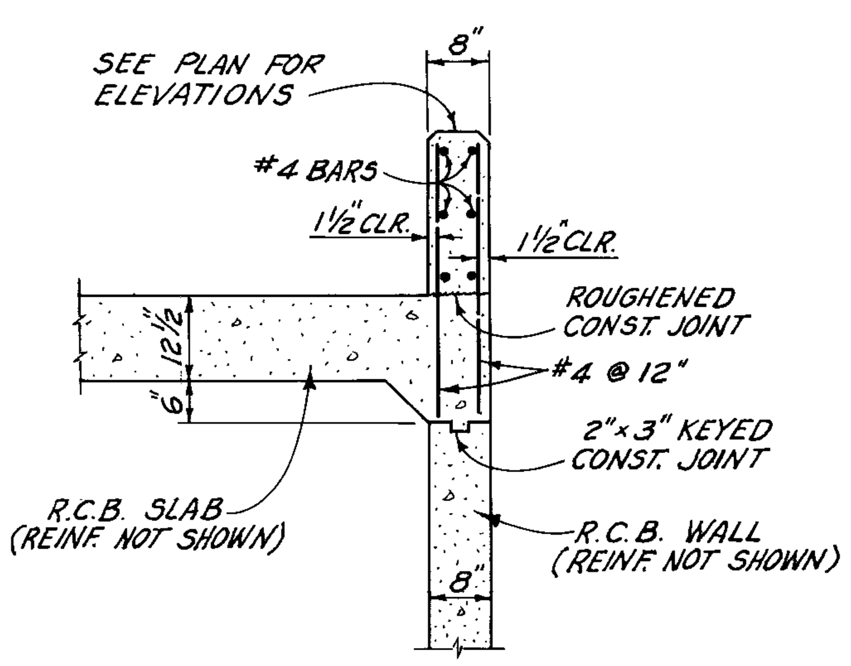
1. CONSTRUCT 30 L.F. OF R.C. TRANSITION, SEE SHEET NO. 6 FOR REINF. DETAILS (USE TYPICAL SECTION STA. 56+42.02 TO STA. 56+72.02, MAX. WALL HEIGHT = 13'-3") AND SEE THIS SHEET FOR STRUCTURAL DATA.
2. JOIN TRIPLE 12'(W) × 10'(H) R.C.B. STRUCTURE, SEE CONSTRUCTION JOINT III DETAIL ON SHEET NO. 6.
3. CONST. 4' WIDE SINGLE FRAME CHAIN LINK GATE, SEE DETAILS ON SHEET NO. 11.
4. CONST. TYPE I CHAIN LINK FENCE, SEE DETAILS ON SHEET NO. 11.
5. CONSTRUCTION JOINT II SEE DETAIL ON SHEET NO. 6.
6. CONST. RETAINING WALL I PER DETAIL ON THIS SHEET.
7. CONST. RETAINING WALL II PER DETAIL ON THIS SHEET.

GENERAL NOTES

1. UP TO AND INCLUDING JULY 1, 1972, THE DISTRICT MAY AT ITS OPTION DELETE ALL CONSTRUCTION OF THE TRIPLE 12'(W) × 10'(H) R.C.B. BETWEEN STA. 56+72.02 AND STA. 58+50.42 AND REPLACE IT WITH OPEN CHANNEL.
2. IF THE DISTRICT EXERCISES ITS OPTION, THE PLAN OF TRANSITION AND DETAILS ON THIS SHEET WILL REPLACE PLAN OF TRANSITION ON SHEET NO. 9. SEE ALSO SECTION 2 B-15 IN SPECIFICATIONS.

STRUCTURAL DATA

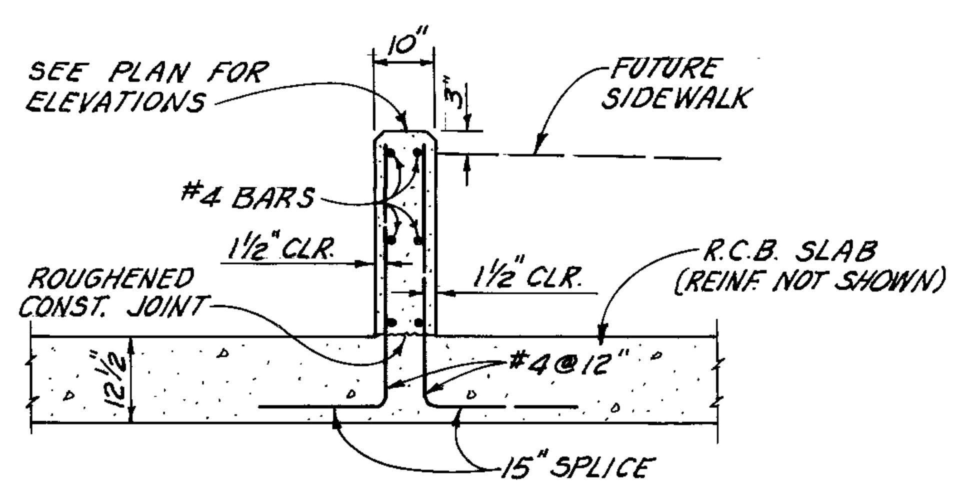
	REINFORCING STEEL									THICKNESS		
	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	T-1	T-2	
STA. 58+20.42 TO STA. 58+50.42	#5@10"	#6@10"	#7@10"	#4@16"	#5@16"	#7@16"	#4@10"	#5@10"	#5@10"	1'-3"	1'-3"	
HORIZONTAL LENGTH	VARIES 20'-9" TO 21'-5"	8'-7"	5'-4"	1'-5"	1'-5"	1'-5"	VARIES 21'-3" TO 21'-11"	11'-2"	7'-8"			
VERTICAL LENGTH	VARIES 11'-5" TO 14'-2"	9'-2"	5'-8"	VARIES 11'-5" TO 14'-2"	8'-1"	5'-6"	—	—	—			



R.C. BOX CULVERT RETAINING WALL II DETAIL

NO SCALE

NOTES:
1. SPLICES IN REINF. STEEL SHALL BE 30 BAR DIA., UNLESS OTHERWISE SHOWN.
2. ALL EXPOSED EDGES SHALL HAVE ¾" CHAMFER.



R.C. BOX CULVERT RETAINING WALL I DETAIL

NO SCALE

NOTE: Deleted this sheet from contract work, "AS BUILT" 5-29-73

DATUM = O.C.F.C.D. = O.C.S. ADJUSTED 1957

BENCH MARK NO. F2-2 ELEV. 34.70
A SPIKE IN P.P. #599104E, ON SOUTH SIDE OF SUNFLOWER AVE, APPROX. 100' EAST OF EXISTING F02 R.C.B. AND 700' EAST OF BRISTOL STREET.

BENCH MARK NO. F2-8 ELEV. 34.87
THE N. E. CORNER OF SQUARE MANHOLE RIM ON THE NORTH SIDE OF ALTON AVE. APPROX. 50' WEST OF F02 CHANNEL.

0 1 2 3
3 INCHES ON ORIGINAL PLAN

PRELIMINARY REVISION CODE
Disregard Prints Bearing Earlier Codes

REVISIONS

MARK	DATE	DESCRIPTION
1	1-74	As Built

ORANGE COUNTY FLOOD CONTROL DISTRICT

SANTA ANA-GARDENS CHANNEL
OPTIONAL TRANS. DETAIL AT DOWNSTREAM END OF TRIPLE 12'(W) X 10'(H) R.C.B. & RETAINING WALL DET'S.

DESIGNED U.G.F.
DRAWN G.E.V. CHECKED R.E.M.
SUBMITTED V.T.N. ORANGE CO.
RECOMMENDED

SCALE	DATE	DWG. NO.
AS SHOWN	MAR. 1972	F02 – 701 – 1 – A

F0001-176

Attachment 4 – Exhibit 2 Santa Ana MPD Gardens Watershed Hydrology Map

RBF

A Baker Company

Revised by Fuscoe Engineering
3/31/2023

EXHIBIT 2
SANTA ANA MPD
GARDENS WATERSHED
HYDROLOGY MAP

Attachment 5 – Updated Rational Method Hydrology Calculations Q10

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

                          Analysis prepared by:





 ************************* DESCRIPTION OF STUDY *************************
* SANTA ANA MPD - GARDEN WATERSHED                                       *
* RATIONAL METHOD HYDROLOGY - EXISTING CONDITION-UPDATED 1-2023          *
* 10-YEAR SEPTEMBER 2014 KCHAN REV FEB 2015 MCHANDOO REV DEC 2022 SAUSILI  *
 ************************************************************************

  FILE NAME: GC10EX.DAT
  TIME/DATE OF STUDY: 18:07 01/18/2023
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   20.0     10.0    0.020/0.020/0.020   0.50    2.00 0.0313 0.125 0.0150
  2   42.0     21.0    0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  3   51.0     25.0    0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150

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

************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    108.00  DOWNSTREAM(FEET) =    106.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.40      0.25     0.500    69   10.99
 COMMERCIAL                 C        1.50      0.25     0.100    69    8.59
 URBAN POOR COVER
 "TURF"                     C        0.20      0.25     1.000    83   14.83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.339
 SUBAREA RUNOFF(CFS) =      8.07
 TOTAL AREA(ACRES) =      3.10   PEAK FLOW RATE(CFS) =      8.07

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  106.00  DOWNSTREAM ELEVATION(FEET) =  100.00
 STREET LENGTH(FEET) =   641.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.77
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   15.66
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.84
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.22
 STREET FLOW TRAVEL TIME(MIN.) =   3.76   Tc(MIN.) =   12.35
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.418
 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"       C        5.00      0.25     0.500    69
 COMMERCIAL                 C        1.40      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.413
 SUBAREA AREA(ACRES) =    6.40      SUBAREA RUNOFF(CFS) =   13.33
 EFFECTIVE AREA(ACRES) =      9.50    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =        9.5        PEAK FLOW RATE(CFS) =      19.84

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.62
 FLOW VELOCITY(FEET/SEC.) =  3.05   DEPTH*VELOCITY(FT*FT/SEC.) =   1.43
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     971.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  100.00  DOWNSTREAM ELEVATION(FEET) =   92.00
  STREET LENGTH(FEET) =  1712.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      38.72
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.62
    HALFSTREET FLOOD WIDTH(FEET) =   26.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.93
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
  STREET FLOW TRAVEL TIME(MIN.) =   9.73   Tc(MIN.) =   22.08
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.733
  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"       B       16.80      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.80      0.25     0.500    69
  COMMERCIAL                 B        4.40      0.30     0.100    56
  COMMERCIAL                 C        1.60      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.406
  SUBAREA AREA(ACRES) =   25.60      SUBAREA RUNOFF(CFS) =   37.20
  EFFECTIVE AREA(ACRES) =     35.10    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       35.1        PEAK FLOW RATE(CFS) =      51.19

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.67   HALFSTREET FLOOD WIDTH(FEET) =  28.72
  FLOW VELOCITY(FEET/SEC.) =  3.17   DEPTH*VELOCITY(FT*FT/SEC.) =   2.14
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1712.0 FT WITH ELEVATION-DROP =   8.0 FT, IS   42.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    103.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    2683.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    109.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   92.00  DOWNSTREAM ELEVATION(FEET) =   86.00
  STREET LENGTH(FEET) =  2064.00   CURB HEIGHT(INCHES) =  8.0
```

```
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      89.58
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.93
   HALFSTREET FLOOD WIDTH(FEET) =   52.10
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.64
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.46
 STREET FLOW TRAVEL TIME(MIN.) =  13.05   Tc(MIN.) =   35.13
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.328
 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"       B       19.80      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C       30.00      0.25     0.500    69
 COMMERCIAL                 B        7.20      0.30     0.100    56
 COMMERCIAL                 C       11.30      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     C        1.20      0.25     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.402
 SUBAREA AREA(ACRES) =   69.50      SUBAREA RUNOFF(CFS) =   76.33
 EFFECTIVE AREA(ACRES) =    104.60    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =      104.6        PEAK FLOW RATE(CFS) =     114.72

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.00   HALFSTREET FLOOD WIDTH(FEET) =  58.73
 FLOW VELOCITY(FEET/SEC.) =  2.76   DEPTH*VELOCITY(FT*FT/SEC.) =   2.77
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 2064.0 FT WITH ELEVATION-DROP =   6.0 FT, IS  105.7 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    109.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =    4747.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 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.) =   35.13
 RAINFALL INTENSITY(INCH/HR) =   1.33
 AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.40
 EFFECTIVE STREAM AREA(ACRES) =     104.60
 TOTAL STREAM AREA(ACRES) =     104.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     114.72
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     92.50  DOWNSTREAM(FEET) =     92.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  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"       B        2.00      0.30     0.500    56   14.50
  COMMERCIAL                 B        0.80      0.30     0.100    56   11.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.386
  SUBAREA RUNOFF(CFS) =      6.11
  TOTAL AREA(ACRES) =      2.80   PEAK FLOW RATE(CFS) =      6.11

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   92.00  DOWNSTREAM ELEVATION(FEET) =   90.00
  STREET LENGTH(FEET) =   650.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.47
    HALFSTREET FLOOD WIDTH(FEET) =   17.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.83
  STREET FLOW TRAVEL TIME(MIN.) =   6.15   Tc(MIN.) =   17.48
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.982
  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"       B        5.40      0.30     0.500    56
  COMMERCIAL                 B        1.20      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.427
  SUBAREA AREA(ACRES) =    6.60      SUBAREA RUNOFF(CFS) =   11.01
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```
  EFFECTIVE AREA(ACRES) =      9.40    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        9.4        PEAK FLOW RATE(CFS) =      15.71

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.84
  FLOW VELOCITY(FEET/SEC.) =  1.89   DEPTH*VELOCITY(FT*FT/SEC.) =   0.97
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    106.00 =     980.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   90.00  DOWNSTREAM ELEVATION(FEET) =   88.00
  STREET LENGTH(FEET) =   712.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.08
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.60
    HALFSTREET FLOOD WIDTH(FEET) =   24.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.18
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
  STREET FLOW TRAVEL TIME(MIN.) =   5.44   Tc(MIN.) =   22.92
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.697
  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"       B       11.20      0.30     0.500    56
  COMMERCIAL                 B        3.40      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.407
  SUBAREA AREA(ACRES) =   14.60      SUBAREA RUNOFF(CFS) =   20.69
  EFFECTIVE AREA(ACRES) =     24.00    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       24.0        PEAK FLOW RATE(CFS) =      33.99

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.64   HALFSTREET FLOOD WIDTH(FEET) =  27.19
  FLOW VELOCITY(FEET/SEC.) =  2.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.52
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  712.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   28.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    107.00
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    107.00 =    1692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  62
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----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   88.00  DOWNSTREAM ELEVATION(FEET) =   87.00
  STREET LENGTH(FEET) =   293.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      52.60
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.71
    HALFSTREET FLOOD WIDTH(FEET) =   30.67
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.85
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.03
  STREET FLOW TRAVEL TIME(MIN.) =   1.71   Tc(MIN.) =   24.63
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.628
  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"       B       20.20      0.30     0.500    56
  COMMERCIAL                 B        7.20      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.395
  SUBAREA AREA(ACRES) =   27.40      SUBAREA RUNOFF(CFS) =   37.22
  EFFECTIVE AREA(ACRES) =     51.40    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       51.4        PEAK FLOW RATE(CFS) =      69.73

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.78   HALFSTREET FLOOD WIDTH(FEET) =  34.03
  FLOW VELOCITY(FEET/SEC.) =  3.06   DEPTH*VELOCITY(FT*FT/SEC.) =   2.39
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  293.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   67.7 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    108.00
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    108.00 =    1985.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   87.00  DOWNSTREAM ELEVATION(FEET) =   86.00
  STREET LENGTH(FEET) =   533.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      87.60
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.93
    HALFSTREET FLOOD WIDTH(FEET) =   41.60
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.38
  STREET FLOW TRAVEL TIME(MIN.) =   3.47   Tc(MIN.) =   28.11
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.509
  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"       B       12.00      0.30     0.500    56
  COMMERCIAL                 B        6.10      0.30     0.100    56
  URBAN POOR COVER
  "TURF"                     B        4.50      0.30     1.000    74
  SCHOOL                     B        6.70      0.30     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.516
  SUBAREA AREA(ACRES) =   29.30      SUBAREA RUNOFF(CFS) =   35.72
  EFFECTIVE AREA(ACRES) =     80.70    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       80.7        PEAK FLOW RATE(CFS) =      99.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.98   HALFSTREET FLOOD WIDTH(FEET) =  43.79
  FLOW VELOCITY(FEET/SEC.) =  2.63   DEPTH*VELOCITY(FT*FT/SEC.) =   2.57
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  533.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   57.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    109.00
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    109.00 =    2518.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 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.) =   28.11
  RAINFALL INTENSITY(INCH/HR) =   1.51
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.44
  EFFECTIVE STREAM AREA(ACRES) =      80.70
  TOTAL STREAM AREA(ACRES) =      80.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      99.97

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      114.72   35.13    1.328  0.27( 0.11) 0.40     104.6     100.00
```

```
    2      99.97   28.11    1.509  0.30( 0.13) 0.44      80.7     104.00

  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      205.40   28.11    1.509  0.29( 0.12) 0.42     164.4     104.00
      2      201.54   35.13    1.328  0.29( 0.12) 0.42     185.3     100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     205.40    Tc(MIN.) =    28.11
  EFFECTIVE AREA(ACRES) =     164.39   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =      185.3
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =    4747.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 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) =    86.00  DOWNSTREAM(FEET) =    85.50
  FLOW LENGTH(FEET) =  1021.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  76.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.50
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     205.40
  PIPE TRAVEL TIME(MIN.) =   3.78    Tc(MIN.) =   31.89
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =    5768.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 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.) =   31.89
  RAINFALL INTENSITY(INCH/HR) =   1.40
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.42
  EFFECTIVE STREAM AREA(ACRES) =     164.39
  TOTAL STREAM AREA(ACRES) =     185.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     205.40

****************************************************************************
  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) =   281.00
  ELEVATION DATA: UPSTREAM(FEET) =    103.00  DOWNSTREAM(FEET) =    102.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.956
```

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  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.907
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.90      0.25     0.500    69   11.46
  COMMERCIAL                 C        1.10      0.25     0.100    69    8.96
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        0.10      0.25     1.000    77   20.80
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.314
  SUBAREA RUNOFF(CFS) =      5.35
  TOTAL AREA(ACRES) =      2.10   PEAK FLOW RATE(CFS) =      5.35

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  103.00  DOWNSTREAM ELEVATION(FEET) =   96.00
  STREET LENGTH(FEET) =  1341.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 51.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  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) =      19.40
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.55
    HALFSTREET FLOOD WIDTH(FEET) =   19.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.43
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.33
  STREET FLOW TRAVEL TIME(MIN.) =   9.19   Tc(MIN.) =   18.14
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.940
  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"       B       12.10      0.30     0.500    56
  COMMERCIAL                 C        4.60      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.390
  SUBAREA AREA(ACRES) =   16.70      SUBAREA RUNOFF(CFS) =   27.42
  EFFECTIVE AREA(ACRES) =     18.80    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =       18.8        PEAK FLOW RATE(CFS) =      30.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.63   HALFSTREET FLOOD WIDTH(FEET) =  23.42
  FLOW VELOCITY(FEET/SEC.) =  2.73   DEPTH*VELOCITY(FT*FT/SEC.) =   1.71
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    114.00 =    1622.00 FEET.

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

```
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   96.00  DOWNSTREAM ELEVATION(FEET) =   85.50
  STREET LENGTH(FEET) =  2539.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      68.63
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.75
    HALFSTREET FLOOD WIDTH(FEET) =   32.68
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.46
  STREET FLOW TRAVEL TIME(MIN.) =  12.95   Tc(MIN.) =   31.09
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.425
  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"       B       16.90      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       19.40      0.25     0.500    69
  COMMERCIAL                 B        8.00      0.30     0.100    56
  COMMERCIAL                 C       13.50      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.10      0.25     1.000    83
  SCHOOL                     C        4.60      0.25     0.600    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.371
  SUBAREA AREA(ACRES) =   62.50      SUBAREA RUNOFF(CFS) =   74.50
  EFFECTIVE AREA(ACRES) =     81.30    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =       81.3       PEAK FLOW RATE(CFS) =      96.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.84   HALFSTREET FLOOD WIDTH(FEET) =  37.14
  FLOW VELOCITY(FEET/SEC.) =  3.55   DEPTH*VELOCITY(FT*FT/SEC.) =   2.99
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 2539.0 FT WITH ELEVATION-DROP =  10.5 FT, IS   94.8 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    115.00
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    115.00 =    4161.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   31.09
 RAINFALL INTENSITY(INCH/HR) =   1.42
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.37
 EFFECTIVE STREAM AREA(ACRES) =      81.30
 TOTAL STREAM AREA(ACRES) =      81.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      96.72

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      205.40   31.89    1.404  0.29( 0.12) 0.42     164.4     104.00
     1      201.54   38.92    1.253  0.29( 0.12) 0.42     185.3     100.00
     2       96.72   31.09    1.425  0.28( 0.10) 0.37      81.3     112.00

 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      300.19   31.09    1.425  0.28( 0.11) 0.41     241.6     112.00
     2      300.62   31.89    1.404  0.28( 0.12) 0.41     245.7     104.00
     3      285.68   38.92    1.253  0.28( 0.11) 0.41     266.6     100.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     300.62    Tc(MIN.) =    31.89
 EFFECTIVE AREA(ACRES) =     245.69   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =      266.6
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =    5768.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    85.50  DOWNSTREAM(FEET) =    85.00
 FLOW LENGTH(FEET) =    473.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 102.0 INCH PIPE IS  76.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.60
 ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     300.62
 PIPE TRAVEL TIME(MIN.) =   1.19    Tc(MIN.) =   33.08
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =    6241.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 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.) =   33.08
 RAINFALL INTENSITY(INCH/HR) =   1.37
 AREA-AVERAGED Fm(INCH/HR) =  0.12
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.41
 EFFECTIVE STREAM AREA(ACRES) =     245.69
 TOTAL STREAM AREA(ACRES) =     266.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     300.62

****************************************************************************
 FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     88.50  DOWNSTREAM(FEET) =     88.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
 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"       B        1.70      0.30     0.500    56   14.50
 COMMERCIAL                 B        0.30      0.30     0.100    56   11.33
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.440
 SUBAREA RUNOFF(CFS) =      4.34
 TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      4.34

****************************************************************************
 FLOW PROCESS FROM NODE    117.00 TO NODE    118.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   88.00  DOWNSTREAM ELEVATION(FEET) =   87.00
 STREET LENGTH(FEET) =   506.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.76
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.45
   HALFSTREET FLOOD WIDTH(FEET) =   16.52
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.35
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.60
 STREET FLOW TRAVEL TIME(MIN.) =    6.25    Tc(MIN.) =   17.58
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.975
 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"       B        3.40      0.30     0.500    56
  COMMERCIAL                 B        0.70      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.432
  SUBAREA AREA(ACRES) =    4.10      SUBAREA RUNOFF(CFS) =    6.81
  EFFECTIVE AREA(ACRES) =      6.10    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =        6.1        PEAK FLOW RATE(CFS) =      10.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.40
  FLOW VELOCITY(FEET/SEC.) =  1.43   DEPTH*VELOCITY(FT*FT/SEC.) =   0.69
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    118.00 =     836.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   87.00  DOWNSTREAM ELEVATION(FEET) =   86.00
  STREET LENGTH(FEET) =   545.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.46
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.56
    HALFSTREET FLOOD WIDTH(FEET) =   22.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.63
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.91
  STREET FLOW TRAVEL TIME(MIN.) =    5.57   Tc(MIN.) =   23.15
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.687
  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"       B        7.30      0.30     0.500    56
  COMMERCIAL                 B        1.70      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.424
  SUBAREA AREA(ACRES) =    9.00      SUBAREA RUNOFF(CFS) =   12.63
  EFFECTIVE AREA(ACRES) =     15.10    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =       15.1        PEAK FLOW RATE(CFS) =      21.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  24.87
  FLOW VELOCITY(FEET/SEC.) =  1.76   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  545.0 FT WITH ELEVATION-DROP =    1.0 FT, IS   17.7 CFS,
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       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    119.00
 LONGEST FLOWPATH FROM NODE    116.00 TO NODE    119.00 =    1381.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   86.00  DOWNSTREAM ELEVATION(FEET) =   85.00
 STREET LENGTH(FEET) =   662.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      32.20
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.70
   HALFSTREET FLOOD WIDTH(FEET) =   29.75
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.29
 STREET FLOW TRAVEL TIME(MIN.) =   5.95   Tc(MIN.) =   29.10
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.480
 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"       B       12.90      0.30     0.500    56
 COMMERCIAL                 B        4.80      0.30     0.100    56
 URBAN POOR COVER
 "TURF"                     B        0.30      0.30     1.000    74
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.402
 SUBAREA AREA(ACRES) =   18.00      SUBAREA RUNOFF(CFS) =   22.02
 EFFECTIVE AREA(ACRES) =     33.10    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =       33.1       PEAK FLOW RATE(CFS) =      40.38

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.75   HALFSTREET FLOOD WIDTH(FEET) =  32.32
 FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   1.47
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L =  662.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   33.1 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    120.00
 LONGEST FLOWPATH FROM NODE    116.00 TO NODE    120.00 =    2043.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   29.10
 RAINFALL INTENSITY(INCH/HR) =   1.48
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.41
 EFFECTIVE STREAM AREA(ACRES) =      33.10
 TOTAL STREAM AREA(ACRES) =      33.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      40.38

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      300.19   32.29    1.394  0.28( 0.11) 0.41     241.6     112.00
     1      300.62   33.08    1.375  0.28( 0.12) 0.41     245.7     104.00
     1      285.68   40.12    1.231  0.28( 0.11) 0.41     266.6     100.00
     2       40.38   29.10    1.480  0.30( 0.12) 0.41      33.1     116.00

 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      329.03   29.10    1.480  0.29( 0.12) 0.41     250.8     116.00
     2      338.02   32.29    1.394  0.29( 0.12) 0.41     274.7     112.00
     3      337.88   33.08    1.375  0.29( 0.12) 0.41     278.8     104.00
     4      318.65   40.12    1.231  0.28( 0.12) 0.41     299.7     100.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     338.02    Tc(MIN.) =    32.29
 EFFECTIVE AREA(ACRES) =     274.69   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =      299.7
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =    6241.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    127.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    85.00  DOWNSTREAM(FEET) =    78.00
 FLOW LENGTH(FEET) =  1464.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  62.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.81
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     338.02
 PIPE TRAVEL TIME(MIN.) =   2.07    Tc(MIN.) =   34.35
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    127.00 =    7705.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     96.50  DOWNSTREAM(FEET) =     96.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        0.70      0.25     0.100    69   11.33
  SCHOOL                     C        0.70      0.25     0.600    69   15.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      3.09
  TOTAL AREA(ACRES) =      1.40   PEAK FLOW RATE(CFS) =      3.09

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   96.00  DOWNSTREAM ELEVATION(FEET) =   94.00
  STREET LENGTH(FEET) =   439.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.11
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   12.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.72
  STREET FLOW TRAVEL TIME(MIN.) =   4.15   Tc(MIN.) =   15.48
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.125
  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"       C        1.10      0.25     0.500    69
  COMMERCIAL                 C        1.20      0.25     0.100    69
  SCHOOL                     C        1.00      0.25     0.600    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.385
  SUBAREA AREA(ACRES) =    3.30      SUBAREA RUNOFF(CFS) =    6.02
  EFFECTIVE AREA(ACRES) =      4.70    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =        4.7        PEAK FLOW RATE(CFS) =       8.59
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 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  14.36
 FLOW VELOCITY(FEET/SEC.) =  1.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.85
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    123.00 =     769.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    123.00 TO NODE    124.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   94.00  DOWNSTREAM ELEVATION(FEET) =   90.00
 STREET LENGTH(FEET) =   870.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.28
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.50
   HALFSTREET FLOOD WIDTH(FEET) =   17.18
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.12
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.06
 STREET FLOW TRAVEL TIME(MIN.) =   6.86   Tc(MIN.) =   22.33
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.722
 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"       C        3.30      0.25     0.500    69
 COMMERCIAL                 C        2.00      0.25     0.100    69
 SCHOOL                     C        1.10      0.25     0.600    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.392
 SUBAREA AREA(ACRES) =    6.40      SUBAREA RUNOFF(CFS) =    9.35
 EFFECTIVE AREA(ACRES) =     11.10    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =       11.1        PEAK FLOW RATE(CFS) =      16.24

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  18.59
 FLOW VELOCITY(FEET/SEC.) =  2.23   DEPTH*VELOCITY(FT*FT/SEC.) =   1.18
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    124.00 =    1639.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   90.00  DOWNSTREAM ELEVATION(FEET) =   85.00
 STREET LENGTH(FEET) =   967.00   CURB HEIGHT(INCHES) =  8.0
```

```
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.40
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.59
   HALFSTREET FLOOD WIDTH(FEET) =   21.70
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.59
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.54
 STREET FLOW TRAVEL TIME(MIN.) =   6.21   Tc(MIN.) =   28.55
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.496
 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"       C        8.50      0.25     0.500    69
 COMMERCIAL                 C        4.80      0.25     0.100    69
 SCHOOL                     C        1.20      0.25     0.600    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.376
 SUBAREA AREA(ACRES) =   14.50      SUBAREA RUNOFF(CFS) =   18.30
 EFFECTIVE AREA(ACRES) =     25.60    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =       25.6        PEAK FLOW RATE(CFS) =      32.28

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.63   HALFSTREET FLOOD WIDTH(FEET) =  23.83
 FLOW VELOCITY(FEET/SEC.) =  2.75   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    125.00 =    2606.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    125.00 TO NODE    126.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   85.00  DOWNSTREAM ELEVATION(FEET) =   82.00
 STREET LENGTH(FEET) =   452.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      46.76
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.68
```

```
    HALFSTREET FLOOD WIDTH(FEET) =   27.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.26
  STREET FLOW TRAVEL TIME(MIN.) =   2.28   Tc(MIN.) =   30.82
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.432
  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"       C       11.70      0.25     0.500    69
  COMMERCIAL                 C       12.00      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.297
  SUBAREA AREA(ACRES) =   23.70      SUBAREA RUNOFF(CFS) =   28.95
  EFFECTIVE AREA(ACRES) =     49.30    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       49.3        PEAK FLOW RATE(CFS) =      59.75

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.73   HALFSTREET FLOOD WIDTH(FEET) =  32.08
  FLOW VELOCITY(FEET/SEC.) =  3.49   DEPTH*VELOCITY(FT*FT/SEC.) =   2.56
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  452.0 FT WITH ELEVATION-DROP =   3.0 FT, IS   58.1 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    126.00
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    126.00 =    3058.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    126.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    82.00  DOWNSTREAM(FEET) =    80.00
  FLOW LENGTH(FEET) =   847.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.97
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.75
  PIPE TRAVEL TIME(MIN.) =   2.37    Tc(MIN.) =   33.19
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    126.50 =    3905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    126.50 TO NODE    126.50 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.) =   33.19
  RAINFALL INTENSITY(INCH/HR) =   1.37
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.34
  EFFECTIVE STREAM AREA(ACRES) =      49.30
  TOTAL STREAM AREA(ACRES) =      49.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      59.75

****************************************************************************
  FLOW PROCESS FROM NODE    126.10 TO NODE    126.20 IS CODE =  21
----------------------------------------------------------------------------
```

```
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     85.00  DOWNSTREAM(FEET) =     84.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.80      0.25     0.500    69   12.62
 COMMERCIAL                 C        0.30      0.25     0.100    69    9.86
 URBAN POOR COVER
 "TURF"                     C        0.70      0.25     1.000    83   17.03
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.628
 SUBAREA RUNOFF(CFS) =      4.20
 TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      4.20

****************************************************************************
 FLOW PROCESS FROM NODE    126.20 TO NODE    126.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   84.00  DOWNSTREAM ELEVATION(FEET) =   82.00
 STREET LENGTH(FEET) =   625.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.47
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   15.51
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.66
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
 STREET FLOW TRAVEL TIME(MIN.) =    6.28   Tc(MIN.) =   16.14
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.074
 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"       C        1.10      0.25     0.500    69
 COMMERCIAL                 A        1.20      0.40     0.100    32
 COMMERCIAL                 C        0.60      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     B        1.20      0.30     1.000    74
 URBAN POOR COVER
 "TURF"                     C        0.80      0.25     1.000    83
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.557
  SUBAREA AREA(ACRES) =    4.90      SUBAREA RUNOFF(CFS) =    8.46
  EFFECTIVE AREA(ACRES) =      6.70    AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      11.57

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.62
  FLOW VELOCITY(FEET/SEC.) =  1.78   DEPTH*VELOCITY(FT*FT/SEC.) =   0.83
  LONGEST FLOWPATH FROM NODE    126.10 TO NODE    126.30 =     955.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    126.30 TO NODE    126.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   82.00  DOWNSTREAM ELEVATION(FEET) =   81.00
  STREET LENGTH(FEET) =   292.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.30
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.53
    HALFSTREET FLOOD WIDTH(FEET) =   21.45
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.07
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.09
  STREET FLOW TRAVEL TIME(MIN.) =   2.35   Tc(MIN.) =   18.49
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.919
  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"       C        3.80      0.25     0.500    69
  COMMERCIAL                 B        1.40      0.30     0.100    56
  COMMERCIAL                 C        2.90      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.288
  SUBAREA AREA(ACRES) =    8.10      SUBAREA RUNOFF(CFS) =   13.46
  EFFECTIVE AREA(ACRES) =     14.80    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       14.8        PEAK FLOW RATE(CFS) =      24.09

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.57   HALFSTREET FLOOD WIDTH(FEET) =  23.41
  FLOW VELOCITY(FEET/SEC.) =  2.27   DEPTH*VELOCITY(FT*FT/SEC.) =   1.29
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  292.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   20.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    126.40
```

```
  LONGEST FLOWPATH FROM NODE    126.10 TO NODE    126.40 =    1247.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    126.40 TO NODE    126.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   81.00  DOWNSTREAM ELEVATION(FEET) =   80.00
  STREET LENGTH(FEET) =   449.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.17
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.67
    HALFSTREET FLOOD WIDTH(FEET) =   28.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.17
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.45
  STREET FLOW TRAVEL TIME(MIN.) =   3.44   Tc(MIN.) =   21.94
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.740
  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"       C        4.10      0.25     0.500    69
  COMMERCIAL                 B        1.60      0.30     0.100    56
  COMMERCIAL                 C        7.60      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.223
  SUBAREA AREA(ACRES) =   13.30      SUBAREA RUNOFF(CFS) =   20.15
  EFFECTIVE AREA(ACRES) =     28.10    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.33
  TOTAL AREA(ACRES) =       28.1        PEAK FLOW RATE(CFS) =      41.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.71   HALFSTREET FLOOD WIDTH(FEET) =  30.49
  FLOW VELOCITY(FEET/SEC.) =  2.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.63
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  449.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   28.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    126.50
  LONGEST FLOWPATH FROM NODE    126.10 TO NODE    126.50 =    1696.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    126.50 TO NODE    126.50 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.) =   21.94
 RAINFALL INTENSITY(INCH/HR) =   1.74
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.33
 EFFECTIVE STREAM AREA(ACRES) =      28.10
 TOTAL STREAM AREA(ACRES) =      28.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.85

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       59.75   33.19    1.372  0.25( 0.09) 0.34      49.3     121.00
     2       41.85   21.94    1.740  0.26( 0.08) 0.33      28.1     126.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       92.62   21.94    1.740  0.25( 0.08) 0.33      60.7     126.10
     2       92.31   33.19    1.372  0.25( 0.08) 0.34      77.4     121.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      92.62    Tc(MIN.) =    21.94
 EFFECTIVE AREA(ACRES) =      60.68   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.33
 TOTAL AREA(ACRES) =       77.4
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    126.50 =    3905.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    126.50 TO NODE    127.00 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) =    78.00
 FLOW LENGTH(FEET) =   889.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.53
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      92.62
 PIPE TRAVEL TIME(MIN.) =   2.27    Tc(MIN.) =   24.20
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    127.00 =    4794.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 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       92.62   24.20    1.644  0.25( 0.08) 0.33      60.7     126.10
     2       92.31   35.46    1.321  0.25( 0.08) 0.34      77.4     121.00
 LONGEST FLOWPATH FROM NODE    121.00 TO NODE    127.00 =    4794.00 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     329.03   31.17    1.423  0.29( 0.12) 0.41     250.8     116.00
    2     338.02   34.35    1.345  0.29( 0.12) 0.41     274.7     112.00
    3     337.88   35.15    1.328  0.29( 0.12) 0.41     278.8     104.00
    4     318.65   42.20    1.196  0.28( 0.12) 0.41     299.7     100.00
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    127.00 =    7705.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1     391.52   24.20    1.644  0.28( 0.11) 0.39     255.5     126.10
    2     421.46   31.17    1.423  0.28( 0.11) 0.39     321.9     116.00
    3     430.36   34.35    1.345  0.28( 0.11) 0.39     350.5     112.00
    4     430.20   35.15    1.328  0.28( 0.11) 0.39     355.7     104.00
    5     429.34   35.46    1.321  0.28( 0.11) 0.39     357.1     121.00
    6     401.61   42.20    1.196  0.28( 0.11) 0.39     377.1     100.00
  TOTAL AREA(ACRES) =       377.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      430.36  Tc(MIN.) =   34.354
EFFECTIVE AREA(ACRES) =    350.45  AREA-AVERAGED Fm(INCH/HR) =  0.11
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.39
TOTAL AREA(ACRES) =      377.1
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    127.00 =    7705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 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.) =   34.35
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.39
  EFFECTIVE STREAM AREA(ACRES) =     350.45
  TOTAL STREAM AREA(ACRES) =     377.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     430.36

****************************************************************************
  FLOW PROCESS FROM NODE    126.60 TO NODE    126.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     80.00  DOWNSTREAM(FEET) =     79.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
```

```
 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                 B        9.20      0.30     0.100    56   11.33
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =     20.79
 TOTAL AREA(ACRES) =      9.20   PEAK FLOW RATE(CFS) =     20.79

****************************************************************************
 FLOW PROCESS FROM NODE    126.70 TO NODE    126.80 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   79.50  DOWNSTREAM ELEVATION(FEET) =   79.00
 STREET LENGTH(FEET) =   350.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      30.83
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.76
   HALFSTREET FLOOD WIDTH(FEET) =   34.54
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.64
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.24
 STREET FLOW TRAVEL TIME(MIN.) =   3.55   Tc(MIN.) =   14.88
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.173
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B       10.40      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   10.40      SUBAREA RUNOFF(CFS) =   20.06
 EFFECTIVE AREA(ACRES) =     19.60    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       19.6        PEAK FLOW RATE(CFS) =      37.80

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.80   HALFSTREET FLOOD WIDTH(FEET) =  39.14
 FLOW VELOCITY(FEET/SEC.) =  1.71   DEPTH*VELOCITY(FT*FT/SEC.) =   1.37
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  350.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   23.0 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    126.80
 LONGEST FLOWPATH FROM NODE    126.60 TO NODE    126.80 =     680.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    126.80 TO NODE    127.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
```

```
============================================================================
  UPSTREAM ELEVATION(FEET) =   79.00  DOWNSTREAM ELEVATION(FEET) =   78.00
  STREET LENGTH(FEET) =   461.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      62.38
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.88
    HALFSTREET FLOOD WIDTH(FEET) =   46.36
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.20
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.93
  STREET FLOW TRAVEL TIME(MIN.) =   3.49   Tc(MIN.) =   18.37
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.926
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       26.90      0.30     0.100    56
  URBAN POOR COVER
  "TURF"                     B        2.20      0.30     1.000    74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.168
  SUBAREA AREA(ACRES) =   29.10      SUBAREA RUNOFF(CFS) =   49.12
  EFFECTIVE AREA(ACRES) =     48.70    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =       48.7        PEAK FLOW RATE(CFS) =      82.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.95   HALFSTREET FLOOD WIDTH(FEET) =  53.74
  FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY(FT*FT/SEC.) =   2.20
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  461.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   62.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    127.00
  LONGEST FLOWPATH FROM NODE    126.60 TO NODE    127.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 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.) =   18.37
  RAINFALL INTENSITY(INCH/HR) =   1.93
  AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.14
  EFFECTIVE STREAM AREA(ACRES) =      48.70
  TOTAL STREAM AREA(ACRES) =      48.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      82.56
```

```
 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      391.52   24.20    1.644  0.28( 0.11) 0.39     255.5     126.10
     1      421.46   31.17    1.423  0.28( 0.11) 0.39     321.9     116.00
     1      430.36   34.35    1.345  0.28( 0.11) 0.39     350.5     112.00
     1      430.20   35.15    1.328  0.28( 0.11) 0.39     355.7     104.00
     1      429.34   35.46    1.321  0.28( 0.11) 0.39     357.1     121.00
     1      401.61   42.20    1.196  0.28( 0.11) 0.39     377.1     100.00
     2       82.56   18.37    1.926  0.30( 0.04) 0.14      48.7     126.60

 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      434.19   18.37    1.926  0.28( 0.10) 0.34     242.6     126.60
     2      461.74   24.20    1.644  0.28( 0.10) 0.35     304.2     126.10
     3      481.96   31.17    1.423  0.28( 0.10) 0.36     370.6     116.00
     4      487.49   34.35    1.345  0.28( 0.10) 0.36     399.2     112.00
     5      486.55   35.15    1.328  0.28( 0.10) 0.36     404.4     104.00
     6      485.40   35.46    1.321  0.28( 0.10) 0.36     405.8     121.00
     7      452.18   42.20    1.196  0.28( 0.10) 0.36     425.8     100.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     487.49    Tc(MIN.) =    34.35
 EFFECTIVE AREA(ACRES) =     399.15   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.36
 TOTAL AREA(ACRES) =      425.8
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    127.00 =    7705.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    129.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     78.50  DOWNSTREAM(FEET) =     78.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
 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.)
 APARTMENTS                 B        7.90      0.30     0.200    56   12.07
 COMMERCIAL                 B        0.20      0.30     0.100    56   11.33
 URBAN POOR COVER
 "TURF"                     B        0.10      0.30     1.000    74   19.56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.207
 SUBAREA RUNOFF(CFS) =     18.29
 TOTAL AREA(ACRES) =      8.20   PEAK FLOW RATE(CFS) =     18.29

****************************************************************************
 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) =   78.00  DOWNSTREAM ELEVATION(FEET) =   75.00
  STREET LENGTH(FEET) =   525.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      29.08
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.56
    HALFSTREET FLOOD WIDTH(FEET) =   22.92
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.60
  STREET FLOW TRAVEL TIME(MIN.) =   3.05   Tc(MIN.) =   14.38
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.216
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B       10.80      0.30     0.200    56
  COMMERCIAL                 B        0.20      0.30     0.100    56
  URBAN POOR COVER
  "TURF"                     B        0.10      0.30     1.000    74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.205
  SUBAREA AREA(ACRES) =   11.10      SUBAREA RUNOFF(CFS) =   21.52
  EFFECTIVE AREA(ACRES) =     19.30    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =       19.3        PEAK FLOW RATE(CFS) =      37.41

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  24.87
  FLOW VELOCITY(FEET/SEC.) =  3.11   DEPTH*VELOCITY(FT*FT/SEC.) =   1.86
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  525.0 FT WITH ELEVATION-DROP =    3.0 FT, IS   26.0 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    130.00
  LONGEST FLOWPATH FROM NODE    128.00 TO NODE    130.00 =     855.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   75.00  DOWNSTREAM ELEVATION(FEET) =   74.00
  STREET LENGTH(FEET) =   837.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      47.12
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.82
   HALFSTREET FLOOD WIDTH(FEET) =   35.80
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.52
 STREET FLOW TRAVEL TIME(MIN.) =   7.48   Tc(MIN.) =   21.87
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.743
 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"       B        0.10      0.30     0.500    56
 APARTMENTS                 B       12.40      0.30     0.200    56
 COMMERCIAL                 B        0.10      0.30     0.100    56
 URBAN POOR COVER
 "TURF"                     B        0.10      0.30     1.000    74
 SCHOOL                     B        0.10      0.30     0.600    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.211
 SUBAREA AREA(ACRES) =   12.80      SUBAREA RUNOFF(CFS) =   19.35
 EFFECTIVE AREA(ACRES) =     32.10    AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.21
 TOTAL AREA(ACRES) =       32.1        PEAK FLOW RATE(CFS) =      48.55

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.82   HALFSTREET FLOOD WIDTH(FEET) =  36.22
 FLOW VELOCITY(FEET/SEC.) =  1.88   DEPTH*VELOCITY(FT*FT/SEC.) =   1.55
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  837.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   22.3 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    130.50
 LONGEST FLOWPATH FROM NODE    128.00 TO NODE    130.50 =    1692.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.50 TO NODE    131.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    74.00  DOWNSTREAM(FEET) =    73.50
 FLOW LENGTH(FEET) =   188.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.83
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      48.55
 PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   22.40
 LONGEST FLOWPATH FROM NODE    128.00 TO NODE    131.00 =    1880.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     88.00  DOWNSTREAM(FEET) =     87.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.80      0.25     0.500    69   12.62
 COMMERCIAL                 C        0.90      0.25     0.100    69    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.288
 SUBAREA RUNOFF(CFS) =      4.10
 TOTAL AREA(ACRES) =      1.70   PEAK FLOW RATE(CFS) =      4.10

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   87.00  DOWNSTREAM ELEVATION(FEET) =   84.00
 STREET LENGTH(FEET) =   733.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.77
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   15.66
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.88
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.81
 STREET FLOW TRAVEL TIME(MIN.) =    6.51   Tc(MIN.) =   16.37
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.058
 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"       C        3.30      0.25     0.500    69
 COMMERCIAL                 C        3.00      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.310
 SUBAREA AREA(ACRES) =    6.30      SUBAREA RUNOFF(CFS) =   11.23
 EFFECTIVE AREA(ACRES) =      8.00    AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =        8.0        PEAK FLOW RATE(CFS) =      14.27

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.24
 FLOW VELOCITY(FEET/SEC.) =  2.05   DEPTH*VELOCITY(FT*FT/SEC.) =   0.99
```

```
  LONGEST FLOWPATH FROM NODE    132.00 TO NODE    134.00 =    1063.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    135.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   84.00  DOWNSTREAM ELEVATION(FEET) =   83.50
  STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      27.84
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.68
    HALFSTREET FLOOD WIDTH(FEET) =   29.02
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.69
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.15
  STREET FLOW TRAVEL TIME(MIN.) =   3.80   Tc(MIN.) =   20.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.826
  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"       C        8.60      0.25     0.500    69
  COMMERCIAL                 C        8.60      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.300
  SUBAREA AREA(ACRES) =   17.20      SUBAREA RUNOFF(CFS) =   27.10
  EFFECTIVE AREA(ACRES) =     25.20    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =       25.2        PEAK FLOW RATE(CFS) =      39.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.76   HALFSTREET FLOOD WIDTH(FEET) =  33.05
  FLOW VELOCITY(FEET/SEC.) =  1.85   DEPTH*VELOCITY(FT*FT/SEC.) =   1.41
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  385.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   36.1 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    135.00
  LONGEST FLOWPATH FROM NODE    132.00 TO NODE    135.00 =    1448.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    136.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    83.50  DOWNSTREAM(FEET) =    82.00
  FLOW LENGTH(FEET) =  1072.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.2 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      39.69
 PIPE TRAVEL TIME(MIN.) =   4.05    Tc(MIN.) =   24.22
 LONGEST FLOWPATH FROM NODE    132.00 TO NODE    136.00 =    2520.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    136.00 TO NODE    136.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   24.22
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.644
 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"       C       15.20      0.25     0.500    69
 COMMERCIAL                 C       13.20      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.314
 SUBAREA AREA(ACRES) =   28.40      SUBAREA RUNOFF(CFS) =   40.01
 EFFECTIVE AREA(ACRES) =     53.60   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =       53.6       PEAK FLOW RATE(CFS) =      75.58

****************************************************************************
 FLOW PROCESS FROM NODE    136.00 TO NODE    137.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    82.00  DOWNSTREAM(FEET) =    76.00
 FLOW LENGTH(FEET) =  1011.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.99
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      75.58
 PIPE TRAVEL TIME(MIN.) =   1.87    Tc(MIN.) =   26.09
 LONGEST FLOWPATH FROM NODE    132.00 TO NODE    137.00 =    3531.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    137.00 TO NODE    137.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   26.09
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.575
 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"       C       16.20      0.25     0.500    69
 COMMERCIAL                 C       14.10      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.314
 SUBAREA AREA(ACRES) =   30.30      SUBAREA RUNOFF(CFS) =   40.81
 EFFECTIVE AREA(ACRES) =     83.90   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =       83.9       PEAK FLOW RATE(CFS) =     113.08
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    137.00 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) =    76.00  DOWNSTREAM(FEET) =    74.00
  FLOW LENGTH(FEET) =  1012.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  46.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.54
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     113.08
  PIPE TRAVEL TIME(MIN.) =   2.58    Tc(MIN.) =   28.67
  LONGEST FLOWPATH FROM NODE    132.00 TO NODE    141.00 =    4543.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 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.) =   28.67
  RAINFALL INTENSITY(INCH/HR) =   1.49
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.31
  EFFECTIVE STREAM AREA(ACRES) =      83.90
  TOTAL STREAM AREA(ACRES) =      83.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     113.08

****************************************************************************
  FLOW PROCESS FROM NODE    138.00 TO NODE    139.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     76.00  DOWNSTREAM(FEET) =     75.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  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                 B        2.10      0.30     0.100    56   11.33
  COMMERCIAL                 C        3.20      0.25     0.100    69   11.33
  URBAN POOR COVER
  "TURF"                     B        0.10      0.30     1.000    74   19.56
  SCHOOL                     B        3.20      0.30     0.600    56   15.35
  SCHOOL                     C        0.70      0.25     0.600    69   15.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.319
  SUBAREA RUNOFF(CFS) =     20.50
  TOTAL AREA(ACRES) =      9.30   PEAK FLOW RATE(CFS) =     20.50

****************************************************************************
  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) =   75.50  DOWNSTREAM ELEVATION(FEET) =   75.00
  STREET LENGTH(FEET) =   560.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      33.61
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.77
    HALFSTREET FLOOD WIDTH(FEET) =   33.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.54
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.18
  STREET FLOW TRAVEL TIME(MIN.) =   6.06   Tc(MIN.) =   17.39
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.988
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.20      0.30     0.100    56
  URBAN POOR COVER
  "TURF"                     B        0.30      0.30     1.000    74
  SCHOOL                     B        5.00      0.30     0.600    56
  SCHOOL                     C        6.10      0.25     0.600    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.473
  SUBAREA AREA(ACRES) =   15.60      SUBAREA RUNOFF(CFS) =   26.08
  EFFECTIVE AREA(ACRES) =     24.90    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       24.9        PEAK FLOW RATE(CFS) =      41.95

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.82   HALFSTREET FLOOD WIDTH(FEET) =  36.16
  FLOW VELOCITY(FEET/SEC.) =  1.63   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  560.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   27.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    140.00
  LONGEST FLOWPATH FROM NODE    138.00 TO NODE    140.00 =     890.00 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) =    75.00  DOWNSTREAM(FEET) =    74.00
  FLOW LENGTH(FEET) =   391.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.65
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      41.95
  PIPE TRAVEL TIME(MIN.) =   1.15    Tc(MIN.) =   18.54
  LONGEST FLOWPATH FROM NODE    138.00 TO NODE    141.00 =    1281.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.54
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.916
  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"       B        1.30      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.00      0.25     0.500    69
  COMMERCIAL                 B        3.60      0.30     0.100    56
  COMMERCIAL                 C        4.80      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     B        0.20      0.30     1.000    74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.226
  SUBAREA AREA(ACRES) =   11.90      SUBAREA RUNOFF(CFS) =   19.86
  EFFECTIVE AREA(ACRES) =     36.80   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       36.8       PEAK FLOW RATE(CFS) =      60.20

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    141.00 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.) =   18.54
  RAINFALL INTENSITY(INCH/HR) =   1.92
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =      36.80
  TOTAL STREAM AREA(ACRES) =      36.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      60.20

  ** CONFLUENCE DATA **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      113.08   28.67    1.492  0.25( 0.08) 0.31      83.9     132.00
      2       60.20   18.54    1.916  0.28( 0.10) 0.35      36.8     138.00

  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      155.20   18.54    1.916  0.26( 0.09) 0.33      91.1     138.00
      2      159.25   28.67    1.492  0.26( 0.08) 0.32     120.7     132.00
```

```
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     159.25    Tc(MIN.) =    28.67
EFFECTIVE AREA(ACRES) =     120.70   AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.32
TOTAL AREA(ACRES) =      120.7
LONGEST FLOWPATH FROM NODE    132.00 TO NODE    141.00 =    4543.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    143.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     78.00  DOWNSTREAM(FEET) =     77.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  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.)
  APARTMENTS                 B        0.30      0.30     0.200    56   12.07
  COMMERCIAL                 B        0.40      0.30     0.100    56   11.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.143
  SUBAREA RUNOFF(CFS) =      1.57
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.57

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    144.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   77.50  DOWNSTREAM ELEVATION(FEET) =   77.00
  STREET LENGTH(FEET) =   307.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.93
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.34
  STREET FLOW TRAVEL TIME(MIN.) =   5.16   Tc(MIN.) =   16.49
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.049
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  APARTMENTS                 B        1.20      0.30     0.200    56
  COMMERCIAL                 B        0.30      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.180
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    2.69
  EFFECTIVE AREA(ACRES) =      2.20    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =        2.2        PEAK FLOW RATE(CFS) =      3.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  13.09
  FLOW VELOCITY(FEET/SEC.) =  1.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.40
  LONGEST FLOWPATH FROM NODE    142.00 TO NODE    144.00 =     637.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    144.00 TO NODE    145.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   77.00  DOWNSTREAM ELEVATION(FEET) =   76.00
  STREET LENGTH(FEET) =   632.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.76
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.44
    HALFSTREET FLOOD WIDTH(FEET) =   16.37
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.20
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.53
  STREET FLOW TRAVEL TIME(MIN.) =   8.80   Tc(MIN.) =   25.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.603
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        3.30      0.30     0.200    56
  COMMERCIAL                 B        0.70      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.183
  SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    5.58
  EFFECTIVE AREA(ACRES) =      6.20    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        6.2        PEAK FLOW RATE(CFS) =      8.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.01
  FLOW VELOCITY(FEET/SEC.) =  1.28   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
  LONGEST FLOWPATH FROM NODE    142.00 TO NODE    145.00 =    1269.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    146.00 IS CODE =  62
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----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   76.00  DOWNSTREAM ELEVATION(FEET) =   72.00
  STREET LENGTH(FEET) =  1273.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.90
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   20.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.91
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
  STREET FLOW TRAVEL TIME(MIN.) =  11.12   Tc(MIN.) =   36.41
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
  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"       B        2.50      0.30     0.500    56
  COMMERCIAL                 B        2.70      0.30     0.100    56
  SCHOOL                     B        8.60      0.30     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.484
  SUBAREA AREA(ACRES) =   13.80      SUBAREA RUNOFF(CFS) =   14.36
  EFFECTIVE AREA(ACRES) =     20.00    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       20.0        PEAK FLOW RATE(CFS) =      21.32

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.56   HALFSTREET FLOOD WIDTH(FEET) =  22.80
  FLOW VELOCITY(FEET/SEC.) =  2.12   DEPTH*VELOCITY(FT*FT/SEC.) =   1.18
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1273.0 FT WITH ELEVATION-DROP =   4.0 FT, IS   23.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    146.00
  LONGEST FLOWPATH FROM NODE    142.00 TO NODE    146.00 =    2542.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    146.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   72.00  DOWNSTREAM ELEVATION(FEET) =   71.00
  STREET LENGTH(FEET) =   594.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
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 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      30.68
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.74
   HALFSTREET FLOOD WIDTH(FEET) =   32.58
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.76
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
 STREET FLOW TRAVEL TIME(MIN.) =   5.63   Tc(MIN.) =   42.05
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.198
 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"       B       10.50      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.10      0.25     0.500    69
 COMMERCIAL                 B        5.30      0.30     0.100    56
 COMMERCIAL                 C        0.60      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     B        0.70      0.30     1.000    74
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.395
 SUBAREA AREA(ACRES) =   19.20      SUBAREA RUNOFF(CFS) =   18.71
 EFFECTIVE AREA(ACRES) =     39.20    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       39.2        PEAK FLOW RATE(CFS) =      38.18

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.79   HALFSTREET FLOOD WIDTH(FEET) =  37.50
 FLOW VELOCITY(FEET/SEC.) =  1.83   DEPTH*VELOCITY(FT*FT/SEC.) =   1.44
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  594.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   36.8 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    146.50
 LONGEST FLOWPATH FROM NODE    142.00 TO NODE    146.50 =    3136.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    146.50 TO NODE    147.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    71.00  DOWNSTREAM(FEET) =    70.00
 FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.33
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      38.18
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   42.17
 LONGEST FLOWPATH FROM NODE    142.00 TO NODE    147.00 =    3210.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    148.00 TO NODE    149.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
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 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     74.00  DOWNSTREAM(FEET) =     72.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
 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"       B        1.30      0.30     0.500    56   10.99
 COMMERCIAL                 B        0.60      0.30     0.100    56    8.59
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.374
 SUBAREA RUNOFF(CFS) =      4.90
 TOTAL AREA(ACRES) =      1.90   PEAK FLOW RATE(CFS) =      4.90

****************************************************************************
 FLOW PROCESS FROM NODE    149.00 TO NODE    150.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
 UPSTREAM ELEVATION(FEET) =   72.00  DOWNSTREAM ELEVATION(FEET) =   70.00
 STREET LENGTH(FEET) =   341.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.30
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.40
   HALFSTREET FLOOD WIDTH(FEET) =   14.26
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.13
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
 STREET FLOW TRAVEL TIME(MIN.) =   2.67   Tc(MIN.) =   11.25
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.551
 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"       B        2.80      0.30     0.500    56
 COMMERCIAL                 B        1.20      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.380
 SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    8.77
 EFFECTIVE AREA(ACRES) =      5.90    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =        5.9        PEAK FLOW RATE(CFS) =      12.94

 END OF SUBAREA STREET FLOW HYDRAULICS:
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  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  16.29
  FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY(FT*FT/SEC.) =   1.02
  LONGEST FLOWPATH FROM NODE    148.00 TO NODE    150.00 =     671.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    151.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   70.00  DOWNSTREAM ELEVATION(FEET) =   69.50
  STREET LENGTH(FEET) =   383.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.72
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.60
    HALFSTREET FLOOD WIDTH(FEET) =   24.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.48
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.88
  STREET FLOW TRAVEL TIME(MIN.) =   4.31   Tc(MIN.) =   15.56
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.118
  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"       B        4.00      0.30     0.500    56
  COMMERCIAL                 B        1.30      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.402
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =    9.53
  EFFECTIVE AREA(ACRES) =     11.20    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       11.2        PEAK FLOW RATE(CFS) =      20.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.62   HALFSTREET FLOOD WIDTH(FEET) =  25.91
  FLOW VELOCITY(FEET/SEC.) =  1.54   DEPTH*VELOCITY(FT*FT/SEC.) =   0.95
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  383.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   10.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    151.00
  LONGEST FLOWPATH FROM NODE    148.00 TO NODE    151.00 =    1054.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    151.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   69.50  DOWNSTREAM ELEVATION(FEET) =   69.00
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  STREET LENGTH(FEET) =   502.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.68
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.69
    HALFSTREET FLOOD WIDTH(FEET) =   29.57
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.50
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.04
  STREET FLOW TRAVEL TIME(MIN.) =   5.58   Tc(MIN.) =   21.14
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.777
  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"       B        5.30      0.30     0.500    56
  COMMERCIAL                 B        1.80      0.30     0.100    56
  URBAN POOR COVER
  "TURF"                     B        0.30      0.30     1.000    74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.423
  SUBAREA AREA(ACRES) =    7.40      SUBAREA RUNOFF(CFS) =   10.99
  EFFECTIVE AREA(ACRES) =     18.60    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       18.6        PEAK FLOW RATE(CFS) =      27.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.71   HALFSTREET FLOOD WIDTH(FEET) =  30.43
  FLOW VELOCITY(FEET/SEC.) =  1.53   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  502.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   13.8 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    151.50
  LONGEST FLOWPATH FROM NODE    148.00 TO NODE    151.50 =    1556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    151.50 TO NODE    152.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    69.00  DOWNSTREAM(FEET) =    68.50
  FLOW LENGTH(FEET) =   168.16   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.43
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.72
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   21.66
  LONGEST FLOWPATH FROM NODE    148.00 TO NODE    152.00 =    1724.16 FEET.

****************************************************************************
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```
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     70.00  DOWNSTREAM(FEET) =     69.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  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"       B        1.50      0.30     0.500    56   14.50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.10      0.25     0.500    69   14.50
  COMMERCIAL                 B        0.60      0.30     0.100    56   11.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.391
  SUBAREA RUNOFF(CFS) =      4.80
  TOTAL AREA(ACRES) =      2.20   PEAK FLOW RATE(CFS) =      4.80

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    155.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   69.50  DOWNSTREAM ELEVATION(FEET) =   69.00
  STREET LENGTH(FEET) =   403.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.94
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   20.73
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.20
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.62
  STREET FLOW TRAVEL TIME(MIN.) =   5.59   Tc(MIN.) =   16.92
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.019
  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"       B        3.80      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.10      0.25     0.500    69
  COMMERCIAL                 B        1.50      0.30     0.100    56
  URBAN POOR COVER
```

```
 "TURF"                        B        0.60      0.30     1.000    74
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.450
 SUBAREA AREA(ACRES) =    6.00      SUBAREA RUNOFF(CFS) =   10.17
 EFFECTIVE AREA(ACRES) =      8.20    AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.43
 TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      13.94

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.56   HALFSTREET FLOOD WIDTH(FEET) =  23.10
 FLOW VELOCITY(FEET/SEC.) =  1.35   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  403.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   12.1 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    155.00
 LONGEST FLOWPATH FROM NODE    153.00 TO NODE    155.00 =     733.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    156.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    69.00  DOWNSTREAM(FEET) =    68.50
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.16
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.94
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   17.32
  LONGEST FLOWPATH FROM NODE    153.00 TO NODE    156.00 =     856.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    157.00 TO NODE    158.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     74.00  DOWNSTREAM(FEET) =     72.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        3.30      0.25     0.500    69   10.99
  COMMERCIAL                  C        0.90      0.25     0.100    69    8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.414
  SUBAREA RUNOFF(CFS) =     10.87
  TOTAL AREA(ACRES) =      4.20   PEAK FLOW RATE(CFS) =     10.87

****************************************************************************
  FLOW PROCESS FROM NODE    158.00 TO NODE    159.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
```

```
 UPSTREAM ELEVATION(FEET) =   72.00  DOWNSTREAM ELEVATION(FEET) =   70.00
 STREET LENGTH(FEET) =   307.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.33
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.46
   HALFSTREET FLOOD WIDTH(FEET) =   17.07
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.50
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.15
 STREET FLOW TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =   10.63
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.635
 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"       C        2.60      0.25     0.500    69
 COMMERCIAL                 C        1.30      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
 SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =    8.93
 EFFECTIVE AREA(ACRES) =      8.10    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =        8.1        PEAK FLOW RATE(CFS) =      18.50

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.40
 FLOW VELOCITY(FEET/SEC.) =  2.62   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
 LONGEST FLOWPATH FROM NODE    157.00 TO NODE    159.00 =     637.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    159.00 TO NODE    159.50 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   70.00  DOWNSTREAM ELEVATION(FEET) =   69.50
 STREET LENGTH(FEET) =   624.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.34
   ***STREET FLOWING FULL***
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    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.71
    HALFSTREET FLOOD WIDTH(FEET) =   30.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.98
  STREET FLOW TRAVEL TIME(MIN.) =   7.55   Tc(MIN.) =   18.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.938
  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"       C        5.70      0.25     0.500    69
  COMMERCIAL                 C        2.50      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.378
  SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   13.60
  EFFECTIVE AREA(ACRES) =     16.30    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      27.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.73   HALFSTREET FLOOD WIDTH(FEET) =  31.34
  FLOW VELOCITY(FEET/SEC.) =  1.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.02
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  624.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   14.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    159.50
  LONGEST FLOWPATH FROM NODE    157.00 TO NODE    159.50 =    1261.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    159.50 TO NODE    160.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    69.50  DOWNSTREAM(FEET) =    69.00
  FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.33
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.02
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   18.46
  LONGEST FLOWPATH FROM NODE    157.00 TO NODE    160.00 =    1371.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    161.00 TO NODE    162.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     86.00  DOWNSTREAM(FEET) =     85.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.50      0.25     0.500    69   12.62
```

```
  COMMERCIAL                 C        0.50      0.25     0.100    69    9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      4.77
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      4.77

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    163.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   85.00  DOWNSTREAM ELEVATION(FEET) =   84.00
  STREET LENGTH(FEET) =   437.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.57
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   15.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
  STREET FLOW TRAVEL TIME(MIN.) =   5.15   Tc(MIN.) =   15.01
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.162
  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"       C        2.10      0.25     0.500    69
  COMMERCIAL                 C        0.80      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.10      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.410
  SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =    5.56
  EFFECTIVE AREA(ACRES) =      5.00    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        5.0        PEAK FLOW RATE(CFS) =       9.27

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  17.23
  FLOW VELOCITY(FEET/SEC.) =  1.49   DEPTH*VELOCITY(FT*FT/SEC.) =   0.69
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    163.00 =     767.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    164.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   84.00  DOWNSTREAM ELEVATION(FEET) =   82.00
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```
  STREET LENGTH(FEET) =   283.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.59
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.44
    HALFSTREET FLOOD WIDTH(FEET) =   16.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.49
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.09
  STREET FLOW TRAVEL TIME(MIN.) =   1.89   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"       C        3.90      0.25     0.500    69
  COMMERCIAL                 C        1.10      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.412
  SUBAREA AREA(ACRES) =    5.00      SUBAREA RUNOFF(CFS) =    8.63
  EFFECTIVE AREA(ACRES) =     10.00    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      17.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.62
  FLOW VELOCITY(FEET/SEC.) =  2.65   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    164.00 =    1050.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    164.00 TO NODE    165.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   82.00  DOWNSTREAM ELEVATION(FEET) =   80.00
  STREET LENGTH(FEET) =   584.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.05
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
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    STREET FLOW DEPTH(FEET) =  0.57
    HALFSTREET FLOOD WIDTH(FEET) =   23.71
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.32
  STREET FLOW TRAVEL TIME(MIN.) =   4.23   Tc(MIN.) =   21.14
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.777
  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"       C        7.70      0.25     0.500    69
  COMMERCIAL                 C        2.60      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.399
  SUBAREA AREA(ACRES) =   10.30      SUBAREA RUNOFF(CFS) =   15.55
  EFFECTIVE AREA(ACRES) =     20.30    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       20.3        PEAK FLOW RATE(CFS) =      30.63

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.61   HALFSTREET FLOOD WIDTH(FEET) =  25.36
  FLOW VELOCITY(FEET/SEC.) =  2.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  584.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   21.8 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    165.00
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    165.00 =    1634.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    166.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   80.00  DOWNSTREAM ELEVATION(FEET) =   78.00
  STREET LENGTH(FEET) =   939.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.10
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.71
    HALFSTREET FLOOD WIDTH(FEET) =   30.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.24
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.60
  STREET FLOW TRAVEL TIME(MIN.) =   6.97   Tc(MIN.) =   28.11
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.509
  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"       C       12.60      0.25     0.500    69
```

```
  COMMERCIAL                 C        3.90      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.405
  SUBAREA AREA(ACRES) =   16.50      SUBAREA RUNOFF(CFS) =   20.91
  EFFECTIVE AREA(ACRES) =     36.80    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       36.8        PEAK FLOW RATE(CFS) =      46.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.74   HALFSTREET FLOOD WIDTH(FEET) =  32.01
  FLOW VELOCITY(FEET/SEC.) =  2.32   DEPTH*VELOCITY(FT*FT/SEC.) =   1.71
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  939.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   29.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    166.00
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    166.00 =    2573.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    166.00 TO NODE    167.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   78.00  DOWNSTREAM ELEVATION(FEET) =   73.00
  STREET LENGTH(FEET) =   761.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      62.14
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.68
    HALFSTREET FLOOD WIDTH(FEET) =   28.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.78
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.57
  STREET FLOW TRAVEL TIME(MIN.) =    3.35   Tc(MIN.) =   31.46
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.415
  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"       C       18.00      0.25     0.500    69
  COMMERCIAL                 C        7.90      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.20      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.383
  SUBAREA AREA(ACRES) =   26.10      SUBAREA RUNOFF(CFS) =   30.99
  EFFECTIVE AREA(ACRES) =     62.90    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       62.9        PEAK FLOW RATE(CFS) =      74.51

  END OF SUBAREA STREET FLOW HYDRAULICS:
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 DEPTH(FEET) = 0.72   HALFSTREET FLOOD WIDTH(FEET) =  30.91
 FLOW VELOCITY(FEET/SEC.) =  3.97   DEPTH*VELOCITY(FT*FT/SEC.) =   2.85
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  761.0 FT WITH ELEVATION-DROP =   5.0 FT, IS   56.1 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    167.00
 LONGEST FLOWPATH FROM NODE    161.00 TO NODE    167.00 =    3334.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    167.00 TO NODE    168.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   73.00  DOWNSTREAM ELEVATION(FEET) =   72.00
 STREET LENGTH(FEET) =   291.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      84.87
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.83
   HALFSTREET FLOOD WIDTH(FEET) =   36.59
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.21
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.67
 STREET FLOW TRAVEL TIME(MIN.) =   1.51   Tc(MIN.) =   32.97
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.378
 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"       C       12.60      0.25     0.500    69
 COMMERCIAL                 C        5.10      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     C        0.30      0.25     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.395
 SUBAREA AREA(ACRES) =   18.00      SUBAREA RUNOFF(CFS) =   20.72
 EFFECTIVE AREA(ACRES) =     80.90    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       80.9        PEAK FLOW RATE(CFS) =      93.10

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.86   HALFSTREET FLOOD WIDTH(FEET) =  37.93
 FLOW VELOCITY(FEET/SEC.) =  3.28   DEPTH*VELOCITY(FT*FT/SEC.) =   2.81
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  291.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   44.9 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    168.00
 LONGEST FLOWPATH FROM NODE    161.00 TO NODE    168.00 =    3625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    168.00 TO NODE    169.00 IS CODE =  31
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----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    72.00  DOWNSTREAM(FEET) =    70.00
  FLOW LENGTH(FEET) =   621.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  39.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.51
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      93.10
  PIPE TRAVEL TIME(MIN.) =   1.38    Tc(MIN.) =   34.35
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    169.00 =    4246.00 FEET.

****************************************************************************
  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) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     68.00  DOWNSTREAM(FEET) =     67.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.50      0.25     0.500    69   12.62
  COMMERCIAL                 C        0.70      0.25     0.100    69    9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.413
  SUBAREA RUNOFF(CFS) =      7.62
  TOTAL AREA(ACRES) =      3.20   PEAK FLOW RATE(CFS) =      7.62

****************************************************************************
  FLOW PROCESS FROM NODE    171.00 TO NODE    172.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   67.00  DOWNSTREAM ELEVATION(FEET) =   66.00
  STREET LENGTH(FEET) =   398.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.48
    HALFSTREET FLOOD WIDTH(FEET) =   18.32
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.61
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   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.78
 STREET FLOW TRAVEL TIME(MIN.) =   4.11   Tc(MIN.) =   13.98
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.253
 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"       B        0.60      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    69
 COMMERCIAL                 B        0.10      0.30     0.100    56
 COMMERCIAL                 C        0.70      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.416
 SUBAREA AREA(ACRES) =    3.80      SUBAREA RUNOFF(CFS) =    7.33
 EFFECTIVE AREA(ACRES) =      7.00    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =        7.0        PEAK FLOW RATE(CFS) =      13.53

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  20.11
 FLOW VELOCITY(FEET/SEC.) =  1.69   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
 LONGEST FLOWPATH FROM NODE    170.00 TO NODE    172.00 =     728.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    172.00 TO NODE    173.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   66.00  DOWNSTREAM ELEVATION(FEET) =   65.50
 STREET LENGTH(FEET) =   435.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.75
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.61
   HALFSTREET FLOOD WIDTH(FEET) =   25.36
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.42
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
 STREET FLOW TRAVEL TIME(MIN.) =   5.11   Tc(MIN.) =   19.08
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.884
 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"       B        3.70      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.20      0.25     0.500    69
 COMMERCIAL                 B        1.40      0.30     0.100    56
```

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  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.394
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =    8.43
  EFFECTIVE AREA(ACRES) =     12.30    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       12.3        PEAK FLOW RATE(CFS) =      19.63

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.62   HALFSTREET FLOOD WIDTH(FEET) =  26.21
  FLOW VELOCITY(FEET/SEC.) =  1.47   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  435.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   10.5 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    173.00
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    173.00 =    1163.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    173.00 TO NODE    174.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    65.50  DOWNSTREAM(FEET) =    65.00
  FLOW LENGTH(FEET) =   149.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.17
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.63
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   19.56
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    174.00 =    1312.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    176.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     74.00  DOWNSTREAM(FEET) =     72.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  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"       B        3.40      0.30     0.500    56   10.99
  COMMERCIAL                 B        0.40      0.30     0.100    56    8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.458
  SUBAREA RUNOFF(CFS) =      9.72
  TOTAL AREA(ACRES) =      3.80   PEAK FLOW RATE(CFS) =      9.72

****************************************************************************
  FLOW PROCESS FROM NODE    176.00 TO NODE    177.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   72.00  DOWNSTREAM ELEVATION(FEET) =   70.00
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  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.82
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.53
    HALFSTREET FLOOD WIDTH(FEET) =   21.27
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.16
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
  STREET FLOW TRAVEL TIME(MIN.) =   4.02   Tc(MIN.) =   12.61
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.390
  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"       B        7.90      0.30     0.500    56
  COMMERCIAL                 B        1.00      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.455
  SUBAREA AREA(ACRES) =    8.90      SUBAREA RUNOFF(CFS) =   18.05
  EFFECTIVE AREA(ACRES) =     12.70    AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       12.7        PEAK FLOW RATE(CFS) =      25.75

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.57   HALFSTREET FLOOD WIDTH(FEET) =  23.47
  FLOW VELOCITY(FEET/SEC.) =  2.42   DEPTH*VELOCITY(FT*FT/SEC.) =   1.38
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  522.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   19.3 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    177.00
  LONGEST FLOWPATH FROM NODE    175.00 TO NODE    177.00 =     852.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    177.00 TO NODE    178.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   70.00  DOWNSTREAM ELEVATION(FEET) =   68.00
  STREET LENGTH(FEET) =   539.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      36.00
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.63
    HALFSTREET FLOOD WIDTH(FEET) =   26.40
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.66
  STREET FLOW TRAVEL TIME(MIN.) =   3.39   Tc(MIN.) =   15.99
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.085
  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"       B       10.90      0.30     0.500    56
  COMMERCIAL                 B        0.80      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.473
  SUBAREA AREA(ACRES) =   11.70      SUBAREA RUNOFF(CFS) =   20.46
  EFFECTIVE AREA(ACRES) =     24.40    AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       24.4        PEAK FLOW RATE(CFS) =      42.73

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.66   HALFSTREET FLOOD WIDTH(FEET) =  28.05
  FLOW VELOCITY(FEET/SEC.) =  2.78   DEPTH*VELOCITY(FT*FT/SEC.) =   1.84
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  539.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   25.0 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    178.00
  LONGEST FLOWPATH FROM NODE    175.00 TO NODE    178.00 =    1391.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    178.00 TO NODE    179.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   68.00  DOWNSTREAM ELEVATION(FEET) =   66.00
  STREET LENGTH(FEET) =  1457.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      60.95
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.93
    HALFSTREET FLOOD WIDTH(FEET) =   51.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.69
  STREET FLOW TRAVEL TIME(MIN.) =  13.40   Tc(MIN.) =   29.40
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.471
  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"       B       15.00      0.30     0.500    56
 COMMERCIAL                 B       14.20      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.305
 SUBAREA AREA(ACRES) =   29.20      SUBAREA RUNOFF(CFS) =   36.25
 EFFECTIVE AREA(ACRES) =     53.60    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =       53.6        PEAK FLOW RATE(CFS) =      65.50

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.95   HALFSTREET FLOOD WIDTH(FEET) =  53.74
 FLOW VELOCITY(FEET/SEC.) =  1.83   DEPTH*VELOCITY(FT*FT/SEC.) =   1.74
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1457.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   44.6 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    179.00
 LONGEST FLOWPATH FROM NODE    175.00 TO NODE    179.00 =    2848.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    179.00 TO NODE    180.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   66.00  DOWNSTREAM ELEVATION(FEET) =   65.50
 STREET LENGTH(FEET) =  1087.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      81.22
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  1.16
   HALFSTREET FLOOD WIDTH(FEET) =   66.91
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.31
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.52
 STREET FLOW TRAVEL TIME(MIN.) =  13.84   Tc(MIN.) =   43.24
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.179
 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"       B        2.90      0.30     0.500    56
 COMMERCIAL                 B        5.40      0.30     0.100    56
 COMMERCIAL                 C        0.30      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     B       19.10      0.30     1.000    74
 SCHOOL                     B        7.60      0.30     0.600    56
 SCHOOL                     C        0.80      0.25     0.600    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
```

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  SUBAREA AREA(ACRES) =   36.10      SUBAREA RUNOFF(CFS) =   31.27
  EFFECTIVE AREA(ACRES) =     89.70    AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       89.7        PEAK FLOW RATE(CFS) =      82.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 1.17   HALFSTREET FLOOD WIDTH(FEET) =  67.22
  FLOW VELOCITY(FEET/SEC.) =  1.32   DEPTH*VELOCITY(FT*FT/SEC.) =   1.54
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1087.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   47.7 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    180.00
  LONGEST FLOWPATH FROM NODE    175.00 TO NODE    180.00 =    3935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    181.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    65.50  DOWNSTREAM(FEET) =    65.00
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.23
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      82.70
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   43.34
  LONGEST FLOWPATH FROM NODE    175.00 TO NODE    181.00 =    3996.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    181.10 TO NODE    181.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.00  DOWNSTREAM(FEET) =     74.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       0.60      0.25     0.500    69   12.62
  COMMERCIAL                 C       1.30      0.25     0.100    69    9.86
  URBAN POOR COVER
  "TURF"                     C       0.20      0.25     1.000    83   17.03
  SCHOOL                     C       2.10      0.25     0.600    69   13.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.450
  SUBAREA RUNOFF(CFS) =      9.97
  TOTAL AREA(ACRES) =      4.20   PEAK FLOW RATE(CFS) =      9.97

****************************************************************************
  FLOW PROCESS FROM NODE    181.20 TO NODE    181.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =   74.00  DOWNSTREAM ELEVATION(FEET) =   72.50
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.61
    HALFSTREET FLOOD WIDTH(FEET) =   22.44
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.69
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.03
  STREET FLOW TRAVEL TIME(MIN.) =   7.01   Tc(MIN.) =   16.87
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.022
  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"       C        5.30      0.25     0.500    69
  COMMERCIAL                 C        2.50      0.25     0.100    69
  SCHOOL                     C        1.00      0.25     0.600    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.398
  SUBAREA AREA(ACRES) =    8.80      SUBAREA RUNOFF(CFS) =   15.23
  EFFECTIVE AREA(ACRES) =     13.00    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       13.0        PEAK FLOW RATE(CFS) =      22.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.65   HALFSTREET FLOOD WIDTH(FEET) =  24.65
  FLOW VELOCITY(FEET/SEC.) =  1.79   DEPTH*VELOCITY(FT*FT/SEC.) =   1.17
  LONGEST FLOWPATH FROM NODE    181.10 TO NODE    181.30 =    1041.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    181.30 TO NODE    181.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   72.50  DOWNSTREAM ELEVATION(FEET) =   72.00
  STREET LENGTH(FEET) =   216.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      39.68
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    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.76
    HALFSTREET FLOOD WIDTH(FEET) =   34.71
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.60
  STREET FLOW TRAVEL TIME(MIN.) =   1.71   Tc(MIN.) =   18.59
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.913
  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"       C       13.20      0.25     0.500    69
  COMMERCIAL                 C        6.20      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        1.80      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.425
  SUBAREA AREA(ACRES) =   21.20      SUBAREA RUNOFF(CFS) =   34.47
  EFFECTIVE AREA(ACRES) =     34.20    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       34.2        PEAK FLOW RATE(CFS) =      55.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.84   HALFSTREET FLOOD WIDTH(FEET) =  42.75
  FLOW VELOCITY(FEET/SEC.) =  2.22   DEPTH*VELOCITY(FT*FT/SEC.) =   1.86
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  216.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   54.0 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    181.40
  LONGEST FLOWPATH FROM NODE    181.10 TO NODE    181.40 =    1257.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    181.40 TO NODE    181.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   72.00  DOWNSTREAM ELEVATION(FEET) =   69.00
  STREET LENGTH(FEET) =   690.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      74.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.83
    HALFSTREET FLOOD WIDTH(FEET) =   42.09
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.52
  STREET FLOW TRAVEL TIME(MIN.) =   3.80   Tc(MIN.) =   22.38
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.720
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

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 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        5.60      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C       13.70      0.25     0.500    69
 COMMERCIAL                 B        1.80      0.30     0.100    56
 COMMERCIAL                 C        4.70      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.399
 SUBAREA AREA(ACRES) =   25.80      SUBAREA RUNOFF(CFS) =   37.48
 EFFECTIVE AREA(ACRES) =     60.00    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =       60.0        PEAK FLOW RATE(CFS) =      87.17

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.87   HALFSTREET FLOOD WIDTH(FEET) =  46.03
 FLOW VELOCITY(FEET/SEC.) =  3.11   DEPTH*VELOCITY(FT*FT/SEC.) =   2.71
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  690.0 FT WITH ELEVATION-DROP =   3.0 FT, IS   53.8 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    181.50
 LONGEST FLOWPATH FROM NODE    181.10 TO NODE    181.50 =    1947.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    181.50 TO NODE    181.60 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   69.00  DOWNSTREAM ELEVATION(FEET) =   66.50
 STREET LENGTH(FEET) =   623.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     105.55
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.93
   HALFSTREET FLOOD WIDTH(FEET) =   52.10
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.11
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.90
 STREET FLOW TRAVEL TIME(MIN.) =   3.34   Tc(MIN.) =   25.73
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.588
 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"       B        5.60      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C       12.90      0.25     0.500    69
 COMMERCIAL                 B        3.80      0.30     0.100    56
 COMMERCIAL                 C        5.10      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.370
 SUBAREA AREA(ACRES) =   27.40      SUBAREA RUNOFF(CFS) =   36.73
```

```
  EFFECTIVE AREA(ACRES) =     87.40    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       87.4        PEAK FLOW RATE(CFS) =     116.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.96   HALFSTREET FLOOD WIDTH(FEET) =  54.89
  FLOW VELOCITY(FEET/SEC.) =  3.16   DEPTH*VELOCITY(FT*FT/SEC.) =   3.04
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  623.0 FT WITH ELEVATION-DROP =   2.5 FT, IS   58.1 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    181.60
  LONGEST FLOWPATH FROM NODE    181.10 TO NODE    181.60 =    2570.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    181.60 TO NODE    181.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    66.50  DOWNSTREAM(FEET) =    66.00
  FLOW LENGTH(FEET) =    93.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  41.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.44
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     116.79
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   25.89
  LONGEST FLOWPATH FROM NODE    181.10 TO NODE    181.70 =    2663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    182.00 TO NODE    183.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     62.50  DOWNSTREAM(FEET) =     62.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  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"       B        1.20      0.30     0.500    56   14.50
  COMMERCIAL                 B        0.60      0.30     0.100    56   11.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      3.94
  TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      3.94

****************************************************************************
  FLOW PROCESS FROM NODE    183.00 TO NODE    184.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   62.00  DOWNSTREAM ELEVATION(FEET) =   61.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.50
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.42
   HALFSTREET FLOOD WIDTH(FEET) =   15.43
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.29
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.55
 STREET FLOW TRAVEL TIME(MIN.) =   6.65   Tc(MIN.) =   17.98
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.950
 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"       B        2.40      0.30     0.500    56
 COMMERCIAL                 B        0.70      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.410
 SUBAREA AREA(ACRES) =    3.10      SUBAREA RUNOFF(CFS) =    5.10
 EFFECTIVE AREA(ACRES) =      4.90    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =        4.9        PEAK FLOW RATE(CFS) =      8.08

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.84
 FLOW VELOCITY(FEET/SEC.) =  1.35   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
 LONGEST FLOWPATH FROM NODE    182.00 TO NODE    184.00 =     843.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    184.00 TO NODE    185.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   61.00  DOWNSTREAM ELEVATION(FEET) =   60.00
 STREET LENGTH(FEET) =   574.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.87
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.57
   HALFSTREET FLOOD WIDTH(FEET) =   23.28
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.61
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.91
 STREET FLOW TRAVEL TIME(MIN.) =   5.95   Tc(MIN.) =   23.93
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.655
 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"       B        8.70      0.30     0.500    56
 COMMERCIAL                 B        3.90      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.376
 SUBAREA AREA(ACRES) =   12.60      SUBAREA RUNOFF(CFS) =   17.49
 EFFECTIVE AREA(ACRES) =     17.50    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =       17.5        PEAK FLOW RATE(CFS) =      24.27

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.63   HALFSTREET FLOOD WIDTH(FEET) =  26.28
 FLOW VELOCITY(FEET/SEC.) =  1.80   DEPTH*VELOCITY(FT*FT/SEC.) =   1.13
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  574.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   24.5 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    185.00
 LONGEST FLOWPATH FROM NODE    182.00 TO NODE    185.00 =    1417.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    185.00 TO NODE    186.00 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) =    59.00
 FLOW LENGTH(FEET) =   580.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.22
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      24.27
 PIPE TRAVEL TIME(MIN.) =   2.29    Tc(MIN.) =   26.22
 LONGEST FLOWPATH FROM NODE    182.00 TO NODE    186.00 =    1997.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    186.00 TO NODE    186.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   26.22
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.571
 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"       B       10.20      0.30     0.500    56
 COMMERCIAL                 B        5.20      0.30     0.100    56
 URBAN POOR COVER
 "TURF"                     B        0.20      0.30     1.000    74
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.373
 SUBAREA AREA(ACRES) =   15.60      SUBAREA RUNOFF(CFS) =   20.48
 EFFECTIVE AREA(ACRES) =     33.10   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =       33.1       PEAK FLOW RATE(CFS) =      43.42
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    187.00 TO NODE    188.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     72.00  DOWNSTREAM(FEET) =     70.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.60      0.25     0.500    69   10.99
  COMMERCIAL                 C        5.80      0.25     0.100    69    8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.186
  SUBAREA RUNOFF(CFS) =     19.52
  TOTAL AREA(ACRES) =      7.40   PEAK FLOW RATE(CFS) =     19.52

****************************************************************************
  FLOW PROCESS FROM NODE    188.00 TO NODE    189.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   70.00  DOWNSTREAM ELEVATION(FEET) =   68.00
  STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      31.51
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.59
    HALFSTREET FLOOD WIDTH(FEET) =   24.44
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.60
  STREET FLOW TRAVEL TIME(MIN.) =   2.74   Tc(MIN.) =   11.33
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  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"       C        3.60      0.25     0.500    69
  COMMERCIAL                 C        7.10      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.235
```

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 SUBAREA AREA(ACRES) =   10.70      SUBAREA RUNOFF(CFS) =   23.90
 EFFECTIVE AREA(ACRES) =     18.10    AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.21
 TOTAL AREA(ACRES) =       18.1        PEAK FLOW RATE(CFS) =      40.51

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.63   HALFSTREET FLOOD WIDTH(FEET) =  26.64
 FLOW VELOCITY(FEET/SEC.) =  2.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.85
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  447.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   25.3 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    189.00
 LONGEST FLOWPATH FROM NODE    187.00 TO NODE    189.00 =     777.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    189.00 TO NODE    190.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   68.00  DOWNSTREAM ELEVATION(FEET) =   63.00
 STREET LENGTH(FEET) =  1345.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      69.18
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.77
   HALFSTREET FLOOD WIDTH(FEET) =   33.42
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.15
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.42
 STREET FLOW TRAVEL TIME(MIN.) =   7.12   Tc(MIN.) =   18.45
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.921
 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"       B        5.70      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C       14.70      0.25     0.500    69
 COMMERCIAL                 B        2.20      0.30     0.100    56
 COMMERCIAL                 C       11.90      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.337
 SUBAREA AREA(ACRES) =   34.50      SUBAREA RUNOFF(CFS) =   56.90
 EFFECTIVE AREA(ACRES) =     52.60    AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =       52.6        PEAK FLOW RATE(CFS) =      87.33

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.83   HALFSTREET FLOOD WIDTH(FEET) =  36.47
 FLOW VELOCITY(FEET/SEC.) =  3.33   DEPTH*VELOCITY(FT*FT/SEC.) =   2.76
```

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 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1345.0 FT WITH ELEVATION-DROP =   5.0 FT, IS   60.6 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    190.00
 LONGEST FLOWPATH FROM NODE    187.00 TO NODE    190.00 =    2122.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    190.00 TO NODE    194.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    63.00  DOWNSTREAM(FEET) =    62.00
 FLOW LENGTH(FEET) =   522.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  43.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.04
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      87.33
 PIPE TRAVEL TIME(MIN.) =   1.44    Tc(MIN.) =   19.89
 LONGEST FLOWPATH FROM NODE    187.00 TO NODE    194.00 =    2644.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    194.00 TO NODE    194.00 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.) =   19.89
 RAINFALL INTENSITY(INCH/HR) =   1.84
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.29
 EFFECTIVE STREAM AREA(ACRES) =      52.60
 TOTAL STREAM AREA(ACRES) =      52.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      87.33

****************************************************************************
 FLOW PROCESS FROM NODE    191.00 TO NODE    192.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     68.00  DOWNSTREAM(FEET) =     66.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
 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"       B        1.90      0.30     0.500    56   10.99
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.50      0.25     0.500    69   10.99
 COMMERCIAL                 B        0.50      0.30     0.100    56    8.59
 COMMERCIAL                 C        0.10      0.25     0.100    69    8.59
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.420
 SUBAREA RUNOFF(CFS) =      7.71
```

```
  TOTAL AREA(ACRES) =      3.00   PEAK FLOW RATE(CFS) =      7.71

****************************************************************************
  FLOW PROCESS FROM NODE    192.00 TO NODE    193.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   66.00  DOWNSTREAM ELEVATION(FEET) =   64.00
  STREET LENGTH(FEET) =   548.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.59
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.48
    HALFSTREET FLOOD WIDTH(FEET) =   18.32
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.94
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.94
  STREET FLOW TRAVEL TIME(MIN.) =   4.71   Tc(MIN.) =   13.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.318
  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"       B        4.30      0.30     0.500    56
  COMMERCIAL                 B        1.60      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.392
  SUBAREA AREA(ACRES) =    5.90      SUBAREA RUNOFF(CFS) =   11.68
  EFFECTIVE AREA(ACRES) =      8.90    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        8.9        PEAK FLOW RATE(CFS) =      17.62

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  21.03
  FLOW VELOCITY(FEET/SEC.) =  2.08   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
  LONGEST FLOWPATH FROM NODE    191.00 TO NODE    193.00 =     878.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    193.00 TO NODE    194.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   64.00  DOWNSTREAM ELEVATION(FEET) =   62.00
  STREET LENGTH(FEET) =   767.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.30
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.60
    HALFSTREET FLOOD WIDTH(FEET) =   24.87
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.11
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.26
  STREET FLOW TRAVEL TIME(MIN.) =   6.07   Tc(MIN.) =   19.37
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.869
  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"       B        6.90      0.30     0.500    56
  COMMERCIAL                 B        2.80      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.385
  SUBAREA AREA(ACRES) =    9.70      SUBAREA RUNOFF(CFS) =   15.31
  EFFECTIVE AREA(ACRES) =     18.60    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       18.6        PEAK FLOW RATE(CFS) =      29.32

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.62   HALFSTREET FLOOD WIDTH(FEET) =  26.15
  FLOW VELOCITY(FEET/SEC.) =  2.20   DEPTH*VELOCITY(FT*FT/SEC.) =   1.37
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  767.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   18.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    194.00
  LONGEST FLOWPATH FROM NODE    191.00 TO NODE    194.00 =    1645.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    194.00 TO NODE    194.00 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.) =   19.37
  RAINFALL INTENSITY(INCH/HR) =   1.87
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.39
  EFFECTIVE STREAM AREA(ACRES) =      18.60
  TOTAL STREAM AREA(ACRES) =      18.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      29.32

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       87.33   19.89    1.840  0.26( 0.08) 0.29      52.6     187.00
      2       29.32   19.37    1.869  0.30( 0.12) 0.39      18.6     191.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```

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 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      115.72   19.37    1.869  0.27( 0.09) 0.32      69.8     191.00
     2      116.17   19.89    1.840  0.27( 0.09) 0.32      71.2     187.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     116.17    Tc(MIN.) =    19.89
 EFFECTIVE AREA(ACRES) =      71.20   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.32
 TOTAL AREA(ACRES) =       71.2
 LONGEST FLOWPATH FROM NODE    187.00 TO NODE    194.00 =    2644.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    194.00 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) =    62.00  DOWNSTREAM(FEET) =    61.00
 FLOW LENGTH(FEET) =   265.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.43
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     116.17
 PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   20.41
 LONGEST FLOWPATH FROM NODE    187.00 TO NODE    198.00 =    2909.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    198.00 TO NODE    198.00 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.) =   20.41
 RAINFALL INTENSITY(INCH/HR) =   1.81
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.32
 EFFECTIVE STREAM AREA(ACRES) =      71.20
 TOTAL STREAM AREA(ACRES) =      71.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     116.17

****************************************************************************
 FLOW PROCESS FROM NODE    195.00 TO NODE    196.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     66.00  DOWNSTREAM(FEET) =     64.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
 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"       B        1.40      0.30     0.500    56   10.99
COMMERCIAL                 B        0.70      0.30     0.100    56    8.59
URBAN POOR COVER
"TURF"                     B        0.40      0.30     1.000    74   14.83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.468
SUBAREA RUNOFF(CFS) =      6.38
TOTAL AREA(ACRES) =      2.50   PEAK FLOW RATE(CFS) =      6.38

****************************************************************************
FLOW PROCESS FROM NODE    196.00 TO NODE    197.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =   64.00  DOWNSTREAM ELEVATION(FEET) =   62.00
STREET LENGTH(FEET) =   384.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 20.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
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 =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.23
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.41
  HALFSTREET FLOOD WIDTH(FEET) =   14.57
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.03
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.83
STREET FLOW TRAVEL TIME(MIN.) =   3.15   Tc(MIN.) =   11.73
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.490
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"       B        1.80      0.30     0.500    56
COMMERCIAL                 B        0.50      0.30     0.100    56
URBAN POOR COVER
"TURF"                     B        0.40      0.30     1.000    74
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
SUBAREA AREA(ACRES) =    2.70      SUBAREA RUNOFF(CFS) =    5.69
EFFECTIVE AREA(ACRES) =      5.20    AREA-AVERAGED Fm(INCH/HR) =  0.15
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.48
TOTAL AREA(ACRES) =        5.2        PEAK FLOW RATE(CFS) =      10.97

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.66
FLOW VELOCITY(FEET/SEC.) =  2.11   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
LONGEST FLOWPATH FROM NODE    195.00 TO NODE    197.00 =     714.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    197.00 TO NODE    198.00 IS CODE =  62
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   62.00  DOWNSTREAM ELEVATION(FEET) =   61.00
  STREET LENGTH(FEET) =   585.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.40
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.54
    HALFSTREET FLOOD WIDTH(FEET) =   22.19
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.82
  STREET FLOW TRAVEL TIME(MIN.) =   6.43   Tc(MIN.) =   18.16
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.939
  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"       B        2.60      0.30     0.500    56
  COMMERCIAL                 B        1.10      0.30     0.100    56
  URBAN POOR COVER
  "TURF"                     B        0.50      0.30     1.000    74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.455
  SUBAREA AREA(ACRES) =    4.20      SUBAREA RUNOFF(CFS) =    6.81
  EFFECTIVE AREA(ACRES) =      9.40    AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        9.4        PEAK FLOW RATE(CFS) =      15.21

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  22.55
  FLOW VELOCITY(FEET/SEC.) =  1.55   DEPTH*VELOCITY(FT*FT/SEC.) =   0.85
  LONGEST FLOWPATH FROM NODE    195.00 TO NODE    198.00 =    1299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    198.00 TO NODE    198.00 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.) =   18.16
  RAINFALL INTENSITY(INCH/HR) =   1.94
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.47
  EFFECTIVE STREAM AREA(ACRES) =      9.40
```

```
 TOTAL STREAM AREA(ACRES) =      9.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.21

 ** CONFLUENCE DATA **
  STREAM      Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      115.72   19.89    1.840  0.27( 0.09) 0.32      69.8     191.00
     1      116.17   20.41    1.813  0.27( 0.09) 0.32      71.2     187.00
     2       15.21   18.16    1.939  0.30( 0.14) 0.47       9.4     195.00

 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      126.79   18.16    1.939  0.28( 0.09) 0.34      73.1     195.00
     2      130.09   19.89    1.840  0.28( 0.09) 0.34      79.2     191.00
     3      130.32   20.41    1.813  0.28( 0.09) 0.34      80.6     187.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     130.32    Tc(MIN.) =    20.41
 EFFECTIVE AREA(ACRES) =      80.60   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =       80.6
 LONGEST FLOWPATH FROM NODE    187.00 TO NODE    198.00 =    2909.00 FEET.

****************************************************************************
 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) =    61.00  DOWNSTREAM(FEET) =    60.00
 FLOW LENGTH(FEET) =   169.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.22
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     130.32
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   20.69
 LONGEST FLOWPATH FROM NODE    187.00 TO NODE    199.00 =    3078.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     64.00  DOWNSTREAM(FEET) =     62.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
 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"       B        2.20      0.30     0.500    56   10.99
 COMMERCIAL                 B        1.40      0.30     0.100    56    8.59
```

```
SCHOOL                     B        4.30      0.30     0.600    56   11.64
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.484
SUBAREA RUNOFF(CFS) =     20.14
TOTAL AREA(ACRES) =      7.90   PEAK FLOW RATE(CFS) =     20.14

****************************************************************************
FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =   62.00  DOWNSTREAM ELEVATION(FEET) =   61.00
STREET LENGTH(FEET) =   464.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 20.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
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 =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      28.57
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.64
  HALFSTREET FLOOD WIDTH(FEET) =   26.76
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.05
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
STREET FLOW TRAVEL TIME(MIN.) =   3.78   Tc(MIN.) =   12.37
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.416
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"       B        2.70      0.30     0.500    56
COMMERCIAL                 B        1.70      0.30     0.100    56
SCHOOL                     B        3.80      0.30     0.600    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.463
SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   16.80
EFFECTIVE AREA(ACRES) =     16.10    AREA-AVERAGED Fm(INCH/HR) =  0.14
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.47
TOTAL AREA(ACRES) =       16.1        PEAK FLOW RATE(CFS) =      32.95

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.66   HALFSTREET FLOOD WIDTH(FEET) =  28.17
FLOW VELOCITY(FEET/SEC.) =  2.12   DEPTH*VELOCITY(FT*FT/SEC.) =   1.41
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L =  464.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   17.0 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    202.00
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     794.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =   61.00  DOWNSTREAM ELEVATION(FEET) =   60.00
  STREET LENGTH(FEET) =   647.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      43.89
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.76
    HALFSTREET FLOOD WIDTH(FEET) =   33.23
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.02
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.54
  STREET FLOW TRAVEL TIME(MIN.) =   5.34   Tc(MIN.) =   17.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.967
  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"       B        9.50      0.30     0.500    56
  COMMERCIAL                 B        3.60      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.390
  SUBAREA AREA(ACRES) =   13.10      SUBAREA RUNOFF(CFS) =   21.81
  EFFECTIVE AREA(ACRES) =     29.20    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       29.2        PEAK FLOW RATE(CFS) =      48.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.79   HALFSTREET FLOOD WIDTH(FEET) =  34.39
  FLOW VELOCITY(FEET/SEC.) =  2.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.63
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  647.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   24.3 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    203.00
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =    1441.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 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) =    58.00
  FLOW LENGTH(FEET) =   728.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.25
  PIPE TRAVEL TIME(MIN.) =   2.05    Tc(MIN.) =   19.76
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =    2169.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.76
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  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"       B       15.50      0.30     0.500    56
  COMMERCIAL                 B        3.80      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.421
  SUBAREA AREA(ACRES) =   19.30      SUBAREA RUNOFF(CFS) =   29.89
  EFFECTIVE AREA(ACRES) =     48.50   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =       48.5       PEAK FLOW RATE(CFS) =      75.00

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 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) =    58.00  DOWNSTREAM(FEET) =    57.00
  FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  40.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.16
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      75.00
  PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =   20.94
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    209.00 =    2606.00 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.) =   20.94
  RAINFALL INTENSITY(INCH/HR) =   1.79
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.43
  EFFECTIVE STREAM AREA(ACRES) =      48.50
  TOTAL STREAM AREA(ACRES) =      48.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      75.00

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     66.00  DOWNSTREAM(FEET) =     65.00
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 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"       B        4.50      0.30     0.500    56   12.62
 COMMERCIAL                 B        2.10      0.30     0.100    56    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.373
 SUBAREA RUNOFF(CFS) =     15.67
 TOTAL AREA(ACRES) =      6.60   PEAK FLOW RATE(CFS) =     15.67

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   65.00  DOWNSTREAM ELEVATION(FEET) =   64.00
 STREET LENGTH(FEET) =   487.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      24.87
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.61
   HALFSTREET FLOOD WIDTH(FEET) =   25.73
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.93
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.19
 STREET FLOW TRAVEL TIME(MIN.) =   4.20   Tc(MIN.) =   14.07
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.244
 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"       B        7.50      0.30     0.500    56
 COMMERCIAL                 B        2.10      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.412
 SUBAREA AREA(ACRES) =    9.60      SUBAREA RUNOFF(CFS) =   18.32
 EFFECTIVE AREA(ACRES) =     16.20    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       16.2        PEAK FLOW RATE(CFS) =      30.99

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.66   HALFSTREET FLOOD WIDTH(FEET) =  27.80
 FLOW VELOCITY(FEET/SEC.) =  2.05   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  487.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   19.7 CFS,
```

```
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    207.00
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     817.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   64.00  DOWNSTREAM ELEVATION(FEET) =   60.00
 STREET LENGTH(FEET) =  1239.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      42.51
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.67
   HALFSTREET FLOOD WIDTH(FEET) =   28.72
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.63
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.78
 STREET FLOW TRAVEL TIME(MIN.) =   7.84   Tc(MIN.) =   21.91
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.741
 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"       B       11.60      0.30     0.500    56
 COMMERCIAL                 B        4.10      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.396
 SUBAREA AREA(ACRES) =   15.70      SUBAREA RUNOFF(CFS) =   22.93
 EFFECTIVE AREA(ACRES) =     31.90    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       31.9        PEAK FLOW RATE(CFS) =      46.58

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.69   HALFSTREET FLOOD WIDTH(FEET) =  29.63
 FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY(FT*FT/SEC.) =   1.88
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1239.0 FT WITH ELEVATION-DROP =   4.0 FT, IS   27.2 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    208.00
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    208.00 =    2056.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    208.00 TO NODE    209.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   60.00  DOWNSTREAM ELEVATION(FEET) =   57.00
 STREET LENGTH(FEET) =  1850.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      57.02
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.83
    HALFSTREET FLOOD WIDTH(FEET) =   36.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.20
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.81
  STREET FLOW TRAVEL TIME(MIN.) =  14.05   Tc(MIN.) =   35.95
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.311
  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"       B        5.60      0.30     0.500    56
  COMMERCIAL                 B        8.30      0.30     0.100    56
  SCHOOL                     B        5.30      0.30     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.355
  SUBAREA AREA(ACRES) =   19.20      SUBAREA RUNOFF(CFS) =   20.81
  EFFECTIVE AREA(ACRES) =     51.10    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =       51.1        PEAK FLOW RATE(CFS) =      55.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.82   HALFSTREET FLOOD WIDTH(FEET) =  35.86
  FLOW VELOCITY(FEET/SEC.) =  2.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.77
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1850.0 FT WITH ELEVATION-DROP =   3.0 FT, IS   28.0 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    209.00
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    209.00 =    3906.00 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.) =   35.95
  RAINFALL INTENSITY(INCH/HR) =   1.31
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.38
  EFFECTIVE STREAM AREA(ACRES) =      51.10
  TOTAL STREAM AREA(ACRES) =      51.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      55.04

  ** CONFLUENCE DATA **
```

```
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       75.00   20.94    1.787  0.30( 0.13) 0.43      48.5     200.00
    2       55.04   35.95    1.311  0.30( 0.11) 0.38      51.1     205.00

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      119.81   20.94    1.787  0.30( 0.12) 0.41      78.3     200.00
    2      108.51   35.95    1.311  0.30( 0.12) 0.40      99.6     205.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     119.81    Tc(MIN.) =    20.94
EFFECTIVE AREA(ACRES) =      78.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
TOTAL AREA(ACRES) =       99.6
LONGEST FLOWPATH FROM NODE    205.00 TO NODE    209.00 =    3906.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    210.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    57.00  DOWNSTREAM(FEET) =    56.50
  FLOW LENGTH(FEET) =  1315.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  87.0 INCH PIPE IS  66.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.57
  ESTIMATED PIPE DIAMETER(INCH) =  87.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     119.81
  PIPE TRAVEL TIME(MIN.) =   6.14    Tc(MIN.) =   27.08
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    210.00 =    5221.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.08
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.542
  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"       B       10.90      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.00      0.25     0.500    69
  COMMERCIAL                 B        3.50      0.30     0.100    56
  COMMERCIAL                 C        3.50      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.30      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.375
  SUBAREA AREA(ACRES) =   21.20      SUBAREA RUNOFF(CFS) =   27.37
  EFFECTIVE AREA(ACRES) =     99.46   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =      120.8       PEAK FLOW RATE(CFS) =     127.29
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    210.10 TO NODE    210.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     60.00  DOWNSTREAM(FEET) =     59.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  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"       B        1.10      0.30     0.500    56   14.50
  COMMERCIAL                 B        0.50      0.30     0.100    56   11.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.375
  SUBAREA RUNOFF(CFS) =      3.50
  TOTAL AREA(ACRES) =      1.60   PEAK FLOW RATE(CFS) =      3.50

****************************************************************************
  FLOW PROCESS FROM NODE    210.20 TO NODE    210.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   59.50  DOWNSTREAM ELEVATION(FEET) =   59.00
  STREET LENGTH(FEET) =   538.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   17.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.95
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.43
  STREET FLOW TRAVEL TIME(MIN.) =   9.49   Tc(MIN.) =   20.82
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.793
  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"       B        2.10      0.30     0.500    56
  COMMERCIAL                 B        0.90      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.380
  SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =    4.53
```

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  EFFECTIVE AREA(ACRES) =      4.60    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      6.95

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.40
  FLOW VELOCITY(FEET/SEC.) =  0.98   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
  LONGEST FLOWPATH FROM NODE    210.10 TO NODE    210.30 =     868.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.30 TO NODE    210.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   59.00  DOWNSTREAM ELEVATION(FEET) =   58.00
  STREET LENGTH(FEET) =   325.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   16.68
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.69
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   3.20   Tc(MIN.) =   24.02
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.652
  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"       B        3.30      0.30     0.500    56
  COMMERCIAL                 B        1.00      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.407
  SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =    5.92
  EFFECTIVE AREA(ACRES) =      8.90    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =        8.9        PEAK FLOW RATE(CFS) =     12.29

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.16
  FLOW VELOCITY(FEET/SEC.) =  1.78   DEPTH*VELOCITY(FT*FT/SEC.) =   0.85
  LONGEST FLOWPATH FROM NODE    210.10 TO NODE    210.40 =    1193.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.40 TO NODE    210.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =   58.00  DOWNSTREAM ELEVATION(FEET) =   57.50
  STREET LENGTH(FEET) =   619.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.45
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.62
    HALFSTREET FLOOD WIDTH(FEET) =   26.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
  STREET FLOW TRAVEL TIME(MIN.) =   8.40   Tc(MIN.) =   32.42
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.391
  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"       B        4.40      0.30     0.500    56
  COMMERCIAL                 B        2.60      0.30     0.100    56
  URBAN POOR COVER
  "TURF"                     B        0.20      0.30     1.000    74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    7.20      SUBAREA RUNOFF(CFS) =    8.30
  EFFECTIVE AREA(ACRES) =     16.10    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =       16.1        PEAK FLOW RATE(CFS) =      18.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.65   HALFSTREET FLOOD WIDTH(FEET) =  27.31
  FLOW VELOCITY(FEET/SEC.) =  1.27   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  619.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   12.5 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    210.50
  LONGEST FLOWPATH FROM NODE    210.10 TO NODE    210.50 =    1812.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    212.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     67.00  DOWNSTREAM(FEET) =     66.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.60      0.25     0.500    69   12.62
 COMMERCIAL                 C        0.50      0.25     0.100    69    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.405
 SUBAREA RUNOFF(CFS) =      5.01
 TOTAL AREA(ACRES) =      2.10   PEAK FLOW RATE(CFS) =      5.01

****************************************************************************
 FLOW PROCESS FROM NODE    212.00 TO NODE    213.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   66.00  DOWNSTREAM ELEVATION(FEET) =   64.00
 STREET LENGTH(FEET) =   523.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.20
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.45
   HALFSTREET FLOOD WIDTH(FEET) =   16.76
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.89
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
 STREET FLOW TRAVEL TIME(MIN.) =   4.60   Tc(MIN.) =   14.46
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.209
 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"       C        4.80      0.25     0.500    69
 COMMERCIAL                 C        1.60      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     C        0.10      0.25     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.409
 SUBAREA AREA(ACRES) =    6.50      SUBAREA RUNOFF(CFS) =   12.32
 EFFECTIVE AREA(ACRES) =      8.60    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =        8.6        PEAK FLOW RATE(CFS) =      16.31

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  19.80
 FLOW VELOCITY(FEET/SEC.) =  2.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
 LONGEST FLOWPATH FROM NODE    211.00 TO NODE    213.00 =     853.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    213.00 TO NODE    214.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
```

```
==============================================================================
  UPSTREAM ELEVATION(FEET) =   64.00  DOWNSTREAM ELEVATION(FEET) =   60.00
  STREET LENGTH(FEET) =  1186.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      27.79
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.59
    HALFSTREET FLOOD WIDTH(FEET) =   24.57
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.37
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.40
  STREET FLOW TRAVEL TIME(MIN.) =   8.33   Tc(MIN.) =   22.80
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.702
  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"       C       11.50      0.25     0.500    69
  COMMERCIAL                 C        4.20      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.10      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.397
  SUBAREA AREA(ACRES) =   15.80      SUBAREA RUNOFF(CFS) =   22.79
  EFFECTIVE AREA(ACRES) =     24.40    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       24.4        PEAK FLOW RATE(CFS) =      35.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.63   HALFSTREET FLOOD WIDTH(FEET) =  26.64
  FLOW VELOCITY(FEET/SEC.) =  2.54   DEPTH*VELOCITY(FT*FT/SEC.) =   1.61
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1186.0 FT WITH ELEVATION-DROP =    4.0 FT, IS   28.1 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    214.00
  LONGEST FLOWPATH FROM NODE    211.00 TO NODE    214.00 =    2039.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 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.) =   22.80
  RAINFALL INTENSITY(INCH/HR) =   1.70
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =      24.40
  TOTAL STREAM AREA(ACRES) =      24.40
```

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  PEAK FLOW RATE(CFS) AT CONFLUENCE =      35.17

****************************************************************************
  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) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     68.00  DOWNSTREAM(FEET) =     66.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.20      0.25     0.500    69   10.99
  COMMERCIAL                 C        1.50      0.25     0.100    69    8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.147
  SUBAREA RUNOFF(CFS) =      4.50
  TOTAL AREA(ACRES) =      1.70   PEAK FLOW RATE(CFS) =      4.50

****************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    217.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   66.00  DOWNSTREAM ELEVATION(FEET) =   62.00
  STREET LENGTH(FEET) =   970.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   14.49
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =    9.04   Tc(MIN.) =   17.63
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.972
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        3.80      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.20      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.145
```

```
SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    6.97
EFFECTIVE AREA(ACRES) =      5.70    AREA-AVERAGED Fm(INCH/HR) =  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.15
TOTAL AREA(ACRES) =        5.7       PEAK FLOW RATE(CFS) =      9.93

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.74
FLOW VELOCITY(FEET/SEC.) =  1.89   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
LONGEST FLOWPATH FROM NODE    215.00 TO NODE    217.00 =    1300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    214.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    62.00  DOWNSTREAM(FEET) =    60.00
  FLOW LENGTH(FEET) =  1132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.45
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.93
  PIPE TRAVEL TIME(MIN.) =   5.46    Tc(MIN.) =   23.09
  LONGEST FLOWPATH FROM NODE    215.00 TO NODE    214.00 =    2432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.09
  RAINFALL INTENSITY(INCH/HR) =   1.69
  AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.15
  EFFECTIVE STREAM AREA(ACRES) =       5.70
  TOTAL STREAM AREA(ACRES) =       5.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.93

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       35.17   22.80    1.702  0.25( 0.10) 0.40      24.4     211.00
      2        9.93   23.09    1.689  0.25( 0.04) 0.15       5.7     215.00

  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       45.05   22.80    1.702  0.25( 0.09) 0.35      30.0     211.00
      2       44.83   23.09    1.689  0.25( 0.09) 0.35      30.1     215.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      45.05    Tc(MIN.) =    22.80
  EFFECTIVE AREA(ACRES) =      30.03   AREA-AVERAGED Fm(INCH/HR) =  0.09
```

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 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =       30.1
 LONGEST FLOWPATH FROM NODE    215.00 TO NODE    214.00 =    2432.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    214.00 TO NODE    222.00 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) =    58.00
 FLOW LENGTH(FEET) =  1041.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.15
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      45.05
 PIPE TRAVEL TIME(MIN.) =   3.37    Tc(MIN.) =   26.17
 LONGEST FLOWPATH FROM NODE    215.00 TO NODE    222.00 =    3473.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    222.00 TO NODE    222.00 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.) =   26.17
 RAINFALL INTENSITY(INCH/HR) =   1.57
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.35
 EFFECTIVE STREAM AREA(ACRES) =      30.03
 TOTAL STREAM AREA(ACRES) =      30.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      45.05

****************************************************************************
 FLOW PROCESS FROM NODE    218.00 TO NODE    219.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     62.00  DOWNSTREAM(FEET) =     61.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.10      0.25     0.500    69   12.62
 COMMERCIAL                 C        0.70      0.25     0.100    69    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.344
 SUBAREA RUNOFF(CFS) =      4.32
 TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      4.32

****************************************************************************
 FLOW PROCESS FROM NODE    219.00 TO NODE    220.00 IS CODE =  62
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   61.00  DOWNSTREAM ELEVATION(FEET) =   60.00
  STREET LENGTH(FEET) =   301.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   14.73
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   3.04   Tc(MIN.) =   12.90
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.359
  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"       C        2.20      0.25     0.500    69
  COMMERCIAL                 C        1.20      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.359
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    6.94
  EFFECTIVE AREA(ACRES) =      5.20    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        5.2        PEAK FLOW RATE(CFS) =      10.62

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  16.73
  FLOW VELOCITY(FEET/SEC.) =  1.78   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  LONGEST FLOWPATH FROM NODE    218.00 TO NODE    220.00 =     631.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    221.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   60.00  DOWNSTREAM ELEVATION(FEET) =   59.00
  STREET LENGTH(FEET) =   680.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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
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 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.10
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.61
   HALFSTREET FLOOD WIDTH(FEET) =   22.68
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.42
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
 STREET FLOW TRAVEL TIME(MIN.) =   8.01   Tc(MIN.) =   20.90
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.789
 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"       C        3.30      0.25     0.500    69
 COMMERCIAL                 C        2.50      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.328
 SUBAREA AREA(ACRES) =    5.80      SUBAREA RUNOFF(CFS) =    8.91
 EFFECTIVE AREA(ACRES) =     11.00    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =       11.0        PEAK FLOW RATE(CFS) =      16.86

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.63   HALFSTREET FLOOD WIDTH(FEET) =  23.67
 FLOW VELOCITY(FEET/SEC.) =  1.46   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
 LONGEST FLOWPATH FROM NODE    218.00 TO NODE    221.00 =    1311.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    221.00 TO NODE    222.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   59.00  DOWNSTREAM ELEVATION(FEET) =   58.00
 STREET LENGTH(FEET) =   915.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      29.20
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.78
   HALFSTREET FLOOD WIDTH(FEET) =   36.35
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.46
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.13
 STREET FLOW TRAVEL TIME(MIN.) =  10.47   Tc(MIN.) =   31.38
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.417
 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"       C       15.20      0.25     0.500    69
```

```
COMMERCIAL                  C        5.50      0.25     0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.394
SUBAREA AREA(ACRES) =   20.70      SUBAREA RUNOFF(CFS) =   24.57
EFFECTIVE AREA(ACRES) =     31.70    AREA-AVERAGED Fm(INCH/HR) =  0.09
AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.38
TOTAL AREA(ACRES) =       31.7        PEAK FLOW RATE(CFS) =      37.76

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.84   HALFSTREET FLOOD WIDTH(FEET) =  42.42
FLOW VELOCITY(FEET/SEC.) =  1.52   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L =  915.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   34.3 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    222.00
LONGEST FLOWPATH FROM NODE    218.00 TO NODE    222.00 =    2226.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    222.00 TO NODE    222.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   31.38
  RAINFALL INTENSITY(INCH/HR) =   1.42
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.38
  EFFECTIVE STREAM AREA(ACRES) =      31.70
  TOTAL STREAM AREA(ACRES) =      31.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      37.76

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       45.05   26.17    1.573  0.25( 0.09) 0.35      30.0     211.00
      1       44.83   26.46    1.563  0.25( 0.09) 0.35      30.1     215.00
      2       37.76   31.38    1.417  0.25( 0.09) 0.38      31.7     218.00

  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       80.23   26.17    1.573  0.25( 0.09) 0.36      56.5     211.00
      2       80.17   26.46    1.563  0.25( 0.09) 0.36      56.8     215.00
      3       78.17   31.38    1.417  0.25( 0.09) 0.36      61.8     218.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      80.23    Tc(MIN.) =    26.17
  EFFECTIVE AREA(ACRES) =      56.46   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =       61.8
  LONGEST FLOWPATH FROM NODE    215.00 TO NODE    222.00 =    3473.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    222.00 TO NODE    227.00 IS CODE =  31
----------------------------------------------------------------------------
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```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    58.00  DOWNSTREAM(FEET) =    57.00
  FLOW LENGTH(FEET) =   411.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  39.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.52
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      80.23
  PIPE TRAVEL TIME(MIN.) =   1.05    Tc(MIN.) =   27.22
  LONGEST FLOWPATH FROM NODE    215.00 TO NODE    227.00 =    3884.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    227.00 TO NODE    227.00 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.) =   27.22
  RAINFALL INTENSITY(INCH/HR) =   1.54
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.36
  EFFECTIVE STREAM AREA(ACRES) =      56.46
  TOTAL STREAM AREA(ACRES) =      61.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      80.23

******************************************************************************
  FLOW PROCESS FROM NODE    223.00 TO NODE    224.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     63.00  DOWNSTREAM(FEET) =     62.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  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"       B        0.50      0.30     0.500    56   12.62
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.60      0.25     0.500    69   12.62
  COMMERCIAL                 B        0.20      0.30     0.100    56    9.86
  COMMERCIAL                 C        0.70      0.25     0.100    69    9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.380
  SUBAREA RUNOFF(CFS) =      7.16
  TOTAL AREA(ACRES) =      3.00   PEAK FLOW RATE(CFS) =      7.16

******************************************************************************
  FLOW PROCESS FROM NODE    224.00 TO NODE    225.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =   62.00  DOWNSTREAM ELEVATION(FEET) =   59.00
  STREET LENGTH(FEET) =   749.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.62
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.44
    HALFSTREET FLOOD WIDTH(FEET) =   16.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
  STREET FLOW TRAVEL TIME(MIN.) =   6.59   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"       C        2.70      0.25     0.500    69
  COMMERCIAL                 C        1.20      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.377
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =    6.87
  EFFECTIVE AREA(ACRES) =      6.90    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =      12.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  17.15
  FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.90
  LONGEST FLOWPATH FROM NODE    223.00 TO NODE    225.00 =    1079.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    226.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   59.00  DOWNSTREAM ELEVATION(FEET) =   58.00
  STREET LENGTH(FEET) =   381.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.95
    ***STREET FLOWING FULL***
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    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.55
    HALFSTREET FLOOD WIDTH(FEET) =   22.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.92
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.06
  STREET FLOW TRAVEL TIME(MIN.) =   3.31   Tc(MIN.) =   19.76
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  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"       B        3.10      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.50      0.25     0.500    69
  COMMERCIAL                 B        0.70      0.30     0.100    56
  COMMERCIAL                 C        1.40      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.403
  SUBAREA AREA(ACRES) =    8.70      SUBAREA RUNOFF(CFS) =   13.60
  EFFECTIVE AREA(ACRES) =     15.60    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       15.6        PEAK FLOW RATE(CFS) =      24.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.59   HALFSTREET FLOOD WIDTH(FEET) =  24.57
  FLOW VELOCITY(FEET/SEC.) =  2.09   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  381.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   19.6 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    226.00
  LONGEST FLOWPATH FROM NODE    223.00 TO NODE    226.00 =    1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    226.00 TO NODE    227.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   58.00  DOWNSTREAM ELEVATION(FEET) =   57.00
  STREET LENGTH(FEET) =   714.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      37.15
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.74
    HALFSTREET FLOOD WIDTH(FEET) =   31.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.87
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
  STREET FLOW TRAVEL TIME(MIN.) =   6.35   Tc(MIN.) =   26.11
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.575
  SUBAREA LOSS RATE DATA(AMC  II):
```

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                                        GC10EX
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        4.80      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C       10.90      0.25     0.500    69
 COMMERCIAL                 B        1.50      0.30     0.100    56
 COMMERCIAL                 C        1.10      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     B        0.50      0.30     1.000    74
 URBAN POOR COVER
 "TURF"                     C        0.60      0.25     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA AREA(ACRES) =   19.40      SUBAREA RUNOFF(CFS) =   25.28
 EFFECTIVE AREA(ACRES) =     35.00    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       35.0        PEAK FLOW RATE(CFS) =      45.93

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.79   HALFSTREET FLOOD WIDTH(FEET) =  34.39
 FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   1.55
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  714.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   34.6 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    227.00
 LONGEST FLOWPATH FROM NODE    223.00 TO NODE    227.00 =    2174.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    227.00 TO NODE    227.00 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.) =   26.11
 RAINFALL INTENSITY(INCH/HR) =   1.57
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.44
 EFFECTIVE STREAM AREA(ACRES) =      35.00
 TOTAL STREAM AREA(ACRES) =      35.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      45.93

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       80.23   27.22    1.538  0.25( 0.09) 0.36      56.5     211.00
     1       80.17   27.51    1.528  0.25( 0.09) 0.36      56.8     215.00
     1       78.17   32.46    1.390  0.25( 0.09) 0.36      61.8     218.00
     2       45.93   26.11    1.575  0.27( 0.12) 0.44      35.0     223.00

 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      124.87   26.11    1.575  0.26( 0.10) 0.39      89.2     223.00
     2      124.99   27.22    1.538  0.26( 0.10) 0.39      91.5     211.00
```

```
    3      124.63   27.51    1.528  0.26( 0.10) 0.39      91.8     215.00
    4      118.28   32.46    1.390  0.26( 0.10) 0.39      96.8     218.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     124.99    Tc(MIN.) =    27.22
 EFFECTIVE AREA(ACRES) =      91.46   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       96.8
 LONGEST FLOWPATH FROM NODE    215.00 TO NODE    227.00 =    3884.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    228.00 TO NODE    229.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     56.00  DOWNSTREAM(FEET) =     54.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
 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"       B        1.80      0.30     0.500    56   10.99
 COMMERCIAL                 B        0.70      0.30     0.100    56    8.59
 SCHOOL                     B        2.20      0.30     0.600    56   11.64
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.487
 SUBAREA RUNOFF(CFS) =     11.98
 TOTAL AREA(ACRES) =      4.70   PEAK FLOW RATE(CFS) =     11.98

****************************************************************************
 FLOW PROCESS FROM NODE    229.00 TO NODE    230.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   54.00  DOWNSTREAM ELEVATION(FEET) =   53.00
 STREET LENGTH(FEET) =   580.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.29
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.58
   HALFSTREET FLOOD WIDTH(FEET) =   23.89
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.65
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.96
```

```
 STREET FLOW TRAVEL TIME(MIN.) =   5.85   Tc(MIN.) =   14.43
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.211
 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"       B        2.80      0.30     0.500    56
 COMMERCIAL                 B        1.40      0.30     0.100    56
 SCHOOL                     B        1.90      0.30     0.600    56
 SCHOOL                     C        0.60      0.25     0.600    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.454
 SUBAREA AREA(ACRES) =    6.70      SUBAREA RUNOFF(CFS) =   12.53
 EFFECTIVE AREA(ACRES) =     11.40    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =       11.4        PEAK FLOW RATE(CFS) =      21.27

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  25.18
 FLOW VELOCITY(FEET/SEC.) =  1.73   DEPTH*VELOCITY(FT*FT/SEC.) =   1.04
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  580.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   12.9 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    230.00
 LONGEST FLOWPATH FROM NODE    228.00 TO NODE    230.00 =     910.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    234.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    53.00  DOWNSTREAM(FEET) =    52.50
 FLOW LENGTH(FEET) =  1212.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.39
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.27
 PIPE TRAVEL TIME(MIN.) =   8.45    Tc(MIN.) =   22.88
 LONGEST FLOWPATH FROM NODE    228.00 TO NODE    234.00 =    2122.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    234.00 TO NODE    234.00 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.) =   22.88
 RAINFALL INTENSITY(INCH/HR) =   1.70
 AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.47
 EFFECTIVE STREAM AREA(ACRES) =      11.40
 TOTAL STREAM AREA(ACRES) =      11.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.27

****************************************************************************
 FLOW PROCESS FROM NODE    231.00 TO NODE    232.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     56.00  DOWNSTREAM(FEET) =     54.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN POOR COVER
  "TURF"                     C        0.30      0.25     1.000    83   14.83
  COMMERCIAL                 C        0.60      0.25     0.100    69    8.59
  SCHOOL                     B        1.80      0.30     0.600    56   11.64
  SCHOOL                     C        5.30      0.25     0.600    69   11.64
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.578
  SUBAREA RUNOFF(CFS) =     20.35
  TOTAL AREA(ACRES) =      8.00   PEAK FLOW RATE(CFS) =     20.35

****************************************************************************
  FLOW PROCESS FROM NODE    232.00 TO NODE    233.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   54.00  DOWNSTREAM ELEVATION(FEET) =   53.00
  STREET LENGTH(FEET) =   345.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      29.53
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.61
    HALFSTREET FLOOD WIDTH(FEET) =   25.73
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.41
  STREET FLOW TRAVEL TIME(MIN.) =   2.51   Tc(MIN.) =   11.09
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.571
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN POOR COVER
  "TURF"                     C        0.30      0.25     1.000    83
  COMMERCIAL                 C        0.60      0.25     0.100    69
  SCHOOL                     B        0.50      0.30     0.600    56
  SCHOOL                     C        7.00      0.25     0.600    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.579
  SUBAREA AREA(ACRES) =    8.40      SUBAREA RUNOFF(CFS) =   18.33
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 EFFECTIVE AREA(ACRES) =     16.40    AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.58
 TOTAL AREA(ACRES) =       16.4        PEAK FLOW RATE(CFS) =      35.76

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.65   HALFSTREET FLOOD WIDTH(FEET) =  27.50
 FLOW VELOCITY(FEET/SEC.) =  2.42   DEPTH*VELOCITY(FT*FT/SEC.) =   1.57
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  345.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   19.4 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    233.00
 LONGEST FLOWPATH FROM NODE    231.00 TO NODE    233.00 =     675.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    233.00 TO NODE    234.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   53.00  DOWNSTREAM ELEVATION(FEET) =   52.50
 STREET LENGTH(FEET) =   375.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      49.62
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.81
   HALFSTREET FLOOD WIDTH(FEET) =   35.74
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.97
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.60
 STREET FLOW TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =   14.27
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.226
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 URBAN POOR COVER
 "TURF"                    C        0.40      0.25     1.000    83
 COMMERCIAL                C        0.90      0.25     0.100    69
 SCHOOL                    B        1.60      0.30     0.600    56
 SCHOOL                    C       11.90      0.25     0.600    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.580
 SUBAREA AREA(ACRES) =   14.80      SUBAREA RUNOFF(CFS) =   27.68
 EFFECTIVE AREA(ACRES) =     31.20    AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.58
 TOTAL AREA(ACRES) =       31.2        PEAK FLOW RATE(CFS) =      58.34

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.86   HALFSTREET FLOOD WIDTH(FEET) =  37.99
 FLOW VELOCITY(FEET/SEC.) =  2.05   DEPTH*VELOCITY(FT*FT/SEC.) =   1.76
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  375.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   30.4 CFS,
```

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       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    234.00
  LONGEST FLOWPATH FROM NODE    231.00 TO NODE    234.00 =    1050.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    234.00 TO NODE    234.00 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.) =   14.27
  RAINFALL INTENSITY(INCH/HR) =   2.23
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.58
  EFFECTIVE STREAM AREA(ACRES) =      31.20
  TOTAL STREAM AREA(ACRES) =      31.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      58.34

  ** CONFLUENCE DATA **
   STREAM      Q      Tc   Intensity   Fp(Fm)     Ap     Ae    HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
      1       21.27   22.88    1.698  0.30( 0.14) 0.47      11.4     228.00
      2       58.34   14.27    2.226  0.26( 0.15) 0.58      31.2     231.00

  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       76.09   14.27    2.226  0.26( 0.15) 0.56      38.3     231.00
      2       64.79   22.88    1.698  0.27( 0.15) 0.55      42.6     228.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      76.09    Tc(MIN.) =    14.27
  EFFECTIVE AREA(ACRES) =      38.31   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =      42.6
  LONGEST FLOWPATH FROM NODE    228.00 TO NODE    234.00 =    2122.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    234.00 TO NODE    235.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.50  DOWNSTREAM(FEET) =    52.00
  FLOW LENGTH(FEET) =    66.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.79
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      76.09
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   14.38
  LONGEST FLOWPATH FROM NODE    228.00 TO NODE    235.00 =    2188.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    236.00 TO NODE    237.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     58.00  DOWNSTREAM(FEET) =     57.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.80      0.25     0.500    69   12.62
  COMMERCIAL                 C        0.60      0.25     0.100    69    9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.429
  SUBAREA RUNOFF(CFS) =      8.09
  TOTAL AREA(ACRES) =      3.40   PEAK FLOW RATE(CFS) =      8.09

****************************************************************************
  FLOW PROCESS FROM NODE    237.00 TO NODE    238.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   57.00  DOWNSTREAM ELEVATION(FEET) =   55.00
  STREET LENGTH(FEET) =   436.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   17.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.96
  STREET FLOW TRAVEL TIME(MIN.) =   3.46   Tc(MIN.) =   13.33
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.315
  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"       C        2.00      0.25     0.500    69
  COMMERCIAL                 C        2.70      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.270
  SUBAREA AREA(ACRES) =    4.70      SUBAREA RUNOFF(CFS) =    9.51
  EFFECTIVE AREA(ACRES) =      8.10    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =        8.1        PEAK FLOW RATE(CFS) =      16.26
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.79
  FLOW VELOCITY(FEET/SEC.) =  2.21   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE    236.00 TO NODE    238.00 =     766.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    238.00 TO NODE    239.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   55.00  DOWNSTREAM ELEVATION(FEET) =   52.00
  STREET LENGTH(FEET) =   915.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.68
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.56
    HALFSTREET FLOOD WIDTH(FEET) =   22.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.16
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.20
  STREET FLOW TRAVEL TIME(MIN.) =   7.06   Tc(MIN.) =   20.39
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.814
  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"       C        5.50      0.25     0.500    69
  COMMERCIAL                 C        1.50      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.414
  SUBAREA AREA(ACRES) =    7.00      SUBAREA RUNOFF(CFS) =   10.78
  EFFECTIVE AREA(ACRES) =     15.10    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =       15.1        PEAK FLOW RATE(CFS) =      23.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.57   HALFSTREET FLOOD WIDTH(FEET) =  23.35
  FLOW VELOCITY(FEET/SEC.) =  2.22   DEPTH*VELOCITY(FT*FT/SEC.) =   1.26
  LONGEST FLOWPATH FROM NODE    236.00 TO NODE    239.00 =    1681.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    239.00 TO NODE    240.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   52.00  DOWNSTREAM ELEVATION(FEET) =   51.50
  STREET LENGTH(FEET) =   610.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      32.86
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.77
   HALFSTREET FLOOD WIDTH(FEET) =   33.54
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.48
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
 STREET FLOW TRAVEL TIME(MIN.) =   6.85   Tc(MIN.) =   27.24
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.537
 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"       C       10.50      0.25     0.500    69
 COMMERCIAL                 C        4.00      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     C        0.10      0.25     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.394
 SUBAREA AREA(ACRES) =   14.60      SUBAREA RUNOFF(CFS) =   18.90
 EFFECTIVE AREA(ACRES) =     29.70    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =       29.7        PEAK FLOW RATE(CFS) =      38.52

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.81   HALFSTREET FLOOD WIDTH(FEET) =  35.61
 FLOW VELOCITY(FEET/SEC.) =  1.54   DEPTH*VELOCITY(FT*FT/SEC.) =   1.25
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  610.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   25.7 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    240.00
 LONGEST FLOWPATH FROM NODE    236.00 TO NODE    240.00 =    2291.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    241.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.50  DOWNSTREAM(FEET) =    51.00
  FLOW LENGTH(FEET) =   131.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  29.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.30
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.52
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   27.58
  LONGEST FLOWPATH FROM NODE    236.00 TO NODE    241.00 =    2422.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    242.00 TO NODE    243.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     54.00  DOWNSTREAM(FEET) =     53.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.70      0.25     0.500    69   12.62
 COMMERCIAL                 C        0.50      0.25     0.100    69    9.86
 URBAN POOR COVER
 "TURF"                     C        0.20      0.25     1.000    83   17.03
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.458
 SUBAREA RUNOFF(CFS) =      5.69
 TOTAL AREA(ACRES) =      2.40   PEAK FLOW RATE(CFS) =      5.69

****************************************************************************
 FLOW PROCESS FROM NODE    243.00 TO NODE    244.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   53.00  DOWNSTREAM ELEVATION(FEET) =   52.00
 STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.96
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.49
   HALFSTREET FLOOD WIDTH(FEET) =   18.87
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.61
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
 STREET FLOW TRAVEL TIME(MIN.) =   4.26   Tc(MIN.) =   14.12
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.239
 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"       C        4.50      0.25     0.500    69
 COMMERCIAL                 C        1.60      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     C        0.40      0.25     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.432
 SUBAREA AREA(ACRES) =    6.50      SUBAREA RUNOFF(CFS) =   12.47
```

```
  EFFECTIVE AREA(ACRES) =      8.90    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        8.9        PEAK FLOW RATE(CFS) =      17.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.54   HALFSTREET FLOOD WIDTH(FEET) =  22.12
  FLOW VELOCITY(FEET/SEC.) =  1.81   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  412.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   14.3 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    244.00
  LONGEST FLOWPATH FROM NODE    242.00 TO NODE    244.00 =     742.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    244.00 TO NODE    245.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    51.00
  FLOW LENGTH(FEET) =   169.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.25
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.06
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   14.57
  LONGEST FLOWPATH FROM NODE    242.00 TO NODE    245.00 =     911.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    246.00 TO NODE    247.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     53.00  DOWNSTREAM(FEET) =     52.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       0.80      0.25     0.500    69   14.50
  COMMERCIAL                 C       0.40      0.25     0.100    69   11.33
  SCHOOL                     B       7.10      0.30     0.600    56   15.35
  SCHOOL                     C       9.60      0.25     0.600    69   15.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.584
  SUBAREA RUNOFF(CFS) =     38.38
  TOTAL AREA(ACRES) =     17.90   PEAK FLOW RATE(CFS) =     38.38

****************************************************************************
  FLOW PROCESS FROM NODE    247.00 TO NODE    248.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   52.50  DOWNSTREAM ELEVATION(FEET) =   52.00
  STREET LENGTH(FEET) =   587.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      50.07
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.88
    HALFSTREET FLOOD WIDTH(FEET) =   39.09
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.66
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.46
  STREET FLOW TRAVEL TIME(MIN.) =   5.90   Tc(MIN.) =   17.23
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.998
  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"       C        1.10      0.25     0.500    69
  COMMERCIAL                 C        1.30      0.25     0.100    69
  SCHOOL                     C       11.50      0.25     0.600    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.545
  SUBAREA AREA(ACRES) =   13.90      SUBAREA RUNOFF(CFS) =   23.29
  EFFECTIVE AREA(ACRES) =     31.80    AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.57
  TOTAL AREA(ACRES) =       31.8        PEAK FLOW RATE(CFS) =      52.93

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.90   HALFSTREET FLOOD WIDTH(FEET) =  39.89
  FLOW VELOCITY(FEET/SEC.) =  1.68   DEPTH*VELOCITY(FT*FT/SEC.) =   1.51
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  587.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   24.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    248.00
  LONGEST FLOWPATH FROM NODE    246.00 TO NODE    248.00 =     917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    248.00 TO NODE    248.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    50.00
  FLOW LENGTH(FEET) =  1285.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  38.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.93
  PIPE TRAVEL TIME(MIN.) =   4.39    Tc(MIN.) =   21.62
  LONGEST FLOWPATH FROM NODE    246.00 TO NODE    248.50 =    2202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    248.50 TO NODE    248.50 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.62
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.754
  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"       C       16.30      0.25     0.500    69
  COMMERCIAL                 C        7.10      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        1.70      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.421
  SUBAREA AREA(ACRES) =   25.10      SUBAREA RUNOFF(CFS) =   37.25
  EFFECTIVE AREA(ACRES) =     56.90   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       56.9       PEAK FLOW RATE(CFS) =      83.20

****************************************************************************
  FLOW PROCESS FROM NODE    249.00 TO NODE    250.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     50.00  DOWNSTREAM(FEET) =     49.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.50      0.25     0.500    69   14.50
  COMMERCIAL                 C        0.40      0.25     0.100    69   11.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.416
  SUBAREA RUNOFF(CFS) =      4.17
  TOTAL AREA(ACRES) =      1.90   PEAK FLOW RATE(CFS) =      4.17

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    251.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   49.50  DOWNSTREAM ELEVATION(FEET) =   49.00
  STREET LENGTH(FEET) =   457.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.46
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   17.30
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
  STREET FLOW TRAVEL TIME(MIN.) =   7.41   Tc(MIN.) =   18.74
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.904
  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"       C        2.00      0.25     0.500    69
  COMMERCIAL                 C        0.80      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.386
  SUBAREA AREA(ACRES) =    2.80      SUBAREA RUNOFF(CFS) =    4.56
  EFFECTIVE AREA(ACRES) =      4.70    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =       7.63

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.48
  FLOW VELOCITY(FEET/SEC.) =  1.07   DEPTH*VELOCITY(FT*FT/SEC.) =   0.52
  LONGEST FLOWPATH FROM NODE    249.00 TO NODE    251.00 =     787.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    251.00 TO NODE    252.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   49.00  DOWNSTREAM ELEVATION(FEET) =   47.00
  STREET LENGTH(FEET) =   920.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.53
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   9.99   Tc(MIN.) =   28.73
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.491
  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"       C        4.20      0.25     0.500    69
  COMMERCIAL                 C        1.60      0.25     0.100    69
```

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  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.390
  SUBAREA AREA(ACRES) =    5.80      SUBAREA RUNOFF(CFS) =    7.27
  EFFECTIVE AREA(ACRES) =     10.50    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       10.5        PEAK FLOW RATE(CFS) =      13.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.73
  FLOW VELOCITY(FEET/SEC.) =  1.59   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
  LONGEST FLOWPATH FROM NODE    249.00 TO NODE    252.00 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    252.00 TO NODE    253.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   47.00  DOWNSTREAM ELEVATION(FEET) =   46.00
  STREET LENGTH(FEET) =   756.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.13
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.62
    HALFSTREET FLOOD WIDTH(FEET) =   25.85
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.96
  STREET FLOW TRAVEL TIME(MIN.) =   8.14   Tc(MIN.) =   36.87
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.292
  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"       C        9.10      0.25     0.500    69
  COMMERCIAL                 C        3.50      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.40      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.408
  SUBAREA AREA(ACRES) =   13.00      SUBAREA RUNOFF(CFS) =   13.92
  EFFECTIVE AREA(ACRES) =     23.50    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       23.5        PEAK FLOW RATE(CFS) =      25.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.66   HALFSTREET FLOOD WIDTH(FEET) =  27.92
  FLOW VELOCITY(FEET/SEC.) =  1.65   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  756.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   23.0 CFS,
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       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    253.00
 LONGEST FLOWPATH FROM NODE    249.00 TO NODE    253.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    253.00 TO NODE    253.50 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   46.00  DOWNSTREAM ELEVATION(FEET) =   45.50
 STREET LENGTH(FEET) =   172.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      31.42
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.63
   HALFSTREET FLOOD WIDTH(FEET) =   26.28
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.34
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.46
 STREET FLOW TRAVEL TIME(MIN.) =   1.23   Tc(MIN.) =   38.10
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.268
 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"       C        8.20      0.25     0.500    69
 COMMERCIAL                 C        3.40      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     C        0.20      0.25     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.393
 SUBAREA AREA(ACRES) =   11.80      SUBAREA RUNOFF(CFS) =   12.42
 EFFECTIVE AREA(ACRES) =     35.30    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       35.3        PEAK FLOW RATE(CFS) =      37.12

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.66   HALFSTREET FLOOD WIDTH(FEET) =  27.86
 FLOW VELOCITY(FEET/SEC.) =  2.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.61
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L =  172.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   32.7 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    253.50
 LONGEST FLOWPATH FROM NODE    249.00 TO NODE    253.50 =    2635.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    253.50 TO NODE    254.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    45.50  DOWNSTREAM(FEET) =    45.00
  FLOW LENGTH(FEET) =   143.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  29.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.03
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.12
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   38.49
  LONGEST FLOWPATH FROM NODE    249.00 TO NODE    254.00 =    2778.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    256.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     50.00  DOWNSTREAM(FEET) =     48.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.60      0.25     0.500    69   10.99
  COMMERCIAL                 C        1.40      0.25     0.100    69    8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.360
  SUBAREA RUNOFF(CFS) =     10.40
  TOTAL AREA(ACRES) =      4.00   PEAK FLOW RATE(CFS) =     10.40

****************************************************************************
  FLOW PROCESS FROM NODE    256.00 TO NODE    257.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   48.00  DOWNSTREAM ELEVATION(FEET) =   47.00
  STREET LENGTH(FEET) =   425.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.67
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.60
    HALFSTREET FLOOD WIDTH(FEET) =   21.94
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.05
  STREET FLOW TRAVEL TIME(MIN.) =   4.01   Tc(MIN.) =   12.60
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.391
  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"       C        4.60      0.25     0.500    69
COMMERCIAL                 C        2.40      0.25     0.100    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.363
SUBAREA AREA(ACRES) =    7.00      SUBAREA RUNOFF(CFS) =   14.49
EFFECTIVE AREA(ACRES) =     11.00    AREA-AVERAGED Fm(INCH/HR) =  0.09
AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.36
TOTAL AREA(ACRES) =       11.0        PEAK FLOW RATE(CFS) =      22.77

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.64   HALFSTREET FLOOD WIDTH(FEET) =  24.24
FLOW VELOCITY(FEET/SEC.) =  1.88   DEPTH*VELOCITY(FT*FT/SEC.) =   1.21
LONGEST FLOWPATH FROM NODE    255.00 TO NODE    257.00 =     755.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    257.00 TO NODE    258.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   47.00  DOWNSTREAM ELEVATION(FEET) =   46.00
  STREET LENGTH(FEET) =  1528.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.01
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.87
    HALFSTREET FLOOD WIDTH(FEET) =   46.19
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.06
  STREET FLOW TRAVEL TIME(MIN.) =  21.10   Tc(MIN.) =   33.70
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.360
  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"       C       13.00      0.25     0.500    69
  COMMERCIAL                 C        6.40      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.368
  SUBAREA AREA(ACRES) =   19.40      SUBAREA RUNOFF(CFS) =   22.15
  EFFECTIVE AREA(ACRES) =     30.40    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =       30.4        PEAK FLOW RATE(CFS) =      34.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.88   HALFSTREET FLOOD WIDTH(FEET) =  46.69
  FLOW VELOCITY(FEET/SEC.) =  1.21   DEPTH*VELOCITY(FT*FT/SEC.) =   1.07
```

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  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1528.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   26.7 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    258.00
  LONGEST FLOWPATH FROM NODE    255.00 TO NODE    258.00 =    2283.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    258.00 TO NODE    259.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   46.00  DOWNSTREAM ELEVATION(FEET) =   44.00
  STREET LENGTH(FEET) =  1287.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      43.95
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.76
    HALFSTREET FLOOD WIDTH(FEET) =   33.17
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.55
  STREET FLOW TRAVEL TIME(MIN.) =  10.57   Tc(MIN.) =   44.27
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.164
  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"       C       14.20      0.25     0.500    69
  COMMERCIAL                 C        4.80      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.30      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.408
  SUBAREA AREA(ACRES) =   19.30      SUBAREA RUNOFF(CFS) =   18.44
  EFFECTIVE AREA(ACRES) =     49.70    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =       49.7        PEAK FLOW RATE(CFS) =      47.77

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.79   HALFSTREET FLOOD WIDTH(FEET) =  34.27
  FLOW VELOCITY(FEET/SEC.) =  2.06   DEPTH*VELOCITY(FT*FT/SEC.) =   1.62
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1287.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   30.6 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    259.00
  LONGEST FLOWPATH FROM NODE    255.00 TO NODE    259.00 =    3570.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    259.00 TO NODE    260.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
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  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    44.00  DOWNSTREAM(FEET) =    43.00
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.69
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.77
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   44.53
  LONGEST FLOWPATH FROM NODE    255.00 TO NODE    260.00 =    3705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    262.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     56.00  DOWNSTREAM(FEET) =     54.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.70      0.25     0.500    69   10.99
  COMMERCIAL                 C        3.00      0.25     0.100    69    8.59
  SCHOOL                     C        1.10      0.25     0.600    69   11.64
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.312
  SUBAREA RUNOFF(CFS) =     15.14
  TOTAL AREA(ACRES) =      5.80   PEAK FLOW RATE(CFS) =     15.14

****************************************************************************
  FLOW PROCESS FROM NODE    262.00 TO NODE    263.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =   54.00  DOWNSTREAM ELEVATION(FEET) =   52.00
  STREET LENGTH(FEET) =   704.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.02
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.59
    HALFSTREET FLOOD WIDTH(FEET) =   24.75
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.19
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   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
 STREET FLOW TRAVEL TIME(MIN.) =   5.37   Tc(MIN.) =   13.95
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.255
 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"       C        4.30      0.25     0.500    69
 COMMERCIAL                 C        2.30      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     C        0.20      0.25     1.000    83
 SCHOOL                     C        4.40      0.25     0.600    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.466
 SUBAREA AREA(ACRES) =   11.20      SUBAREA RUNOFF(CFS) =   21.55
 EFFECTIVE AREA(ACRES) =     17.00    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =       17.0        PEAK FLOW RATE(CFS) =      32.92

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.64   HALFSTREET FLOOD WIDTH(FEET) =  26.82
 FLOW VELOCITY(FEET/SEC.) =  2.35   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  704.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   22.0 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    263.00
 LONGEST FLOWPATH FROM NODE    261.00 TO NODE    263.00 =    1034.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    263.00 TO NODE    264.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   52.00  DOWNSTREAM ELEVATION(FEET) =   48.00
 STREET LENGTH(FEET) =  2045.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      46.44
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.75
   HALFSTREET FLOOD WIDTH(FEET) =   32.44
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.24
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.68
 STREET FLOW TRAVEL TIME(MIN.) =  15.19   Tc(MIN.) =   29.14
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.479
 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"       C       14.90      0.25     0.500    69
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 COMMERCIAL                 C        5.80      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     C        0.90      0.25     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.413
 SUBAREA AREA(ACRES) =   21.60      SUBAREA RUNOFF(CFS) =   26.74
 EFFECTIVE AREA(ACRES) =     38.60    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =       38.6        PEAK FLOW RATE(CFS) =      47.78

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.76   HALFSTREET FLOOD WIDTH(FEET) =  32.81
 FLOW VELOCITY(FEET/SEC.) =  2.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.71
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 2045.0 FT WITH ELEVATION-DROP =   4.0 FT, IS   31.5 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    264.00
 LONGEST FLOWPATH FROM NODE    261.00 TO NODE    264.00 =    3079.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    264.00 TO NODE    265.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    48.00  DOWNSTREAM(FEET) =    47.00
 FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.51
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      47.78
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   29.58
 LONGEST FLOWPATH FROM NODE    261.00 TO NODE    265.00 =    3279.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    266.00 TO NODE    267.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     50.00  DOWNSTREAM(FEET) =     49.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        5.30      0.25     0.500    69   12.62
 COMMERCIAL                 C        1.90      0.25     0.100    69    9.86
 URBAN POOR COVER
 "TURF"                     C        0.40      0.25     1.000    83   17.03
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.426
 SUBAREA RUNOFF(CFS) =     18.09
 TOTAL AREA(ACRES) =      7.60   PEAK FLOW RATE(CFS) =     18.09

****************************************************************************
 FLOW PROCESS FROM NODE    267.00 TO NODE    268.00 IS CODE =  62
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----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   49.00  DOWNSTREAM ELEVATION(FEET) =   48.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      29.56
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.65
    HALFSTREET FLOOD WIDTH(FEET) =   27.62
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.98
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.29
  STREET FLOW TRAVEL TIME(MIN.) =   4.31   Tc(MIN.) =   14.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.235
  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"       C        7.60      0.25     0.500    69
  COMMERCIAL                 C        3.60      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.70      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.408
  SUBAREA AREA(ACRES) =   11.90      SUBAREA RUNOFF(CFS) =   22.84
  EFFECTIVE AREA(ACRES) =     19.50    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       19.5        PEAK FLOW RATE(CFS) =      37.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.70   HALFSTREET FLOOD WIDTH(FEET) =  30.00
  FLOW VELOCITY(FEET/SEC.) =  2.12   DEPTH*VELOCITY(FT*FT/SEC.) =   1.48
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  513.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   24.2 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    268.00
  LONGEST FLOWPATH FROM NODE    266.00 TO NODE    268.00 =     843.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    268.00 TO NODE    269.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   48.00  DOWNSTREAM ELEVATION(FEET) =   47.00
  STREET LENGTH(FEET) =   809.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
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  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      50.04
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.83
    HALFSTREET FLOOD WIDTH(FEET) =   36.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.91
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.58
  STREET FLOW TRAVEL TIME(MIN.) =    7.05   Tc(MIN.) =   21.22
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.773
  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"       C       10.20      0.25     0.500    69
  COMMERCIAL                 C        5.80      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.70      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.382
  SUBAREA AREA(ACRES) =   16.70      SUBAREA RUNOFF(CFS) =   25.22
  EFFECTIVE AREA(ACRES) =     36.20    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       36.2        PEAK FLOW RATE(CFS) =      54.51

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.85   HALFSTREET FLOOD WIDTH(FEET) =  37.57
  FLOW VELOCITY(FEET/SEC.) =  1.96   DEPTH*VELOCITY(FT*FT/SEC.) =   1.67
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  809.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   28.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    269.00
  LONGEST FLOWPATH FROM NODE    266.00 TO NODE    269.00 =    1652.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    269.00 TO NODE    270.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   47.00  DOWNSTREAM ELEVATION(FEET) =   46.00
  STREET LENGTH(FEET) =  1458.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      69.65
```

```
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  1.03
   HALFSTREET FLOOD WIDTH(FEET) =   46.29
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.64
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.68
 STREET FLOW TRAVEL TIME(MIN.) =  14.83   Tc(MIN.) =   36.05
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.309
 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"       C       11.00      0.25     0.500    69
 COMMERCIAL                 C       15.30      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     C        0.80      0.25     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.289
 SUBAREA AREA(ACRES) =   27.10      SUBAREA RUNOFF(CFS) =   30.16
 EFFECTIVE AREA(ACRES) =     63.30    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =       63.3        PEAK FLOW RATE(CFS) =      69.54

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.03   HALFSTREET FLOOD WIDTH(FEET) =  46.29
 FLOW VELOCITY(FEET/SEC.) =  1.64   DEPTH*VELOCITY(FT*FT/SEC.) =   1.68
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1458.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   38.5 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    270.00
 LONGEST FLOWPATH FROM NODE    266.00 TO NODE    270.00 =    3110.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    271.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    46.00  DOWNSTREAM(FEET) =    45.00
 FLOW LENGTH(FEET) =   218.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.96
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      69.54
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   36.51
 LONGEST FLOWPATH FROM NODE    266.00 TO NODE    271.00 =    3328.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    272.00 TO NODE    273.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     45.00  DOWNSTREAM(FEET) =     44.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        4.00      0.25     0.500    69   12.62
 COMMERCIAL                 C        1.80      0.25     0.100    69    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.376
 SUBAREA RUNOFF(CFS) =     13.87
 TOTAL AREA(ACRES) =      5.80   PEAK FLOW RATE(CFS) =     13.87

****************************************************************************
 FLOW PROCESS FROM NODE    273.00 TO NODE    274.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   44.00  DOWNSTREAM ELEVATION(FEET) =   42.00
 STREET LENGTH(FEET) =   863.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.03
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.58
   HALFSTREET FLOOD WIDTH(FEET) =   23.83
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.91
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
 STREET FLOW TRAVEL TIME(MIN.) =   7.53   Tc(MIN.) =   17.39
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.987
 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"       C        3.20      0.25     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        2.80      0.20     0.500    75
 COMMERCIAL                 C        0.80      0.25     0.100    69
 COMMERCIAL                 D        1.50      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.389
 SUBAREA AREA(ACRES) =    8.30      SUBAREA RUNOFF(CFS) =   14.19
 EFFECTIVE AREA(ACRES) =     14.10    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =       14.1        PEAK FLOW RATE(CFS) =      24.07

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  24.93
 FLOW VELOCITY(FEET/SEC.) =  1.99   DEPTH*VELOCITY(FT*FT/SEC.) =   1.19
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  863.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   15.3 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    274.00
 LONGEST FLOWPATH FROM NODE    272.00 TO NODE    274.00 =    1193.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    274.00 TO NODE    278.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    42.00  DOWNSTREAM(FEET) =    40.00
  FLOW LENGTH(FEET) =   494.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.75
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.07
  PIPE TRAVEL TIME(MIN.) =   1.43    Tc(MIN.) =   18.82
  LONGEST FLOWPATH FROM NODE    272.00 TO NODE    278.00 =    1687.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    278.00 TO NODE    278.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.82
  RAINFALL INTENSITY(INCH/HR) =   1.90
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.38
  EFFECTIVE STREAM AREA(ACRES) =      14.10
  TOTAL STREAM AREA(ACRES) =      14.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      24.07

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    276.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     46.00  DOWNSTREAM(FEET) =     44.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.20      0.25     0.500    69   10.99
  COMMERCIAL                 C        0.30      0.25     0.100    69    8.59
  URBAN POOR COVER
  "TURF"                     C        0.20      0.25     1.000    83   14.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.488
  SUBAREA RUNOFF(CFS) =      4.37
  TOTAL AREA(ACRES) =      1.70   PEAK FLOW RATE(CFS) =      4.37

****************************************************************************
  FLOW PROCESS FROM NODE    276.00 TO NODE    277.00 IS CODE =  62
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   44.00  DOWNSTREAM ELEVATION(FEET) =   42.00
  STREET LENGTH(FEET) =   453.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.43
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   13.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
  STREET FLOW TRAVEL TIME(MIN.) =   4.16   Tc(MIN.) =   12.75
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.374
  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"       C        2.00      0.25     0.500    69
  COMMERCIAL                 C        0.70      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.30      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.457
  SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =    6.10
  EFFECTIVE AREA(ACRES) =      4.70    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        4.7        PEAK FLOW RATE(CFS) =      9.55

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  15.27
  FLOW VELOCITY(FEET/SEC.) =  1.92   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE    275.00 TO NODE    277.00 =     783.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    277.00 TO NODE    278.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   42.00  DOWNSTREAM ELEVATION(FEET) =   40.00
  STREET LENGTH(FEET) =   735.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.62
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.54
    HALFSTREET FLOOD WIDTH(FEET) =   21.94
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.02
  STREET FLOW TRAVEL TIME(MIN.) =   6.45   Tc(MIN.) =   19.20
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.878
  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"       C        2.30      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        5.50      0.20     0.500    75
  COMMERCIAL                 C        0.90      0.25     0.100    69
  COMMERCIAL                 D        0.80      0.20     0.100    75
  URBAN POOR COVER
  "TURF"                     C        0.30      0.25     1.000    83
  URBAN POOR COVER
  "TURF"                     D        0.20      0.20     1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.457
  SUBAREA AREA(ACRES) =   10.00      SUBAREA RUNOFF(CFS) =   16.01
  EFFECTIVE AREA(ACRES) =     14.70    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       14.7        PEAK FLOW RATE(CFS) =      23.46

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.58   HALFSTREET FLOOD WIDTH(FEET) =  24.08
  FLOW VELOCITY(FEET/SEC.) =  2.09   DEPTH*VELOCITY(FT*FT/SEC.) =   1.21
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  735.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   19.5 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    278.00
  LONGEST FLOWPATH FROM NODE    275.00 TO NODE    278.00 =    1518.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    278.00 TO NODE    278.00 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.) =   19.20
  RAINFALL INTENSITY(INCH/HR) =   1.88
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23
  AREA-AVERAGED Ap =  0.46
  EFFECTIVE STREAM AREA(ACRES) =      14.70
  TOTAL STREAM AREA(ACRES) =      14.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      23.46

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
    1       24.07   18.82    1.899  0.24( 0.09) 0.38      14.1     272.00
    2       23.46   19.20    1.878  0.23( 0.10) 0.46      14.7     275.00

  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       47.35   18.82    1.899  0.23( 0.10) 0.42      28.5     272.00
      2       47.25   19.20    1.878  0.23( 0.10) 0.42      28.8     275.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      47.35    Tc(MIN.) =    18.82
  EFFECTIVE AREA(ACRES) =      28.51   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       28.8
  LONGEST FLOWPATH FROM NODE    272.00 TO NODE    278.00 =    1687.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    278.00 TO NODE    279.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    40.00  DOWNSTREAM(FEET) =    39.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.14
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.35
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   19.14
  LONGEST FLOWPATH FROM NODE    272.00 TO NODE    279.00 =    1843.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    281.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     40.00  DOWNSTREAM(FEET) =     39.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.30      0.25     0.500    69   14.50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.40      0.20     0.500    75   14.50
  COMMERCIAL                 C        0.10      0.25     0.100    69   11.33
  COMMERCIAL                 D        0.40      0.20     0.100    75   11.33
  URBAN POOR COVER
  "TURF"                     C        0.10      0.25     1.000    83   19.56
  URBAN POOR COVER
  "TURF"                     D        4.50      0.20     1.000    87   19.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.862
  SUBAREA RUNOFF(CFS) =     12.35
  TOTAL AREA(ACRES) =      5.80   PEAK FLOW RATE(CFS) =     12.35

****************************************************************************
  FLOW PROCESS FROM NODE    281.00 TO NODE    282.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   39.50  DOWNSTREAM ELEVATION(FEET) =   36.00
  STREET LENGTH(FEET) =   640.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.40
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.16
  STREET FLOW TRAVEL TIME(MIN.) =   4.45   Tc(MIN.) =   15.78
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.101
  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        0.50      0.20     0.100    75
  URBAN POOR COVER
  "TURF"                     D        3.90      0.20     1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.824
  SUBAREA AREA(ACRES) =     5.40      SUBAREA RUNOFF(CFS) =    9.41
  EFFECTIVE AREA(ACRES) =     11.20    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       11.2        PEAK FLOW RATE(CFS) =      19.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.50   HALFSTREET FLOOD WIDTH(FEET) =  19.64
  FLOW VELOCITY(FEET/SEC.) =  2.48   DEPTH*VELOCITY(FT*FT/SEC.) =   1.25
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    282.00 =     970.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    282.00 TO NODE    283.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    36.00  DOWNSTREAM(FEET) =    35.00
  FLOW LENGTH(FEET) =   470.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.2 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.37
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.47
 PIPE TRAVEL TIME(MIN.) =   1.79    Tc(MIN.) =   17.57
 LONGEST FLOWPATH FROM NODE    280.00 TO NODE    283.00 =    1440.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    283.00 TO NODE    283.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.57
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.976
 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        1.10      0.20     0.500    75
 COMMERCIAL                 D        0.60      0.20     0.100    75
 URBAN POOR COVER
 "TURF"                     D        5.60      0.20     1.000    87
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.851
 SUBAREA AREA(ACRES) =    7.30      SUBAREA RUNOFF(CFS) =   11.86
 EFFECTIVE AREA(ACRES) =     18.50   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =       18.5       PEAK FLOW RATE(CFS) =      30.06

****************************************************************************
 FLOW PROCESS FROM NODE    284.00 TO NODE    285.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     34.00  DOWNSTREAM(FEET) =     32.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.827
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.178
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 URBAN POOR COVER
 "TURF"                     D        8.10      0.20     1.000    87   14.83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =     14.42
 TOTAL AREA(ACRES) =      8.10   PEAK FLOW RATE(CFS) =     14.42

****************************************************************************
 FLOW PROCESS FROM NODE    285.00 TO NODE    286.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   32.00  DOWNSTREAM ELEVATION(FEET) =   31.50
 STREET LENGTH(FEET) =   163.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.58
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.55
   HALFSTREET FLOOD WIDTH(FEET) =   22.61
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.08
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.15
 STREET FLOW TRAVEL TIME(MIN.) =   1.30   Tc(MIN.) =   16.13
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.075
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 URBAN POOR COVER
 "TURF"                     D        7.20      0.20     1.000    87
 SCHOOL                     D        0.10      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.995
 SUBAREA AREA(ACRES) =    7.30      SUBAREA RUNOFF(CFS) =   12.33
 EFFECTIVE AREA(ACRES) =     15.40    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       15.4        PEAK FLOW RATE(CFS) =      25.99

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.59   HALFSTREET FLOOD WIDTH(FEET) =  24.44
 FLOW VELOCITY(FEET/SEC.) =  2.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.32
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  163.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   16.6 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    286.00
 LONGEST FLOWPATH FROM NODE    284.00 TO NODE    286.00 =     493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    286.00 TO NODE    287.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.50  DOWNSTREAM(FEET) =    31.00
  FLOW LENGTH(FEET) =   888.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.81
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.99
  PIPE TRAVEL TIME(MIN.) =   5.27    Tc(MIN.) =   21.40
  LONGEST FLOWPATH FROM NODE    284.00 TO NODE    287.00 =    1381.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    287.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.40
```

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 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.764
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 URBAN POOR COVER
 "TURF"                     D       12.80      0.20     1.000    87
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.80      SUBAREA RUNOFF(CFS) =   18.02
 EFFECTIVE AREA(ACRES) =     28.20   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       28.2       PEAK FLOW RATE(CFS) =      39.71

****************************************************************************
 FLOW PROCESS FROM NODE    288.00 TO NODE    289.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     44.00  DOWNSTREAM(FEET) =     43.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.70      0.25     0.500    69   14.50
 COMMERCIAL                 C        0.50      0.25     0.100    69   11.33
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.409
 SUBAREA RUNOFF(CFS) =      4.83
 TOTAL AREA(ACRES) =      2.20   PEAK FLOW RATE(CFS) =      4.83

****************************************************************************
 FLOW PROCESS FROM NODE    289.00 TO NODE    290.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   43.50  DOWNSTREAM ELEVATION(FEET) =   43.00
 STREET LENGTH(FEET) =   456.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.30
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.48
   HALFSTREET FLOOD WIDTH(FEET) =   18.16
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.06
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    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   7.17   Tc(MIN.) =   18.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.918
  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"       C        2.10      0.25     0.500    69
  COMMERCIAL                 C        0.90      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.380
  SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =    4.92
  EFFECTIVE AREA(ACRES) =      5.20    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =        5.2        PEAK FLOW RATE(CFS) =      8.52

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.50   HALFSTREET FLOOD WIDTH(FEET) =  19.33
  FLOW VELOCITY(FEET/SEC.) =  1.10   DEPTH*VELOCITY(FT*FT/SEC.) =   0.55
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    290.00 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    291.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   43.00  DOWNSTREAM ELEVATION(FEET) =   41.00
  STREET LENGTH(FEET) =   995.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.88
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   20.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.54
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
  STREET FLOW TRAVEL TIME(MIN.) =  10.80   Tc(MIN.) =   29.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.474
  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"       C        5.30      0.25     0.500    69
  COMMERCIAL                 C        1.70      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.403
  SUBAREA AREA(ACRES) =    7.00      SUBAREA RUNOFF(CFS) =    8.65
  EFFECTIVE AREA(ACRES) =     12.20    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
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  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      15.09

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.54   HALFSTREET FLOOD WIDTH(FEET) =  21.94
  FLOW VELOCITY(FEET/SEC.) =  1.63   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  995.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   12.2 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    291.00
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    291.00 =    1781.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    291.00 TO NODE    292.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   41.00  DOWNSTREAM ELEVATION(FEET) =   38.00
  STREET LENGTH(FEET) =  2113.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.34
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.66
    HALFSTREET FLOOD WIDTH(FEET) =   28.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.13
  STREET FLOW TRAVEL TIME(MIN.) =  20.55   Tc(MIN.) =   49.85
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.087
  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"       C       18.20      0.25     0.500    69
  COMMERCIAL                 C        6.80      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.391
  SUBAREA AREA(ACRES) =   25.00      SUBAREA RUNOFF(CFS) =   22.26
  EFFECTIVE AREA(ACRES) =     37.20    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       37.2       PEAK FLOW RATE(CFS) =      33.10

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.71   HALFSTREET FLOOD WIDTH(FEET) =  30.43
  FLOW VELOCITY(FEET/SEC.) =  1.82   DEPTH*VELOCITY(FT*FT/SEC.) =   1.29
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 2113.0 FT WITH ELEVATION-DROP =   3.0 FT, IS   34.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    292.00
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    292.00 =    3894.00 FEET.

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```
 FLOW PROCESS FROM NODE    292.00 TO NODE    293.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   38.00  DOWNSTREAM ELEVATION(FEET) =   37.00
 STREET LENGTH(FEET) =   307.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      48.55
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.70
   HALFSTREET FLOOD WIDTH(FEET) =   30.06
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.74
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.92
 STREET FLOW TRAVEL TIME(MIN.) =   1.87   Tc(MIN.) =   51.72
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.064
 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"       C       26.60      0.25     0.500    69
 COMMERCIAL                 C        9.00      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.399
 SUBAREA AREA(ACRES) =   35.60      SUBAREA RUNOFF(CFS) =   30.90
 EFFECTIVE AREA(ACRES) =     72.80    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       72.8        PEAK FLOW RATE(CFS) =      63.24

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.76   HALFSTREET FLOOD WIDTH(FEET) =  33.11
 FLOW VELOCITY(FEET/SEC.) =  2.93   DEPTH*VELOCITY(FT*FT/SEC.) =   2.23
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  307.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   87.2 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    293.00
 LONGEST FLOWPATH FROM NODE    288.00 TO NODE    293.00 =    4201.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    293.00 TO NODE    298.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    37.00  DOWNSTREAM(FEET) =    36.00
 FLOW LENGTH(FEET) =   922.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.53
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      63.24
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```
  PIPE TRAVEL TIME(MIN.) =   3.40    Tc(MIN.) =   55.12
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    298.00 =    5123.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    298.00 TO NODE    298.00 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.) =   55.12
  RAINFALL INTENSITY(INCH/HR) =   1.03
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =      72.80
  TOTAL STREAM AREA(ACRES) =      72.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      63.24

****************************************************************************
  FLOW PROCESS FROM NODE    294.00 TO NODE    295.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     40.00  DOWNSTREAM(FEET) =     39.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.40      0.25     0.500    69   12.62
  COMMERCIAL                 C        1.40      0.25     0.100    69    9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.403
  SUBAREA RUNOFF(CFS) =     13.83
  TOTAL AREA(ACRES) =      5.80   PEAK FLOW RATE(CFS) =     13.83

****************************************************************************
  FLOW PROCESS FROM NODE    295.00 TO NODE    296.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   39.00  DOWNSTREAM ELEVATION(FEET) =   38.00
  STREET LENGTH(FEET) =   536.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.92
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.60
    HALFSTREET FLOOD WIDTH(FEET) =   25.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.08
  STREET FLOW TRAVEL TIME(MIN.) =   4.97   Tc(MIN.) =   14.83
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.177
  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"       C        6.30      0.25     0.500    69
  COMMERCIAL                 C        2.30      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.393
  SUBAREA AREA(ACRES) =    8.60      SUBAREA RUNOFF(CFS) =   16.09
  EFFECTIVE AREA(ACRES) =     14.40    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       14.4        PEAK FLOW RATE(CFS) =      26.93

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.64   HALFSTREET FLOOD WIDTH(FEET) =  26.89
  FLOW VELOCITY(FEET/SEC.) =  1.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.22
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  536.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   17.3 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    296.00
  LONGEST FLOWPATH FROM NODE    294.00 TO NODE    296.00 =     866.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    296.00 TO NODE    297.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   38.00  DOWNSTREAM ELEVATION(FEET) =   36.50
  STREET LENGTH(FEET) =  1133.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      43.14
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.78
    HALFSTREET FLOOD WIDTH(FEET) =   33.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.48
  STREET FLOW TRAVEL TIME(MIN.) =   9.94   Tc(MIN.) =   24.78
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.622
  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"       C       16.90      0.25     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.90      0.20     0.500    75
 COMMERCIAL                 C        5.60      0.25     0.100    69
 COMMERCIAL                 D        0.10      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.403
 SUBAREA AREA(ACRES) =   23.50      SUBAREA RUNOFF(CFS) =   32.21
 EFFECTIVE AREA(ACRES) =     37.90    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       37.9        PEAK FLOW RATE(CFS) =      51.95

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.83   HALFSTREET FLOOD WIDTH(FEET) =  36.41
 FLOW VELOCITY(FEET/SEC.) =  1.99   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1133.0 FT WITH ELEVATION-DROP =   1.5 FT, IS   37.8 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    297.00
 LONGEST FLOWPATH FROM NODE    294.00 TO NODE    297.00 =    1999.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    297.00 TO NODE    298.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    36.50  DOWNSTREAM(FEET) =    36.00
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.18
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      51.95
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   25.06
 LONGEST FLOWPATH FROM NODE    294.00 TO NODE    298.00 =    2119.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    298.00 TO NODE    298.00 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.) =   25.06
 RAINFALL INTENSITY(INCH/HR) =   1.61
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.40
 EFFECTIVE STREAM AREA(ACRES) =      37.90
 TOTAL STREAM AREA(ACRES) =      37.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      51.95

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       63.24   55.12    1.026  0.25( 0.10) 0.40      72.8     288.00
     2       51.95   25.06    1.612  0.25( 0.10) 0.40      37.9     294.00
```

```
 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       98.87   25.06    1.612  0.25( 0.10) 0.40      71.0     294.00
     2       95.06   55.12    1.026  0.25( 0.10) 0.40     110.7     288.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      98.87    Tc(MIN.) =    25.06
 EFFECTIVE AREA(ACRES) =      71.00   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =      110.7
 LONGEST FLOWPATH FROM NODE    288.00 TO NODE    298.00 =    5123.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    298.00 TO NODE    303.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    36.00  DOWNSTREAM(FEET) =    35.50
 FLOW LENGTH(FEET) =   745.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  56.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.19
 ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      98.87
 PIPE TRAVEL TIME(MIN.) =   2.96    Tc(MIN.) =   28.02
 LONGEST FLOWPATH FROM NODE    288.00 TO NODE    303.00 =    5868.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   28.02
 RAINFALL INTENSITY(INCH/HR) =   1.51
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.40
 EFFECTIVE STREAM AREA(ACRES) =      71.00
 TOTAL STREAM AREA(ACRES) =     110.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      98.87

****************************************************************************
 FLOW PROCESS FROM NODE    299.00 TO NODE    300.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     45.00  DOWNSTREAM(FEET) =     44.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
```

```
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        3.60      0.25     0.500    69   12.62
 COMMERCIAL                 C        2.50      0.25     0.100    69    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.336
 SUBAREA RUNOFF(CFS) =     14.64
 TOTAL AREA(ACRES) =      6.10   PEAK FLOW RATE(CFS) =     14.64

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   44.00  DOWNSTREAM ELEVATION(FEET) =   42.00
 STREET LENGTH(FEET) =   885.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      32.13
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.65
   HALFSTREET FLOOD WIDTH(FEET) =   27.68
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.15
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.40
 STREET FLOW TRAVEL TIME(MIN.) =   6.87   Tc(MIN.) =   16.73
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.032
 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"       C       13.10      0.25     0.500    69
 COMMERCIAL                 C        6.70      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.365
 SUBAREA AREA(ACRES) =   19.80      SUBAREA RUNOFF(CFS) =   34.58
 EFFECTIVE AREA(ACRES) =     25.90    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.36
 TOTAL AREA(ACRES) =       25.9        PEAK FLOW RATE(CFS) =      45.27

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.73   HALFSTREET FLOOD WIDTH(FEET) =  31.34
 FLOW VELOCITY(FEET/SEC.) =  2.35   DEPTH*VELOCITY(FT*FT/SEC.) =   1.71
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  885.0 FT WITH ELEVATION-DROP =    2.0 FT, IS   36.2 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    301.00
 LONGEST FLOWPATH FROM NODE    299.00 TO NODE    301.00 =    1215.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   42.00  DOWNSTREAM ELEVATION(FEET) =   37.00
  STREET LENGTH(FEET) =  1530.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      68.65
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.78
    HALFSTREET FLOOD WIDTH(FEET) =   34.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.34
  STREET FLOW TRAVEL TIME(MIN.) =   8.53   Tc(MIN.) =   25.26
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.605
  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"       C        8.30      0.25     0.500    69
  COMMERCIAL                 D       11.60      0.20     0.100    75
  URBAN POOR COVER
  "TURF"                     C        0.70      0.25     1.000    83
  URBAN POOR COVER
  "TURF"                     D        1.90      0.20     1.000    87
  SCHOOL                     C        7.20      0.25     0.600    69
  SCHOOL                     D        4.70      0.20     0.600    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.437
  SUBAREA AREA(ACRES) =   34.40      SUBAREA RUNOFF(CFS) =   46.55
  EFFECTIVE AREA(ACRES) =     60.30    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       60.3        PEAK FLOW RATE(CFS) =      81.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.83   HALFSTREET FLOOD WIDTH(FEET) =  36.47
  FLOW VELOCITY(FEET/SEC.) =  3.12   DEPTH*VELOCITY(FT*FT/SEC.) =   2.59
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1530.0 FT WITH ELEVATION-DROP =    5.0 FT, IS   57.3 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    302.00
  LONGEST FLOWPATH FROM NODE    299.00 TO NODE    302.00 =    2745.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.00  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =    84.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.63
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      81.87
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   25.37
  LONGEST FLOWPATH FROM NODE    299.00 TO NODE    303.00 =    2829.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   25.37
  RAINFALL INTENSITY(INCH/HR) =   1.60
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =      60.30
  TOTAL STREAM AREA(ACRES) =      60.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      81.87

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       98.87   28.02    1.512  0.25( 0.10) 0.40      71.0     294.00
      1       95.06   58.09    0.996  0.25( 0.10) 0.40     110.7     288.00
      2       81.87   25.37    1.601  0.24( 0.10) 0.40      60.3     299.00

  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      176.99   25.37    1.601  0.24( 0.10) 0.40     124.6     299.00
      2      175.91   28.02    1.512  0.24( 0.10) 0.40     131.3     294.00
      3      144.02   58.09    0.996  0.25( 0.10) 0.40     171.0     288.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     176.99    Tc(MIN.) =    25.37
  EFFECTIVE AREA(ACRES) =     124.57   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =      171.0
  LONGEST FLOWPATH FROM NODE    288.00 TO NODE    303.00 =    5868.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.50  DOWNSTREAM(FEET) =    35.00
  FLOW LENGTH(FEET) =  1880.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 108.0 INCH PIPE IS  81.3 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.44
 ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     176.99
 PIPE TRAVEL TIME(MIN.) =   9.10    Tc(MIN.) =   34.47
 LONGEST FLOWPATH FROM NODE    288.00 TO NODE    304.00 =    7748.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   34.47
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.343
 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"       C       0.40      0.25     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D      22.30      0.20     0.500    75
 COMMERCIAL                 C       0.10      0.25     0.100    69
 COMMERCIAL                 D      12.40      0.20     0.100    75
 URBAN POOR COVER
 "TURF"                     D       1.70      0.20     1.000    87
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.388
 SUBAREA AREA(ACRES) =   36.90      SUBAREA RUNOFF(CFS) =   42.02
 EFFECTIVE AREA(ACRES) =    161.47   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =      207.9       PEAK FLOW RATE(CFS) =     181.63

****************************************************************************
 FLOW PROCESS FROM NODE    305.00 TO NODE    306.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     36.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
 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       1.20      0.20     0.500    75   10.99
 COMMERCIAL                 D       0.30      0.20     0.100    75    8.59
 URBAN POOR COVER
 "TURF"                     D       0.60      0.20     1.000    87   14.83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.586
 SUBAREA RUNOFF(CFS) =      5.41
 TOTAL AREA(ACRES) =      2.10   PEAK FLOW RATE(CFS) =      5.41

****************************************************************************
 FLOW PROCESS FROM NODE    306.00 TO NODE    307.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
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```
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
 UPSTREAM ELEVATION(FEET) =   36.00  DOWNSTREAM ELEVATION(FEET) =   34.00
 STREET LENGTH(FEET) =   826.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.04
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.53
   HALFSTREET FLOOD WIDTH(FEET) =   21.70
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.77
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.95
 STREET FLOW TRAVEL TIME(MIN.) =   7.78   Tc(MIN.) =   16.36
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.058
 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        8.20      0.20     0.500    75
 COMMERCIAL                 D        3.00      0.20     0.100    75
 URBAN POOR COVER
 "TURF"                     D        0.50      0.20     1.000    87
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.419
 SUBAREA AREA(ACRES) =   11.70      SUBAREA RUNOFF(CFS) =   20.79
 EFFECTIVE AREA(ACRES) =     13.80    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       13.8        PEAK FLOW RATE(CFS) =      24.46

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  24.87
 FLOW VELOCITY(FEET/SEC.) =  2.04   DEPTH*VELOCITY(FT*FT/SEC.) =   1.22
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  826.0 FT WITH ELEVATION-DROP =    2.0 FT, IS   22.0 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    307.00
 LONGEST FLOWPATH FROM NODE    305.00 TO NODE    307.00 =    1156.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
 UPSTREAM ELEVATION(FEET) =   34.00  DOWNSTREAM ELEVATION(FEET) =   33.00
 STREET LENGTH(FEET) =   405.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      32.22
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.65
   HALFSTREET FLOOD WIDTH(FEET) =   27.31
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.21
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.43
 STREET FLOW TRAVEL TIME(MIN.) =   3.05   Tc(MIN.) =   19.41
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.866
 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        4.90      0.20     0.500    75
 COMMERCIAL                 D        4.20      0.20     0.100    75
 URBAN POOR COVER
 "TURF"                     D        0.50      0.20     1.000    87
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.351
 SUBAREA AREA(ACRES) =    9.60      SUBAREA RUNOFF(CFS) =   15.52
 EFFECTIVE AREA(ACRES) =     23.40    AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =       23.4        PEAK FLOW RATE(CFS) =      37.59

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.68   HALFSTREET FLOOD WIDTH(FEET) =  28.84
 FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY(FT*FT/SEC.) =   1.56
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  405.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   21.5 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    308.00
 LONGEST FLOWPATH FROM NODE    305.00 TO NODE    308.00 =    1561.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    33.00  DOWNSTREAM(FEET) =    32.50
 FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.95
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.59
 PIPE TRAVEL TIME(MIN.) =   1.89    Tc(MIN.) =   21.31
 LONGEST FLOWPATH FROM NODE    305.00 TO NODE    309.00 =    2010.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    309.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   21.31
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.769
```

```
  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
  COMMERCIAL                 D        1.20      0.20     0.100    75
  URBAN POOR COVER
  "TURF"                     D        7.60      0.20     1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.779
  SUBAREA AREA(ACRES) =   11.90      SUBAREA RUNOFF(CFS) =   17.28
  EFFECTIVE AREA(ACRES) =     35.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =       35.3       PEAK FLOW RATE(CFS) =      52.82

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     45.00  DOWNSTREAM(FEET) =     44.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.40      0.25     0.500    69   12.62
  COMMERCIAL                 C        0.70      0.25     0.100    69    9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      5.03
  TOTAL AREA(ACRES) =      2.10   PEAK FLOW RATE(CFS) =      5.03

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   44.00  DOWNSTREAM ELEVATION(FEET) =   42.00
  STREET LENGTH(FEET) =   587.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.90
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.47
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    HALFSTREET FLOOD WIDTH(FEET) =   17.62
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.83
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
  STREET FLOW TRAVEL TIME(MIN.) =   5.35   Tc(MIN.) =   15.21
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.146
  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"       C        5.40      0.25     0.500    69
  COMMERCIAL                 C        2.00      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.392
  SUBAREA AREA(ACRES) =    7.40      SUBAREA RUNOFF(CFS) =   13.64
  EFFECTIVE AREA(ACRES) =      9.50    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =        9.5        PEAK FLOW RATE(CFS) =      17.52

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  21.21
  FLOW VELOCITY(FEET/SEC.) =  2.03   DEPTH*VELOCITY(FT*FT/SEC.) =   1.06
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  587.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   15.6 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    312.00
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    312.00 =     917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    313.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   42.00  DOWNSTREAM ELEVATION(FEET) =   40.00
  STREET LENGTH(FEET) =  1008.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      28.35
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.64
    HALFSTREET FLOOD WIDTH(FEET) =   27.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.97
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
  STREET FLOW TRAVEL TIME(MIN.) =   8.51   Tc(MIN.) =   23.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.664
  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"       C        7.90      0.25     0.500    69
  RESIDENTIAL
```

```
 "5-7 DWELLINGS/ACRE"       D        1.80      0.20     0.500    75
 COMMERCIAL                 C        2.30      0.25     0.100    69
 COMMERCIAL                 D        0.60      0.20     0.100    75
 SCHOOL                     D        2.70      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
 SUBAREA AREA(ACRES) =   15.30      SUBAREA RUNOFF(CFS) =   21.50
 EFFECTIVE AREA(ACRES) =     24.80    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.42
 TOTAL AREA(ACRES) =       24.8        PEAK FLOW RATE(CFS) =      34.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.68   HALFSTREET FLOOD WIDTH(FEET) =  29.21
 FLOW VELOCITY(FEET/SEC.) =  2.09   DEPTH*VELOCITY(FT*FT/SEC.) =   1.43
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1008.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   26.5 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    313.00
 LONGEST FLOWPATH FROM NODE    310.00 TO NODE    313.00 =    1925.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    314.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   40.00  DOWNSTREAM ELEVATION(FEET) =   38.00
 STREET LENGTH(FEET) =   265.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      46.87
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.61
   HALFSTREET FLOOD WIDTH(FEET) =   25.60
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.67
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.25
 STREET FLOW TRAVEL TIME(MIN.) =   1.20   Tc(MIN.) =   24.92
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.617
 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"       C        7.60      0.25     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        1.80      0.20     0.500    75
 COMMERCIAL                 D        3.80      0.20     0.100    75
 URBAN POOR COVER
 "TURF"                     D        1.70      0.20     1.000    87
 SCHOOL                     D        2.70      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.477
```

```
  SUBAREA AREA(ACRES) =   17.60      SUBAREA RUNOFF(CFS) =   23.93
  EFFECTIVE AREA(ACRES) =     42.40    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       42.4        PEAK FLOW RATE(CFS) =      57.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.65   HALFSTREET FLOOD WIDTH(FEET) =  27.56
  FLOW VELOCITY(FEET/SEC.) =  3.90   DEPTH*VELOCITY(FT*FT/SEC.) =   2.54
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  265.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   49.2 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    314.00
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    314.00 =    2190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    315.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    38.00  DOWNSTREAM(FEET) =    37.00
  FLOW LENGTH(FEET) =   195.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.97
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      57.80
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   25.33
  LONGEST FLOWPATH FROM NODE    310.00 TO NODE    315.00 =    2385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     46.00  DOWNSTREAM(FEET) =     44.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.10      0.25     0.500    69   10.99
  COMMERCIAL                 C        6.20      0.25     0.100    69    8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.233
  SUBAREA RUNOFF(CFS) =     24.44
  TOTAL AREA(ACRES) =      9.30   PEAK FLOW RATE(CFS) =     24.44

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    318.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   44.00  DOWNSTREAM ELEVATION(FEET) =   42.00
  STREET LENGTH(FEET) =   913.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 51.00
```

```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  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) =      44.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.79
    HALFSTREET FLOOD WIDTH(FEET) =   38.01
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.09
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.66
  STREET FLOW TRAVEL TIME(MIN.) =   7.28   Tc(MIN.) =   15.86
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.095
  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"       C        0.20      0.25     0.500    69
  COMMERCIAL                 C       21.20      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.104
  SUBAREA AREA(ACRES) =   21.40      SUBAREA RUNOFF(CFS) =   39.85
  EFFECTIVE AREA(ACRES) =     30.70    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =       30.7        PEAK FLOW RATE(CFS) =      56.90

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.85   HALFSTREET FLOOD WIDTH(FEET) =  43.67
  FLOW VELOCITY(FEET/SEC.) =  2.20   DEPTH*VELOCITY(FT*FT/SEC.) =   1.86
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  913.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   39.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    318.00
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    318.00 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    318.00 TO NODE    319.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   42.00  DOWNSTREAM ELEVATION(FEET) =   39.00
  STREET LENGTH(FEET) =  1068.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 51.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  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) =      74.20
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.88
    HALFSTREET FLOOD WIDTH(FEET) =   47.19
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.25
  STREET FLOW TRAVEL TIME(MIN.) =   6.98   Tc(MIN.) =   22.84
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.700
  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"       C        1.30      0.25     0.500    69
  COMMERCIAL                 C       20.90      0.25     0.100    69
  COMMERCIAL                 D        0.80      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.123
  SUBAREA AREA(ACRES) =   23.00      SUBAREA RUNOFF(CFS) =   34.56
  EFFECTIVE AREA(ACRES) =     53.70    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.13
  TOTAL AREA(ACRES) =       53.7        PEAK FLOW RATE(CFS) =      80.54

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.91   HALFSTREET FLOOD WIDTH(FEET) =  49.33
  FLOW VELOCITY(FEET/SEC.) =  2.58   DEPTH*VELOCITY(FT*FT/SEC.) =   2.34
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1068.0 FT WITH ELEVATION-DROP =   3.0 FT, IS   42.5 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    319.00
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    319.00 =    2311.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    320.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   39.00  DOWNSTREAM ELEVATION(FEET) =   34.00
  STREET LENGTH(FEET) =  1732.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 51.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  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) =     100.45
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.96
    HALFSTREET FLOOD WIDTH(FEET) =   54.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.62
  STREET FLOW TRAVEL TIME(MIN.) =  10.60   Tc(MIN.) =   33.44
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.366
  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"       C        1.70      0.25     0.500    69
```

```
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        5.90      0.20     0.500    75
  COMMERCIAL                 C        2.10      0.25     0.100    69
  COMMERCIAL                 D       23.60      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.191
  SUBAREA AREA(ACRES) =   33.30      SUBAREA RUNOFF(CFS) =   39.76
  EFFECTIVE AREA(ACRES) =     87.00    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =       87.0       PEAK FLOW RATE(CFS) =     104.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.97   HALFSTREET FLOOD WIDTH(FEET) =  55.78
  FLOW VELOCITY(FEET/SEC.) =  2.74   DEPTH*VELOCITY(FT*FT/SEC.) =   2.66
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1732.0 FT WITH ELEVATION-DROP =   5.0 FT, IS   54.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    320.00
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    320.00 =    4043.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    321.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.00  DOWNSTREAM(FEET) =    33.00
  FLOW LENGTH(FEET) =   545.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.14
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     104.18
  PIPE TRAVEL TIME(MIN.) =   1.48    Tc(MIN.) =   34.92
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    321.00 =    4588.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    321.00 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.) =   34.92
  RAINFALL INTENSITY(INCH/HR) =   1.33
  AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.23
  AREA-AVERAGED Ap =  0.16
  EFFECTIVE STREAM AREA(ACRES) =      87.00
  TOTAL STREAM AREA(ACRES) =      87.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     104.18

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    322.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     42.00  DOWNSTREAM(FEET) =     40.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.986
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.586
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.70      0.25     0.500    69   10.99
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.10      0.20     0.500    75   10.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      8.42
  TOTAL AREA(ACRES) =      3.80   PEAK FLOW RATE(CFS) =      8.42

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    323.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   40.00  DOWNSTREAM ELEVATION(FEET) =   38.00
  STREET LENGTH(FEET) =  1467.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.38
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.60
    HALFSTREET FLOOD WIDTH(FEET) =   24.93
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.91
  STREET FLOW TRAVEL TIME(MIN.) =  16.07   Tc(MIN.) =   27.06
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.543
  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"       C        3.20      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        7.60      0.20     0.500    75
  COMMERCIAL                 C        1.00      0.25     0.100    69
  COMMERCIAL                 D        2.90      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.394
  SUBAREA AREA(ACRES) =   14.70      SUBAREA RUNOFF(CFS) =   19.29
  EFFECTIVE AREA(ACRES) =     18.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       18.5        PEAK FLOW RATE(CFS) =      24.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.65   HALFSTREET FLOOD WIDTH(FEET) =  27.37
```

```
  FLOW VELOCITY(FEET/SEC.) =  1.65   DEPTH*VELOCITY(FT*FT/SEC.) =   1.07
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1467.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   22.5 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    323.00
  LONGEST FLOWPATH FROM NODE    321.00 TO NODE    323.00 =    1797.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    324.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   38.00  DOWNSTREAM ELEVATION(FEET) =   33.00
  STREET LENGTH(FEET) =  1382.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      37.97
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.64
    HALFSTREET FLOOD WIDTH(FEET) =   27.01
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.67
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.71
  STREET FLOW TRAVEL TIME(MIN.) =   8.63   Tc(MIN.) =   35.69
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.316
  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       12.70      0.20     0.500    75
  COMMERCIAL                 D        5.90      0.20     0.100    75
  URBAN POOR COVER
  "TURF"                     D        1.30      0.20     1.000    87
  SCHOOL                     D        5.10      0.20     0.600    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.452
  SUBAREA AREA(ACRES) =   25.00      SUBAREA RUNOFF(CFS) =   27.58
  EFFECTIVE AREA(ACRES) =     43.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       43.5        PEAK FLOW RATE(CFS) =      47.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.69   HALFSTREET FLOOD WIDTH(FEET) =  29.39
  FLOW VELOCITY(FEET/SEC.) =  2.83   DEPTH*VELOCITY(FT*FT/SEC.) =   1.95
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1382.0 FT WITH ELEVATION-DROP =   5.0 FT, IS   43.5 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    324.00
  LONGEST FLOWPATH FROM NODE    321.00 TO NODE    324.00 =    3179.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    324.00 TO NODE    324.00 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.) =   35.69
  RAINFALL INTENSITY(INCH/HR) =   1.32
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.44
  EFFECTIVE STREAM AREA(ACRES) =      43.50
  TOTAL STREAM AREA(ACRES) =      43.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      47.96

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      104.18   34.92    1.333  0.23( 0.04) 0.16      87.0     316.00
      2       47.96   35.69    1.316  0.21( 0.09) 0.44      43.5     321.00

  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      151.73   34.92    1.333  0.22( 0.05) 0.25     129.6     316.00
      2      150.80   35.69    1.316  0.22( 0.05) 0.25     130.5     321.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     151.73    Tc(MIN.) =    34.92
  EFFECTIVE AREA(ACRES) =     129.56   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      130.5
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    324.00 =    4588.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    324.00 TO NODE    325.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.00  DOWNSTREAM(FEET) =    32.50
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  50.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.11
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     151.73
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   35.26
  LONGEST FLOWPATH FROM NODE    316.00 TO NODE    325.00 =    4755.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    327.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     36.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  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        1.60      0.20     0.500    75   10.99
  COMMERCIAL                 D        0.50      0.20     0.100    75    8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.405
  SUBAREA RUNOFF(CFS) =      5.48
  TOTAL AREA(ACRES) =      2.10   PEAK FLOW RATE(CFS) =      5.48

****************************************************************************
  FLOW PROCESS FROM NODE    327.00 TO NODE    328.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   36.00  DOWNSTREAM ELEVATION(FEET) =   34.00
  STREET LENGTH(FEET) =   607.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   17.23
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.82
  STREET FLOW TRAVEL TIME(MIN.) =   5.67   Tc(MIN.) =   14.25
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.228
  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        3.70      0.20     0.500    75
  COMMERCIAL                 D        1.70      0.20     0.100    75
  URBAN POOR COVER
  "TURF"                     D        0.40      0.20     1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.417
  SUBAREA AREA(ACRES) =    5.80      SUBAREA RUNOFF(CFS) =   11.19
  EFFECTIVE AREA(ACRES) =      7.90    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       7.9       PEAK FLOW RATE(CFS) =      15.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  19.80
  FLOW VELOCITY(FEET/SEC.) =  1.93   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
```

```
 LONGEST FLOWPATH FROM NODE    326.00 TO NODE    328.00 =     937.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    328.00 TO NODE    329.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    34.00  DOWNSTREAM(FEET) =    33.00
 FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.65
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.25
 PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   14.81
 LONGEST FLOWPATH FROM NODE    326.00 TO NODE    329.00 =    1127.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    331.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     34.00  DOWNSTREAM(FEET) =     33.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 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        1.40      0.20     0.500    75   12.62
 COMMERCIAL                 D        0.50      0.20     0.100    75    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.395
 SUBAREA RUNOFF(CFS) =      4.57
 TOTAL AREA(ACRES) =      1.90   PEAK FLOW RATE(CFS) =      4.57

****************************************************************************
 FLOW PROCESS FROM NODE    331.00 TO NODE    332.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   33.00  DOWNSTREAM ELEVATION(FEET) =   32.50
 STREET LENGTH(FEET) =    80.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.95
```

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  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.42
  HALFSTREET FLOOD WIDTH(FEET) =   15.04
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.27
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.95
STREET FLOW TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =   10.45
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.661
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        4.20      0.20     0.500    75
COMMERCIAL                 D        1.30      0.20     0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.405
SUBAREA AREA(ACRES) =    5.50      SUBAREA RUNOFF(CFS) =   12.77
EFFECTIVE AREA(ACRES) =      7.40    AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =      17.19

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.01
FLOW VELOCITY(FEET/SEC.) =  2.53   DEPTH*VELOCITY(FT*FT/SEC.) =   1.21
LONGEST FLOWPATH FROM NODE    330.00 TO NODE    332.00 =     410.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    332.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    32.50  DOWNSTREAM(FEET) =    32.00
FLOW LENGTH(FEET) =   451.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   3.32
ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      17.19
PIPE TRAVEL TIME(MIN.) =   2.26    Tc(MIN.) =   12.71
LONGEST FLOWPATH FROM NODE    330.00 TO NODE    333.00 =     861.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   12.71
*  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
"5-7 DWELLINGS/ACRE"       D        2.90      0.20     0.500    75
COMMERCIAL                 D        0.90      0.20     0.100    75
URBAN POOR COVER
"TURF"                     D        0.50      0.20     1.000    87
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.474
SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =    8.84
EFFECTIVE AREA(ACRES) =     11.70   AREA-AVERAGED Fm(INCH/HR) =  0.09
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.43
```

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 TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      24.14

****************************************************************************
 FLOW PROCESS FROM NODE    334.00 TO NODE    335.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     36.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
 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        0.90      0.20     0.500    75   10.99
 COMMERCIAL                 D        0.50      0.20     0.100    75    8.59
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.357
 SUBAREA RUNOFF(CFS) =      3.66
 TOTAL AREA(ACRES) =      1.40   PEAK FLOW RATE(CFS) =      3.66

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    336.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   36.00  DOWNSTREAM ELEVATION(FEET) =   34.00
 STREET LENGTH(FEET) =   715.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.71
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.41
   HALFSTREET FLOOD WIDTH(FEET) =   14.57
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.48
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.60
 STREET FLOW TRAVEL TIME(MIN.) =   8.06   Tc(MIN.) =   16.65
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.038
 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        2.30      0.20     0.500    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 =  0.371
```

```
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    6.01
  EFFECTIVE AREA(ACRES) =      4.80    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      8.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.98
  FLOW VELOCITY(FEET/SEC.) =  1.57   DEPTH*VELOCITY(FT*FT/SEC.) =   0.68
  LONGEST FLOWPATH FROM NODE    334.00 TO NODE    336.00 =    1045.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    337.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   34.00  DOWNSTREAM ELEVATION(FEET) =   33.00
  STREET LENGTH(FEET) =   277.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.06
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   16.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.84
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
  STREET FLOW TRAVEL TIME(MIN.) =   2.51   Tc(MIN.) =   19.16
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.880
  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        2.40      0.20     0.500    75
  COMMERCIAL                 D        0.60      0.20     0.100    75
  URBAN POOR COVER
  "TURF"                     D        0.20      0.20     1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.456
  SUBAREA AREA(ACRES) =    3.20      SUBAREA RUNOFF(CFS) =    5.15
  EFFECTIVE AREA(ACRES) =      8.00    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        8.0        PEAK FLOW RATE(CFS) =     12.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.01
  FLOW VELOCITY(FEET/SEC.) =  1.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE    334.00 TO NODE    337.00 =    1322.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    338.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.00  DOWNSTREAM(FEET) =    32.50
  FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.03
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.96
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   19.55
  LONGEST FLOWPATH FROM NODE    334.00 TO NODE    338.00 =    1441.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    339.00 TO NODE    340.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     39.00  DOWNSTREAM(FEET) =     38.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  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.)
  APARTMENTS                 D       2.80      0.20     0.200    75   12.07
  COMMERCIAL                 D       4.00      0.20     0.100    75   11.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.141
  SUBAREA RUNOFF(CFS) =     15.38
  TOTAL AREA(ACRES) =      6.80   PEAK FLOW RATE(CFS) =     15.38

******************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    341.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =   38.50  DOWNSTREAM ELEVATION(FEET) =   38.00
  STREET LENGTH(FEET) =   337.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.81
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.68
    HALFSTREET FLOOD WIDTH(FEET) =   26.83
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.06
  STREET FLOW TRAVEL TIME(MIN.) =   3.62   Tc(MIN.) =   14.94
```

```
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.168
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D        5.80      0.20     0.200    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 =  0.187
 SUBAREA AREA(ACRES) =    6.70      SUBAREA RUNOFF(CFS) =   12.85
 EFFECTIVE AREA(ACRES) =     13.50    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =       13.5        PEAK FLOW RATE(CFS) =      25.94

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.72   HALFSTREET FLOOD WIDTH(FEET) =  30.28
 FLOW VELOCITY(FEET/SEC.) =  1.62   DEPTH*VELOCITY(FT*FT/SEC.) =   1.16
 LONGEST FLOWPATH FROM NODE    339.00 TO NODE    341.00 =     667.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    341.00 TO NODE    346.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    38.00  DOWNSTREAM(FEET) =    37.50
 FLOW LENGTH(FEET) =   637.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.17
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      25.94
 PIPE TRAVEL TIME(MIN.) =   3.35    Tc(MIN.) =   18.30
 LONGEST FLOWPATH FROM NODE    339.00 TO NODE    346.00 =    1304.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    346.00 TO NODE    346.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.30
 RAINFALL INTENSITY(INCH/HR) =   1.93
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.16
 EFFECTIVE STREAM AREA(ACRES) =      13.50
 TOTAL STREAM AREA(ACRES) =      13.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.94

****************************************************************************
 FLOW PROCESS FROM NODE    342.00 TO NODE    343.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     39.00  DOWNSTREAM(FEET) =     38.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  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        1.50      0.20     0.500    75   14.50
  COMMERCIAL                 D        0.60      0.20     0.100    75   11.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.386
  SUBAREA RUNOFF(CFS) =      4.66
  TOTAL AREA(ACRES) =      2.10   PEAK FLOW RATE(CFS) =      4.66

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    344.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   38.50  DOWNSTREAM ELEVATION(FEET) =   38.00
  STREET LENGTH(FEET) =   502.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.50
    HALFSTREET FLOOD WIDTH(FEET) =   19.10
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.52
  STREET FLOW TRAVEL TIME(MIN.) =   8.03   Tc(MIN.) =   19.36
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.869
  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        3.00      0.20     0.500    75
  COMMERCIAL                 D        1.00      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) =    4.00      SUBAREA RUNOFF(CFS) =    6.44
  EFFECTIVE AREA(ACRES) =      6.10    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        6.1        PEAK FLOW RATE(CFS) =       9.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  21.45
  FLOW VELOCITY(FEET/SEC.) =  1.11   DEPTH*VELOCITY(FT*FT/SEC.) =   0.59
  LONGEST FLOWPATH FROM NODE    342.00 TO NODE    344.00 =     832.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    344.00 TO NODE    345.00 IS CODE =  62
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =   38.00  DOWNSTREAM ELEVATION(FEET) =   37.70
  STREET LENGTH(FEET) =   533.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.96
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.69
    HALFSTREET FLOOD WIDTH(FEET) =   29.39
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.12
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
  STREET FLOW TRAVEL TIME(MIN.) =   7.93   Tc(MIN.) =   27.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.535
  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       10.70      0.20     0.500    75
  COMMERCIAL                 D        3.20      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.408
  SUBAREA AREA(ACRES) =   13.90      SUBAREA RUNOFF(CFS) =   18.19
  EFFECTIVE AREA(ACRES) =     20.00    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       20.0        PEAK FLOW RATE(CFS) =      26.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.76   HALFSTREET FLOOD WIDTH(FEET) =  33.05
  FLOW VELOCITY(FEET/SEC.) =  1.22   DEPTH*VELOCITY(FT*FT/SEC.) =   0.93
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  533.0 FT WITH ELEVATION-DROP =   0.3 FT, IS   24.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    345.00
  LONGEST FLOWPATH FROM NODE    342.00 TO NODE    345.00 =    1365.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    346.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.70  DOWNSTREAM(FEET) =    37.50
  FLOW LENGTH(FEET) =   813.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  39.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.08
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.18
  PIPE TRAVEL TIME(MIN.) =   6.51    Tc(MIN.) =   33.80
  LONGEST FLOWPATH FROM NODE    342.00 TO NODE    346.00 =    2178.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    346.00 TO NODE    346.00 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.) =   33.80
  RAINFALL INTENSITY(INCH/HR) =   1.36
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =      20.00
  TOTAL STREAM AREA(ACRES) =      20.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.18

  ** CONFLUENCE DATA **
   STREAM      Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       25.94   18.30    1.930  0.20( 0.03) 0.16      13.5     339.00
      2       26.18   33.80    1.358  0.20( 0.08) 0.40      20.0     342.00

  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       46.46   18.30    1.930  0.20( 0.05) 0.27      24.3     339.00
      2       44.30   33.80    1.358  0.20( 0.06) 0.31      33.5     342.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      46.46    Tc(MIN.) =    18.30
  EFFECTIVE AREA(ACRES) =      24.33   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =       33.5
  LONGEST FLOWPATH FROM NODE    342.00 TO NODE    346.00 =    2178.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    346.00 TO NODE    347.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.50  DOWNSTREAM(FEET) =    37.00
  FLOW LENGTH(FEET) =  1007.75   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.09
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      46.46
  PIPE TRAVEL TIME(MIN.) =   5.44    Tc(MIN.) =   23.74
  LONGEST FLOWPATH FROM NODE    342.00 TO NODE    347.00 =    3185.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    347.00 TO NODE    347.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 MAINLINE Tc(MIN.) =   23.74
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.663
 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
 APARTMENTS                 D        4.70      0.20     0.200    75
 COMMERCIAL                 D        8.50      0.20     0.100    75
 URBAN POOR COVER
 "TURF"                     D        5.10      0.20     1.000    87
 SCHOOL                     D       10.20      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.457
 SUBAREA AREA(ACRES) =   28.90      SUBAREA RUNOFF(CFS) =   40.87
 EFFECTIVE AREA(ACRES) =     53.23   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.37
 TOTAL AREA(ACRES) =       62.4       PEAK FLOW RATE(CFS) =      76.09

****************************************************************************
 FLOW PROCESS FROM NODE    348.00 TO NODE    349.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     36.00  DOWNSTREAM(FEET) =     35.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 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   12.62
 COMMERCIAL                 D        0.40      0.20     0.100    75    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.355
 SUBAREA RUNOFF(CFS) =      2.65
 TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      2.65

****************************************************************************
 FLOW PROCESS FROM NODE    349.00 TO NODE    350.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   35.00  DOWNSTREAM ELEVATION(FEET) =   34.00
 STREET LENGTH(FEET) =   487.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.25
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   14.02
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.24
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.49
  STREET FLOW TRAVEL TIME(MIN.) =   6.53   Tc(MIN.) =   16.40
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.056
  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
  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 =  0.403
  SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    5.15
  EFFECTIVE AREA(ACRES) =      4.00    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =        4.0        PEAK FLOW RATE(CFS) =       7.12

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.82
  FLOW VELOCITY(FEET/SEC.) =  1.34   DEPTH*VELOCITY(FT*FT/SEC.) =   0.58
  LONGEST FLOWPATH FROM NODE    348.00 TO NODE    350.00 =     817.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    351.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   34.00  DOWNSTREAM ELEVATION(FEET) =   33.00
  STREET LENGTH(FEET) =   841.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.84
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.53
    HALFSTREET FLOOD WIDTH(FEET) =   21.51
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =  11.52   Tc(MIN.) =   27.91
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.515
  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        4.40      0.20     0.500    75
```

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 COMMERCIAL                 D        1.30      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.409
 SUBAREA AREA(ACRES) =    5.70      SUBAREA RUNOFF(CFS) =    7.35
 EFFECTIVE AREA(ACRES) =      9.70    AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        9.7        PEAK FLOW RATE(CFS) =      12.53

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  22.49
 FLOW VELOCITY(FEET/SEC.) =  1.28   DEPTH*VELOCITY(FT*FT/SEC.) =   0.71
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  841.0 FT WITH ELEVATION-DROP =   1.0 FT, IS    9.8 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    351.00
 LONGEST FLOWPATH FROM NODE    348.00 TO NODE    351.00 =    1658.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    351.00 TO NODE    364.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    33.00  DOWNSTREAM(FEET) =    32.50
 FLOW LENGTH(FEET) =   329.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.45
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.53
 PIPE TRAVEL TIME(MIN.) =   1.59    Tc(MIN.) =   29.50
 LONGEST FLOWPATH FROM NODE    348.00 TO NODE    364.00 =    1987.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    364.00 TO NODE    364.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    352.00 TO NODE    353.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     34.00  DOWNSTREAM(FEET) =     33.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
 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        1.90      0.20     0.500    75   14.50
 COMMERCIAL                 D        0.50      0.20     0.100    75   11.33
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.417
 SUBAREA RUNOFF(CFS) =      5.31
 TOTAL AREA(ACRES) =      2.40   PEAK FLOW RATE(CFS) =      5.31
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```
****************************************************************************
  FLOW PROCESS FROM NODE    353.00 TO NODE    354.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   33.50  DOWNSTREAM ELEVATION(FEET) =   33.00
  STREET LENGTH(FEET) =   320.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   16.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.55
  STREET FLOW TRAVEL TIME(MIN.) =   4.39   Tc(MIN.) =   15.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.106
  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        1.80      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 =  0.427
  SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    4.00
  EFFECTIVE AREA(ACRES) =      4.60    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =       8.37

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.85
  FLOW VELOCITY(FEET/SEC.) =  1.26   DEPTH*VELOCITY(FT*FT/SEC.) =   0.59
  LONGEST FLOWPATH FROM NODE    352.00 TO NODE    354.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    354.00 TO NODE    363.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    33.00  DOWNSTREAM(FEET) =    32.70
  FLOW LENGTH(FEET) =   477.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.23
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.37
  PIPE TRAVEL TIME(MIN.) =   3.56    Tc(MIN.) =   19.27
  LONGEST FLOWPATH FROM NODE    352.00 TO NODE    363.00 =    1127.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    363.00 TO NODE    363.00 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.) =   19.27
  RAINFALL INTENSITY(INCH/HR) =   1.87
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.42
  EFFECTIVE STREAM AREA(ACRES) =       4.60
  TOTAL STREAM AREA(ACRES) =       4.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.37

****************************************************************************
  FLOW PROCESS FROM NODE    355.00 TO NODE    356.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     35.00  DOWNSTREAM(FEET) =     34.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  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        1.60      0.20     0.500    75   14.50
  COMMERCIAL                 D        0.50      0.20     0.100    75   11.33
  URBAN POOR COVER
  "TURF"                     D        0.10      0.20     1.000    87   19.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.432
  SUBAREA RUNOFF(CFS) =      4.86
  TOTAL AREA(ACRES) =      2.20   PEAK FLOW RATE(CFS) =      4.86

****************************************************************************
  FLOW PROCESS FROM NODE    356.00 TO NODE    357.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   34.50  DOWNSTREAM ELEVATION(FEET) =   34.00
  STREET LENGTH(FEET) =   351.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.99
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.71
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.60
  STREET FLOW TRAVEL TIME(MIN.) =   4.75   Tc(MIN.) =   16.08
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.079
  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        3.00      0.20     0.500    75
  COMMERCIAL                 D        1.10      0.20     0.100    75
  URBAN POOR COVER
  "TURF"                     D        0.50      0.20     1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.459
  SUBAREA AREA(ACRES) =    4.60      SUBAREA RUNOFF(CFS) =    8.23
  EFFECTIVE AREA(ACRES) =      6.80    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        6.8        PEAK FLOW RATE(CFS) =      12.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  21.64
  FLOW VELOCITY(FEET/SEC.) =  1.35   DEPTH*VELOCITY(FT*FT/SEC.) =   0.72
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  351.0 FT WITH ELEVATION-DROP =   0.5 FT, IS    9.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    357.00
  LONGEST FLOWPATH FROM NODE    355.00 TO NODE    357.00 =     681.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    357.00 TO NODE    358.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   34.00  DOWNSTREAM ELEVATION(FEET) =   33.50
  STREET LENGTH(FEET) =   586.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.79
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.60
    HALFSTREET FLOOD WIDTH(FEET) =   25.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =   8.06   Tc(MIN.) =   24.13
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.647
  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        2.90      0.20     0.500    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 =  0.414
 SUBAREA AREA(ACRES) =    3.70      SUBAREA RUNOFF(CFS) =    5.21
 EFFECTIVE AREA(ACRES) =     10.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       10.5        PEAK FLOW RATE(CFS) =      14.74

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  25.05
 FLOW VELOCITY(FEET/SEC.) =  1.21   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
 LONGEST FLOWPATH FROM NODE    355.00 TO NODE    358.00 =    1267.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    358.00 TO NODE    363.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    33.50  DOWNSTREAM(FEET) =    32.70
 FLOW LENGTH(FEET) =   739.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.14
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.74
 PIPE TRAVEL TIME(MIN.) =   3.92    Tc(MIN.) =   28.05
 LONGEST FLOWPATH FROM NODE    355.00 TO NODE    363.00 =    2006.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    363.00 TO NODE    363.00 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.) =   28.05
 RAINFALL INTENSITY(INCH/HR) =   1.51
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.44
 EFFECTIVE STREAM AREA(ACRES) =      10.50
 TOTAL STREAM AREA(ACRES) =      10.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.74

****************************************************************************
 FLOW PROCESS FROM NODE    359.00 TO NODE    360.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     36.00  DOWNSTREAM(FEET) =     35.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
```

```
  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        2.40      0.20     0.500    75   12.62
  COMMERCIAL                 D        0.50      0.20     0.100    75    9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.431
  SUBAREA RUNOFF(CFS) =      6.95
  TOTAL AREA(ACRES) =      2.90   PEAK FLOW RATE(CFS) =      6.95

****************************************************************************
  FLOW PROCESS FROM NODE    360.00 TO NODE    361.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   35.00  DOWNSTREAM ELEVATION(FEET) =   34.00
  STREET LENGTH(FEET) =  1191.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.29
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.57
    HALFSTREET FLOOD WIDTH(FEET) =   23.65
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.13
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =  17.49   Tc(MIN.) =   27.36
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.533
  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        5.60      0.20     0.500    75
  COMMERCIAL                 D        2.00      0.20     0.100    75
  URBAN POOR COVER
  "TURF"                     D        0.30      0.20     1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   10.31
  EFFECTIVE AREA(ACRES) =     10.80    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       10.8        PEAK FLOW RATE(CFS) =      14.08

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.59   HALFSTREET FLOOD WIDTH(FEET) =  24.69
  FLOW VELOCITY(FEET/SEC.) =  1.19   DEPTH*VELOCITY(FT*FT/SEC.) =   0.71
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1191.0 FT WITH ELEVATION-DROP =    1.0 FT, IS   12.0 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    361.00
```

```
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    361.00 =    1521.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    361.00 TO NODE    363.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.00  DOWNSTREAM(FEET) =    32.70
  FLOW LENGTH(FEET) =   743.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.73
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.08
  PIPE TRAVEL TIME(MIN.) =   3.32    Tc(MIN.) =   30.67
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    363.00 =    2264.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    363.00 TO NODE    363.00 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.) =   30.67
  RAINFALL INTENSITY(INCH/HR) =   1.44
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.42
  EFFECTIVE STREAM AREA(ACRES) =      10.80
  TOTAL STREAM AREA(ACRES) =      10.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.08

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.37   19.27    1.874  0.20( 0.08) 0.42       4.6     352.00
      2       14.74   28.05    1.511  0.20( 0.09) 0.44      10.5     355.00
      3       14.08   30.67    1.436  0.20( 0.08) 0.42      10.8     359.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       32.79   19.27    1.874  0.20( 0.09) 0.43      18.6     352.00
      2       35.01   28.05    1.511  0.20( 0.09) 0.43      25.0     355.00
      3       34.36   30.67    1.436  0.20( 0.09) 0.43      25.9     359.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      35.01    Tc(MIN.) =    28.05
  EFFECTIVE AREA(ACRES) =      24.98   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =       25.9
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    363.00 =    2264.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    363.00 TO NODE    364.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    32.70  DOWNSTREAM(FEET) =    32.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.03
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.01
  PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   28.76
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    364.00 =    2434.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    364.00 TO NODE    364.00 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      32.79   19.99    1.835  0.20( 0.09) 0.43      18.6     352.00
      2      35.01   28.76    1.490  0.20( 0.09) 0.43      25.0     355.00
      3      34.36   31.38    1.417  0.20( 0.09) 0.43      25.9     359.00
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    364.00 =    2434.00 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      12.53   29.50    1.468  0.20( 0.08) 0.40       9.7     348.00
  LONGEST FLOWPATH FROM NODE    348.00 TO NODE    364.00 =    1987.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc   Intensity   Fp(Fm)     Ap     Ae    HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      43.53   19.99    1.835  0.20( 0.08) 0.42      25.2     352.00
      2      47.42   28.76    1.490  0.20( 0.08) 0.42      34.4     355.00
      3      47.36   29.50    1.468  0.20( 0.08) 0.42      34.9     348.00
      4      46.43   31.38    1.417  0.20( 0.08) 0.42      35.6     359.00
    TOTAL AREA(ACRES) =        35.6

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       47.42  Tc(MIN.) =   28.757
  EFFECTIVE AREA(ACRES) =     34.43  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       35.6
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    364.00 =    2434.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    364.00 TO NODE    364.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    364.00 TO NODE    368.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    32.50  DOWNSTREAM(FEET) =    32.00
  FLOW LENGTH(FEET) =   483.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  38.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.12
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.42
  PIPE TRAVEL TIME(MIN.) =   1.95    Tc(MIN.) =   30.71
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    368.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    368.00 TO NODE    368.00 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.) =   30.71
  RAINFALL INTENSITY(INCH/HR) =   1.43
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.42
  EFFECTIVE STREAM AREA(ACRES) =      34.43
  TOTAL STREAM AREA(ACRES) =      35.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      47.42

****************************************************************************
  FLOW PROCESS FROM NODE    365.00 TO NODE    366.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     36.00  DOWNSTREAM(FEET) =     35.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  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        2.00      0.20     0.500    75   12.62
  COMMERCIAL                 D        0.30      0.20     0.100    75    9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.448
  SUBAREA RUNOFF(CFS) =      5.51
  TOTAL AREA(ACRES) =      2.30   PEAK FLOW RATE(CFS) =      5.51

****************************************************************************
  FLOW PROCESS FROM NODE    366.00 TO NODE    367.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =   35.00  DOWNSTREAM ELEVATION(FEET) =   33.00
  STREET LENGTH(FEET) =   765.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
```

```
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.84
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.51
    HALFSTREET FLOOD WIDTH(FEET) =   20.11
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.88
  STREET FLOW TRAVEL TIME(MIN.) =   7.39   Tc(MIN.) =   17.25
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.996
  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        7.10      0.20     0.500    75
  COMMERCIAL                 D        2.40      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.399
  SUBAREA AREA(ACRES) =    9.50      SUBAREA RUNOFF(CFS) =   16.39
  EFFECTIVE AREA(ACRES) =     11.80    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       11.8        PEAK FLOW RATE(CFS) =      20.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.56   HALFSTREET FLOOD WIDTH(FEET) =  23.16
  FLOW VELOCITY(FEET/SEC.) =  1.96   DEPTH*VELOCITY(FT*FT/SEC.) =   1.10
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  765.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   18.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    367.00
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    367.00 =    1095.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    367.00 TO NODE    368.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   33.00  DOWNSTREAM ELEVATION(FEET) =   32.00
  STREET LENGTH(FEET) =   649.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.74
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.65
```

```
    HALFSTREET FLOOD WIDTH(FEET) =   27.37
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
  STREET FLOW TRAVEL TIME(MIN.) =   6.15   Tc(MIN.) =   23.40
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.677
  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        5.30      0.20     0.500    75
  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 =  0.383
  SUBAREA AREA(ACRES) =    7.50      SUBAREA RUNOFF(CFS) =   10.80
  EFFECTIVE AREA(ACRES) =     19.30    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      27.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.66   HALFSTREET FLOOD WIDTH(FEET) =  28.11
  FLOW VELOCITY(FEET/SEC.) =  1.80   DEPTH*VELOCITY(FT*FT/SEC.) =   1.19
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  649.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   14.2 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    368.00
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    368.00 =    1744.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    368.00 TO NODE    368.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.40
  RAINFALL INTENSITY(INCH/HR) =   1.68
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =      19.30
  TOTAL STREAM AREA(ACRES) =      19.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      27.74

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       43.53   22.01    1.736  0.20( 0.08) 0.42      25.2     352.00
      1       47.42   30.71    1.435  0.20( 0.08) 0.42      34.4     355.00
      1       47.36   31.45    1.415  0.20( 0.08) 0.42      34.9     348.00
      1       46.43   33.34    1.369  0.20( 0.08) 0.42      35.6     359.00
      2       27.74   23.40    1.677  0.20( 0.08) 0.40      19.3     365.00

  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       70.59   22.01    1.736  0.20( 0.08) 0.41      43.3     352.00
      2       71.89   23.40    1.677  0.20( 0.08) 0.41      46.0     365.00
```

```
     3       70.95   30.71    1.435  0.20( 0.08) 0.41      53.7     355.00
     4       70.56   31.45    1.415  0.20( 0.08) 0.41      54.2     348.00
     5       68.82   33.34    1.369  0.20( 0.08) 0.41      54.9     359.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      71.89    Tc(MIN.) =    23.40
  EFFECTIVE AREA(ACRES) =      45.95   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       54.9
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    368.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    368.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    32.00  DOWNSTREAM(FEET) =    31.00
  FLOW LENGTH(FEET) =  1208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  46.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.23
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      71.89
  PIPE TRAVEL TIME(MIN.) =   4.77    Tc(MIN.) =   28.17
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    374.00 =    4125.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   28.17
  RAINFALL INTENSITY(INCH/HR) =   1.51
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =      45.95
  TOTAL STREAM AREA(ACRES) =      54.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      71.89

****************************************************************************
  FLOW PROCESS FROM NODE    369.00 TO NODE    370.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     32.50  DOWNSTREAM(FEET) =     32.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  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   11.33
  URBAN POOR COVER
  "TURF"                     D        0.30      0.20     1.000    87   19.56
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.438
 SUBAREA RUNOFF(CFS) =      1.77
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.77

****************************************************************************
 FLOW PROCESS FROM NODE    370.00 TO NODE    371.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   32.00  DOWNSTREAM ELEVATION(FEET) =   31.80
 STREET LENGTH(FEET) =   149.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.11
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.50
   HALFSTREET FLOOD WIDTH(FEET) =   17.10
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.14
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
 STREET FLOW TRAVEL TIME(MIN.) =   2.17   Tc(MIN.) =   13.50
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.297
 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        5.20      0.20     0.500    75
 COMMERCIAL                 D        0.10      0.20     0.100    75
 URBAN POOR COVER
 "TURF"                     D        0.10      0.20     1.000    87
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.502
 SUBAREA AREA(ACRES) =    5.40      SUBAREA RUNOFF(CFS) =   10.68
 EFFECTIVE AREA(ACRES) =      6.20    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =        6.2        PEAK FLOW RATE(CFS) =      12.27

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.58   HALFSTREET FLOOD WIDTH(FEET) =  21.29
 FLOW VELOCITY(FEET/SEC.) =  1.30   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
 LONGEST FLOWPATH FROM NODE    369.00 TO NODE    371.00 =     479.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    371.00 TO NODE    372.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   31.80  DOWNSTREAM ELEVATION(FEET) =   31.60
 STREET LENGTH(FEET) =   294.00   CURB HEIGHT(INCHES) =  8.0
```

```
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.75
    HALFSTREET FLOOD WIDTH(FEET) =   34.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.13
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
  STREET FLOW TRAVEL TIME(MIN.) =   4.35   Tc(MIN.) =   17.85
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.958
  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        8.50      0.20     0.500    75
  COMMERCIAL                 D        1.60      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.437
  SUBAREA AREA(ACRES) =   10.10      SUBAREA RUNOFF(CFS) =   17.00
  EFFECTIVE AREA(ACRES) =     16.30    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       16.3        PEAK FLOW RATE(CFS) =      27.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.82   HALFSTREET FLOOD WIDTH(FEET) =  40.29
  FLOW VELOCITY(FEET/SEC.) =  1.19   DEPTH*VELOCITY(FT*FT/SEC.) =   0.97
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  294.0 FT WITH ELEVATION-DROP =   0.2 FT, IS   20.8 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    372.00
  LONGEST FLOWPATH FROM NODE    369.00 TO NODE    372.00 =     773.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    372.00 TO NODE    373.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   31.60  DOWNSTREAM ELEVATION(FEET) =   31.40
  STREET LENGTH(FEET) =   285.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.73
```

```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.87
    HALFSTREET FLOOD WIDTH(FEET) =   45.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.25
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.09
  STREET FLOW TRAVEL TIME(MIN.) =   3.81   Tc(MIN.) =   21.66
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.752
  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        8.00      0.20     0.500    75
  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 =  0.427
  SUBAREA AREA(ACRES) =    9.80      SUBAREA RUNOFF(CFS) =   14.70
  EFFECTIVE AREA(ACRES) =     26.10    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       26.1        PEAK FLOW RATE(CFS) =      39.07

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.90   HALFSTREET FLOOD WIDTH(FEET) =  48.82
  FLOW VELOCITY(FEET/SEC.) =  1.27   DEPTH*VELOCITY(FT*FT/SEC.) =   1.15
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  285.0 FT WITH ELEVATION-DROP =   0.2 FT, IS   20.5 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    373.00
  LONGEST FLOWPATH FROM NODE    369.00 TO NODE    373.00 =    1058.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    373.00 TO NODE    374.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   31.40  DOWNSTREAM ELEVATION(FEET) =   31.00
  STREET LENGTH(FEET) =   369.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      53.89
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.93
    HALFSTREET FLOOD WIDTH(FEET) =   51.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.61
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.49
  STREET FLOW TRAVEL TIME(MIN.) =   3.82   Tc(MIN.) =   25.48
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  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       10.00      0.20     0.500    75
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  COMMERCIAL                 D       11.40      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) =   21.40      SUBAREA RUNOFF(CFS) =   29.65
  EFFECTIVE AREA(ACRES) =     47.50    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =       47.5        PEAK FLOW RATE(CFS) =      65.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.98   HALFSTREET FLOOD WIDTH(FEET) =  56.86
  FLOW VELOCITY(FEET/SEC.) =  1.66   DEPTH*VELOCITY(FT*FT/SEC.) =   1.63
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  369.0 FT WITH ELEVATION-DROP =   0.4 FT, IS   44.8 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    374.00
  LONGEST FLOWPATH FROM NODE    369.00 TO NODE    374.00 =    1427.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   25.48
  RAINFALL INTENSITY(INCH/HR) =   1.60
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.37
  EFFECTIVE STREAM AREA(ACRES) =      47.50
  TOTAL STREAM AREA(ACRES) =      47.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      65.06

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       70.59   26.89    1.548  0.20( 0.08) 0.41      43.3     352.00
      1       71.89   28.17    1.508  0.20( 0.08) 0.41      46.0     365.00
      1       70.95   35.59    1.319  0.20( 0.08) 0.41      53.7     355.00
      1       70.56   36.33    1.303  0.20( 0.08) 0.41      54.2     348.00
      1       68.82   38.22    1.266  0.20( 0.08) 0.41      54.9     359.00
      2       65.06   25.48    1.597  0.20( 0.07) 0.37      47.5     369.00

  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      134.17   25.48    1.597  0.20( 0.08) 0.39      88.6     369.00
      2      133.58   26.89    1.548  0.20( 0.08) 0.39      90.8     352.00
      3      133.13   28.17    1.508  0.20( 0.08) 0.39      93.5     365.00
      4      124.12   35.59    1.319  0.20( 0.08) 0.39     101.2     355.00
      5      123.06   36.33    1.303  0.20( 0.08) 0.39     101.7     348.00
      6      119.73   38.22    1.266  0.20( 0.08) 0.40     102.4     359.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      134.17    Tc(MIN.) =    25.48
  EFFECTIVE AREA(ACRES) =      88.56   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.39
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  TOTAL AREA(ACRES) =      102.4
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    374.00 =    4125.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    375.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.00  DOWNSTREAM(FEET) =    30.00
  FLOW LENGTH(FEET) =   807.12   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.69
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     134.17
  PIPE TRAVEL TIME(MIN.) =   2.36    Tc(MIN.) =   27.85
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    375.00 =    4932.12 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     37.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  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        8.50      0.20     0.100    75    9.86
  URBAN POOR COVER
  "TURF"                     D        0.40      0.20     1.000    87   17.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.140
  SUBAREA RUNOFF(CFS) =     21.81
  TOTAL AREA(ACRES) =      8.90   PEAK FLOW RATE(CFS) =     21.81

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    378.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   37.00  DOWNSTREAM ELEVATION(FEET) =   36.00
  STREET LENGTH(FEET) =   398.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 51.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  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
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    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      31.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.70
    HALFSTREET FLOOD WIDTH(FEET) =   29.02
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.09
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
  STREET FLOW TRAVEL TIME(MIN.) =   3.18   Tc(MIN.) =   13.04
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.344
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        9.30      0.20     0.100    75
  URBAN POOR COVER
  "TURF"                     D        0.30      0.20     1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.128
  SUBAREA AREA(ACRES) =    9.60      SUBAREA RUNOFF(CFS) =   20.03
  EFFECTIVE AREA(ACRES) =     18.50    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.13
  TOTAL AREA(ACRES) =       18.5        PEAK FLOW RATE(CFS) =      38.57

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.74   HALFSTREET FLOOD WIDTH(FEET) =  33.12
  FLOW VELOCITY(FEET/SEC.) =  2.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.61
  LONGEST FLOWPATH FROM NODE    376.00 TO NODE    378.00 =     728.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    378.00 TO NODE    379.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   36.00  DOWNSTREAM ELEVATION(FEET) =   34.00
  STREET LENGTH(FEET) =   537.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 51.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  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) =      50.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.76
    HALFSTREET FLOOD WIDTH(FEET) =   34.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.04
  STREET FLOW TRAVEL TIME(MIN.) =   3.34   Tc(MIN.) =   16.39
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.056
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       12.40      0.20     0.100    75
  URBAN POOR COVER
  "TURF"                     D        1.10      0.20     1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
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 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.173
 SUBAREA AREA(ACRES) =   13.50      SUBAREA RUNOFF(CFS) =   24.56
 EFFECTIVE AREA(ACRES) =     32.00    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
 TOTAL AREA(ACRES) =       32.0        PEAK FLOW RATE(CFS) =      58.35

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.79   HALFSTREET FLOOD WIDTH(FEET) =  38.01
 FLOW VELOCITY(FEET/SEC.) =  2.74   DEPTH*VELOCITY(FT*FT/SEC.) =   2.17
 LONGEST FLOWPATH FROM NODE    376.00 TO NODE    379.00 =    1265.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    379.00 TO NODE    380.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    34.00  DOWNSTREAM(FEET) =    33.00
 FLOW LENGTH(FEET) =   236.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.34
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      58.35
 PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   16.92
 LONGEST FLOWPATH FROM NODE    376.00 TO NODE    380.00 =    1501.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     38.00  DOWNSTREAM(FEET) =     37.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 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        4.90      0.20     0.500    75   12.62
 COMMERCIAL                 D        0.60      0.20     0.100    75    9.86
 URBAN POOR COVER
 "TURF"                     D        1.60      0.20     1.000    87   17.03
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.579
 SUBAREA RUNOFF(CFS) =     16.84
 TOTAL AREA(ACRES) =      7.10   PEAK FLOW RATE(CFS) =     16.84

****************************************************************************
 FLOW PROCESS FROM NODE    382.00 TO NODE    383.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   37.00  DOWNSTREAM ELEVATION(FEET) =   36.50
 STREET LENGTH(FEET) =   994.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 42.00
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 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      28.89
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.87
   HALFSTREET FLOOD WIDTH(FEET) =   45.37
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.05
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.91
 STREET FLOW TRAVEL TIME(MIN.) =  15.73   Tc(MIN.) =   25.59
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.593
 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        6.80      0.20     0.500    75
 APARTMENTS                 D        6.10      0.20     0.200    75
 COMMERCIAL                 D        4.10      0.20     0.100    75
 URBAN POOR COVER
 "TURF"                     D        0.20      0.20     1.000    87
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.304
 SUBAREA AREA(ACRES) =   17.20      SUBAREA RUNOFF(CFS) =   23.71
 EFFECTIVE AREA(ACRES) =     24.30    AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =       24.3        PEAK FLOW RATE(CFS) =      33.15

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.90   HALFSTREET FLOOD WIDTH(FEET) =  48.98
 FLOW VELOCITY(FEET/SEC.) =  1.08   DEPTH*VELOCITY(FT*FT/SEC.) =   0.97
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  994.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   26.0 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    383.00
 LONGEST FLOWPATH FROM NODE    381.00 TO NODE    383.00 =    1324.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    383.00 TO NODE    383.50 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   36.50  DOWNSTREAM ELEVATION(FEET) =   36.00
 STREET LENGTH(FEET) =  1026.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200
```

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  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      40.22
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.96
  HALFSTREET FLOOD WIDTH(FEET) =   54.56
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.10
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.05
 STREET FLOW TRAVEL TIME(MIN.) =  15.57    Tc(MIN.) =   41.16
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.213
 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"       C        0.10      0.25     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        6.00      0.20     0.500    75
 APARTMENTS                 D        6.80      0.20     0.200    75
 COMMERCIAL                 D        0.60      0.20     0.100    75
 URBAN POOR COVER
 "TURF"                     D        0.20      0.20     1.000    87
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.341
 SUBAREA AREA(ACRES) =   13.70      SUBAREA RUNOFF(CFS) =   14.11
 EFFECTIVE AREA(ACRES) =     38.00    AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.37
 TOTAL AREA(ACRES) =       38.0        PEAK FLOW RATE(CFS) =      38.96

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.95   HALFSTREET FLOOD WIDTH(FEET) =  53.74
 FLOW VELOCITY(FEET/SEC.) =  1.09   DEPTH*VELOCITY(FT*FT/SEC.) =   1.04
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1026.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   20.4 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    383.50
 LONGEST FLOWPATH FROM NODE    381.00 TO NODE    383.50 =    2350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    383.50 TO NODE    384.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    36.00  DOWNSTREAM(FEET) =    35.50
 FLOW LENGTH(FEET) =    87.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.56
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      38.96
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   41.35
 LONGEST FLOWPATH FROM NODE    381.00 TO NODE    384.00 =    2437.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    385.00 TO NODE    386.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =     37.00  DOWNSTREAM(FEET) =     36.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.329
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
 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.)
 APARTMENTS                 D        4.40      0.20      0.200    75   12.07
 COMMERCIAL                 D        0.80      0.20      0.100    75   11.33
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.185
 SUBAREA RUNOFF(CFS) =     11.72
 TOTAL AREA(ACRES) =      5.20   PEAK FLOW RATE(CFS) =     11.72

****************************************************************************
 FLOW PROCESS FROM NODE    386.00 TO NODE    387.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   36.50  DOWNSTREAM ELEVATION(FEET) =   36.00
 STREET LENGTH(FEET) =   284.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.13
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.61
   HALFSTREET FLOOD WIDTH(FEET) =   22.44
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.54
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.94
 STREET FLOW TRAVEL TIME(MIN.) =   3.06    Tc(MIN.) =   14.39
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.215
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D        3.80      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 =  0.184
 SUBAREA AREA(ACRES) =    4.50      SUBAREA RUNOFF(CFS) =    8.82
 EFFECTIVE AREA(ACRES) =      9.70    AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        9.7         PEAK FLOW RATE(CFS) =      19.01

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.64   HALFSTREET FLOOD WIDTH(FEET) =  23.91
 FLOW VELOCITY(FEET/SEC.) =  1.61   DEPTH*VELOCITY(FT*FT/SEC.) =   1.02
 LONGEST FLOWPATH FROM NODE    385.00 TO NODE    387.00 =     614.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    387.00 TO NODE    388.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    24.72  DOWNSTREAM(FEET) =    24.29
  FLOW LENGTH(FEET) =   432.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  24.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.31
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.01
  PIPE TRAVEL TIME(MIN.) =   2.17    Tc(MIN.) =   16.57
  LONGEST FLOWPATH FROM NODE    385.00 TO NODE    388.00 =    1046.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    388.00 TO NODE    388.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   16.57
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.043
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  D         5.50      0.20     0.200    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 =  0.180
  SUBAREA AREA(ACRES) =    6.90      SUBAREA RUNOFF(CFS) =   12.47
  EFFECTIVE AREA(ACRES) =     16.60   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =       16.6       PEAK FLOW RATE(CFS) =      29.98

****************************************************************************
  FLOW PROCESS FROM NODE    388.00 TO NODE    388.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    24.29  DOWNSTREAM(FEET) =    23.19
  FLOW LENGTH(FEET) =  1100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  27.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.72
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.98
  PIPE TRAVEL TIME(MIN.) =   4.92    Tc(MIN.) =   21.49
  LONGEST FLOWPATH FROM NODE    385.00 TO NODE    388.10 =    2146.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    388.10 TO NODE    388.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   21.49
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.760
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        10.13      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   10.13      SUBAREA RUNOFF(CFS) =   15.82
  EFFECTIVE AREA(ACRES) =     26.73   AREA-AVERAGED Fm(INCH/HR) =  0.03
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =       26.7       PEAK FLOW RATE(CFS) =      41.58

****************************************************************************
  FLOW PROCESS FROM NODE    388.10 TO NODE    388.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.49
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.760
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        3.87      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.87      SUBAREA RUNOFF(CFS) =    6.04
  EFFECTIVE AREA(ACRES) =     30.60   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =       30.6       PEAK FLOW RATE(CFS) =      47.62

****************************************************************************
  FLOW PROCESS FROM NODE    388.10 TO NODE    388.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.19  DOWNSTREAM(FEET) =    22.48
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  23.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.39
  GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.62
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   22.08
  LONGEST FLOWPATH FROM NODE    385.00 TO NODE    388.20 =    2371.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    388.20 TO NODE    388.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.08
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.733
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C       10.24      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   10.24      SUBAREA RUNOFF(CFS) =   15.74
  EFFECTIVE AREA(ACRES) =     40.84   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.13
  TOTAL AREA(ACRES) =       40.8       PEAK FLOW RATE(CFS) =      62.62

****************************************************************************
  FLOW PROCESS FROM NODE    388.20 TO NODE    389.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    22.48  DOWNSTREAM(FEET) =    22.04
  FLOW LENGTH(FEET) =   438.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  38.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.46
  GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.62
  PIPE TRAVEL TIME(MIN.) =   1.64    Tc(MIN.) =   23.71
  LONGEST FLOWPATH FROM NODE    385.00 TO NODE    389.00 =    2809.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    389.00 TO NODE    389.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.664
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C      32.76      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   32.76      SUBAREA RUNOFF(CFS) =   48.32
  EFFECTIVE AREA(ACRES) =     73.60   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.12
  TOTAL AREA(ACRES) =       73.6       PEAK FLOW RATE(CFS) =     108.38

****************************************************************************
  FLOW PROCESS FROM NODE    389.20 TO NODE    389.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.664
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  MOBILE HOME PARK            C      23.64      0.25     0.250    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
  SUBAREA AREA(ACRES) =   23.64      SUBAREA RUNOFF(CFS) =   34.07
  EFFECTIVE AREA(ACRES) =     97.24   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =       97.2       PEAK FLOW RATE(CFS) =     142.45

****************************************************************************
  FLOW PROCESS FROM NODE    389.10 TO NODE    389.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.664
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C      21.01      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.01      SUBAREA RUNOFF(CFS) =   30.99
  EFFECTIVE AREA(ACRES) =    118.25   AREA-AVERAGED Fm(INCH/HR) =  0.03
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =      118.2       PEAK FLOW RATE(CFS) =     173.44

****************************************************************************
  FLOW PROCESS FROM NODE    390.00 TO NODE    391.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     35.00  DOWNSTREAM(FEET) =     34.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  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.)
  APARTMENTS                  C        0.10      0.25      0.200    69   10.51
  APARTMENTS                  D        3.00      0.20      0.200    75   10.51
  COMMERCIAL                  D        0.20      0.20      0.100    75    9.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.194
  SUBAREA RUNOFF(CFS) =      8.05
  TOTAL AREA(ACRES) =      3.30   PEAK FLOW RATE(CFS) =      8.05

****************************************************************************
  FLOW PROCESS FROM NODE    391.00 TO NODE    392.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   34.00  DOWNSTREAM ELEVATION(FEET) =   33.50
  STREET LENGTH(FEET) =   595.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.73
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.61
    HALFSTREET FLOOD WIDTH(FEET) =   25.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   8.08    Tc(MIN.) =   17.94
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.952
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  D        8.60      0.20      0.200    75
  COMMERCIAL                  D        0.20      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.198
  SUBAREA AREA(ACRES) =    8.80      SUBAREA RUNOFF(CFS) =   15.15
  EFFECTIVE AREA(ACRES) =     12.10    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       12.1        PEAK FLOW RATE(CFS) =      20.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.67   HALFSTREET FLOOD WIDTH(FEET) =  28.29
  FLOW VELOCITY(FEET/SEC.) =  1.33   DEPTH*VELOCITY(FT*FT/SEC.) =   0.89
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  595.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   16.1 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    392.00
  LONGEST FLOWPATH FROM NODE    390.00 TO NODE    392.00 =     925.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    392.00 TO NODE    393.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   33.50  DOWNSTREAM ELEVATION(FEET) =   33.00
  STREET LENGTH(FEET) =   723.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      32.42
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.79
    HALFSTREET FLOOD WIDTH(FEET) =   34.45
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.09
  STREET FLOW TRAVEL TIME(MIN.) =   8.69    Tc(MIN.) =   26.63
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.557
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap     SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       16.20      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 =  0.196
  SUBAREA AREA(ACRES) =   16.90      SUBAREA RUNOFF(CFS) =   23.08
  EFFECTIVE AREA(ACRES) =     29.00    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       29.0        PEAK FLOW RATE(CFS) =      39.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.84   HALFSTREET FLOOD WIDTH(FEET) =  37.20
  FLOW VELOCITY(FEET/SEC.) =  1.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.22
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  723.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   28.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    393.00
```

```
 LONGEST FLOWPATH FROM NODE     390.00 TO NODE     393.00 =    1648.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     393.00 TO NODE     397.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     33.00  DOWNSTREAM(FEET) =     32.50
 FLOW LENGTH(FEET) =  1865.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.35
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      39.60
 PIPE TRAVEL TIME(MIN.) =  13.24    Tc(MIN.) =   39.87
 LONGEST FLOWPATH FROM NODE     390.00 TO NODE     397.00 =    3513.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     397.00 TO NODE     397.00 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.) =   39.87
 RAINFALL INTENSITY(INCH/HR) =   1.24
 AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =      29.00
 TOTAL STREAM AREA(ACRES) =      29.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      39.60

****************************************************************************
 FLOW PROCESS FROM NODE     395.00 TO NODE     396.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    396.00  DOWNSTREAM(FEET) =    395.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C        0.46      0.25     0.100    69    9.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.13
 TOTAL AREA(ACRES) =      0.46   PEAK FLOW RATE(CFS) =      1.13

****************************************************************************
 FLOW PROCESS FROM NODE     396.00 TO NODE     396.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.86
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        1.16      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.16       SUBAREA RUNOFF(CFS) =    2.85
  EFFECTIVE AREA(ACRES) =       1.62   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =         1.6       PEAK FLOW RATE(CFS) =        3.97

****************************************************************************
  FLOW PROCESS FROM NODE    396.00 TO NODE    396.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     25.62  DOWNSTREAM(FEET) =    25.41
  FLOW LENGTH(FEET) =   205.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.23
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        3.97
  PIPE TRAVEL TIME(MIN.) =   1.54    Tc(MIN.) =   11.40
  LONGEST FLOWPATH FROM NODE    395.00 TO NODE    396.10 =     535.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    396.10 TO NODE    396.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.40
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.532
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        7.89      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.89       SUBAREA RUNOFF(CFS) =   17.80
  EFFECTIVE AREA(ACRES) =       9.51   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =         9.5       PEAK FLOW RATE(CFS) =       21.46

****************************************************************************
  FLOW PROCESS FROM NODE    396.10 TO NODE    396.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     25.41  DOWNSTREAM(FEET) =    24.94
  FLOW LENGTH(FEET) =   385.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.56
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       21.46
  PIPE TRAVEL TIME(MIN.) =   1.80    Tc(MIN.) =   13.20
  LONGEST FLOWPATH FROM NODE    395.00 TO NODE    396.20 =     920.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    396.20 TO NODE    396.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.20
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.328
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        7.80      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.80      SUBAREA RUNOFF(CFS) =   16.16
  EFFECTIVE AREA(ACRES) =     17.31   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       17.3        PEAK FLOW RATE(CFS) =       35.87

****************************************************************************
  FLOW PROCESS FROM NODE    396.20 TO NODE    396.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     24.94  DOWNSTREAM(FEET) =    24.72
  FLOW LENGTH(FEET) =   150.33   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.32
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.87
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   13.78
  LONGEST FLOWPATH FROM NODE    395.00 TO NODE    396.30 =    1070.33 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    396.30 TO NODE    396.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.78
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.271
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C       13.06      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   13.06      SUBAREA RUNOFF(CFS) =   26.40
  EFFECTIVE AREA(ACRES) =     30.37   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       30.4        PEAK FLOW RATE(CFS) =       61.39

****************************************************************************
  FLOW PROCESS FROM NODE    396.30 TO NODE    397.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     24.72  DOWNSTREAM(FEET) =    24.65
  FLOW LENGTH(FEET) =   285.00   MANNING'S N =  0.013
```

```
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.38
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      61.39
 PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   14.52
 LONGEST FLOWPATH FROM NODE    395.00 TO NODE    397.00 =    1355.33 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    397.00 TO NODE    397.00 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.) =   14.52
 RAINFALL INTENSITY(INCH/HR) =   2.20
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =      30.37
 TOTAL STREAM AREA(ACRES) =      30.37
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      61.39

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       39.60   39.87    1.235  0.20( 0.04) 0.20      29.0     390.00
     2       61.39   14.52    2.204  0.25( 0.02) 0.10      30.4     395.00

 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       87.49   14.52    2.204  0.23( 0.03) 0.12      40.9     395.00
     2       73.71   39.87    1.235  0.22( 0.03) 0.15      59.4     390.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      87.49    Tc(MIN.) =     14.52
 EFFECTIVE AREA(ACRES) =      40.93   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.12
 TOTAL AREA(ACRES) =       59.4
 LONGEST FLOWPATH FROM NODE    390.00 TO NODE    397.00 =    3513.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    397.00 TO NODE    397.10 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    24.65  DOWNSTREAM(FEET) =    24.32
 FLOW LENGTH(FEET) =   332.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.50
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      87.49
```

```
 PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =   15.53
 LONGEST FLOWPATH FROM NODE    390.00 TO NODE    397.10 =    3845.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    397.10 TO NODE    397.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.53
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.121
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 MOBILE HOME PARK           C       19.02      0.25     0.250    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
 SUBAREA AREA(ACRES) =   19.02      SUBAREA RUNOFF(CFS) =   35.23
 EFFECTIVE AREA(ACRES) =     59.95   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =       78.4       PEAK FLOW RATE(CFS) =     112.30

****************************************************************************
 FLOW PROCESS FROM NODE    397.10 TO NODE    397.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    24.32  DOWNSTREAM(FEET) =    24.02
 FLOW LENGTH(FEET) =   299.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.06
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     112.30
 PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   16.23
 LONGEST FLOWPATH FROM NODE    390.00 TO NODE    397.20 =    4144.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    397.20 TO NODE    397.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.23
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.067
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 MOBILE HOME PARK           C        0.76      0.25     0.250    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
 SUBAREA AREA(ACRES) =    0.76      SUBAREA RUNOFF(CFS) =    1.37
 EFFECTIVE AREA(ACRES) =     60.71   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.17
 TOTAL AREA(ACRES) =       79.2       PEAK FLOW RATE(CFS) =     112.30
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    397.20 TO NODE    397.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    24.02  DOWNSTREAM(FEET) =    23.40
  FLOW LENGTH(FEET) =   615.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.06
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     112.30
  PIPE TRAVEL TIME(MIN.) =   1.45    Tc(MIN.) =   17.69
  LONGEST FLOWPATH FROM NODE    390.00 TO NODE    397.30 =    4759.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    397.30 TO NODE    397.30 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
  MOBILE HOME PARK            C        7.41      0.25      0.250    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
  SUBAREA AREA(ACRES) =     7.41      SUBAREA RUNOFF(CFS) =   12.71
  EFFECTIVE AREA(ACRES) =     68.12   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.24   AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =       86.6        PEAK FLOW RATE(CFS) =     118.09

****************************************************************************
  FLOW PROCESS FROM NODE    397.30 TO NODE    398.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.35  DOWNSTREAM(FEET) =    20.20
  FLOW LENGTH(FEET) =   833.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  39.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.55
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     118.09
  PIPE TRAVEL TIME(MIN.) =   1.62    Tc(MIN.) =   19.31
  LONGEST FLOWPATH FROM NODE    390.00 TO NODE    398.00 =    5592.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    399.10 TO NODE    399.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    110.00  DOWNSTREAM(FEET) =    108.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  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"       B        2.60      0.30     0.500    56   10.99
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        3.60      0.25     0.500    69   10.99
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.90      0.25     1.000    77   19.94
 COMMERCIAL                 B        0.80      0.30     0.100    56    8.59
 COMMERCIAL                 C        1.40      0.25     0.100    69    8.59
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.454
 SUBAREA RUNOFF(CFS) =     23.91
 TOTAL AREA(ACRES) =      9.30   PEAK FLOW RATE(CFS) =     23.91

****************************************************************************
 FLOW PROCESS FROM NODE    399.20 TO NODE    399.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  108.00  DOWNSTREAM ELEVATION(FEET) =  105.00
 STREET LENGTH(FEET) =   510.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 51.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
 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) =      40.31
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.81
   HALFSTREET FLOOD WIDTH(FEET) =   40.15
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.51
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.86
 STREET FLOW TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =   11.01
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.583
 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"       B        4.30      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        5.90      0.25     0.500    69
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        1.50      0.25     1.000    77
 COMMERCIAL                 B        1.10      0.30     0.100    56
 COMMERCIAL                 C        2.00      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.467
 SUBAREA AREA(ACRES) =   14.80      SUBAREA RUNOFF(CFS) =   32.75
 EFFECTIVE AREA(ACRES) =     24.10    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       24.1        PEAK FLOW RATE(CFS) =      53.35

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.88   HALFSTREET FLOOD WIDTH(FEET) =  46.99
```

```
  FLOW VELOCITY(FEET/SEC.) =  3.69   DEPTH*VELOCITY(FT*FT/SEC.) =   3.26
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  510.0 FT WITH ELEVATION-DROP =   3.0 FT, IS   34.1 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    399.30
  LONGEST FLOWPATH FROM NODE    399.10 TO NODE    399.30 =     840.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    399.30 TO NODE    399.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  105.00  DOWNSTREAM ELEVATION(FEET) =  104.00
  STREET LENGTH(FEET) =   698.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 51.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  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) =      69.95
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.96
    HALFSTREET FLOOD WIDTH(FEET) =   54.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.91
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.83
  STREET FLOW TRAVEL TIME(MIN.) =   6.10   Tc(MIN.) =   17.10
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.006
  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"       B        1.30      0.30     0.500    56
  COMMERCIAL                 B        0.90      0.30     0.100    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        8.60      0.25     0.500    69
  COMMERCIAL                 C        3.90      0.25     0.100    69
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        1.10      0.25     1.000    77
  COMMERCIAL                 C        3.40      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.358
  SUBAREA AREA(ACRES) =   19.20      SUBAREA RUNOFF(CFS) =   33.09
  EFFECTIVE AREA(ACRES) =     43.30    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       43.3        PEAK FLOW RATE(CFS) =      73.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.97   HALFSTREET FLOOD WIDTH(FEET) =  55.97
  FLOW VELOCITY(FEET/SEC.) =  1.94   DEPTH*VELOCITY(FT*FT/SEC.) =   1.88
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  698.0 FT WITH ELEVATION-DROP =   1.0 FT, IS   35.2 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    399.40
  LONGEST FLOWPATH FROM NODE    399.10 TO NODE    399.40 =    1538.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    399.40 TO NODE    399.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   104.00  DOWNSTREAM(FEET) =   100.00
  FLOW LENGTH(FEET) =   653.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.85
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      73.94
  PIPE TRAVEL TIME(MIN.) =   1.23    Tc(MIN.) =   18.33
  LONGEST FLOWPATH FROM NODE    399.10 TO NODE    399.80 =    2191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    399.80 TO NODE    399.80 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.33
  RAINFALL INTENSITY(INCH/HR) =   1.93
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.42
  EFFECTIVE STREAM AREA(ACRES) =      43.30
  TOTAL STREAM AREA(ACRES) =      43.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      73.94

****************************************************************************
  FLOW PROCESS FROM NODE    399.50 TO NODE    399.60 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   246.00
  ELEVATION DATA: UPSTREAM(FEET) =    108.00  DOWNSTREAM(FEET) =    107.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.269
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.043
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.10      0.25     0.500    69   10.58
  COMMERCIAL                 C        0.80      0.25     0.100    69    8.27
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.144
  SUBAREA RUNOFF(CFS) =      2.44
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.44

****************************************************************************
  FLOW PROCESS FROM NODE    399.60 TO NODE    399.70 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
```

```
 UPSTREAM ELEVATION(FEET) =  107.00  DOWNSTREAM ELEVATION(FEET) =  102.00
 STREET LENGTH(FEET) =   775.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.16
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.41
   HALFSTREET FLOOD WIDTH(FEET) =   14.49
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.26
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.92
 STREET FLOW TRAVEL TIME(MIN.) =   5.71   Tc(MIN.) =   13.98
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.252
 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"       C        6.40      0.25     0.500    69
 COMMERCIAL                 C        1.50      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.424
 SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   15.26
 EFFECTIVE AREA(ACRES) =      8.80    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        8.8        PEAK FLOW RATE(CFS) =      17.05

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.85
 FLOW VELOCITY(FEET/SEC.) =  2.56   DEPTH*VELOCITY(FT*FT/SEC.) =   1.21
 LONGEST FLOWPATH FROM NODE    399.50 TO NODE    399.70 =    1021.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    399.70 TO NODE    399.80 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  102.00  DOWNSTREAM ELEVATION(FEET) =  100.00
 STREET LENGTH(FEET) =   672.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      23.97
   ***STREET FLOWING FULL***
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```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.58
    HALFSTREET FLOOD WIDTH(FEET) =   23.89
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.17
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.25
  STREET FLOW TRAVEL TIME(MIN.) =   5.17   Tc(MIN.) =   19.15
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.881
  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"       C        2.40      0.25     0.500    69
  COMMERCIAL                 C        6.00      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.214
  SUBAREA AREA(ACRES) =    8.40      SUBAREA RUNOFF(CFS) =   13.81
  EFFECTIVE AREA(ACRES) =     17.20    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      27.92

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  25.18
  FLOW VELOCITY(FEET/SEC.) =  2.27   DEPTH*VELOCITY(FT*FT/SEC.) =   1.37
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  672.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   17.2 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    399.80
  LONGEST FLOWPATH FROM NODE    399.50 TO NODE    399.80 =    1693.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    399.80 TO NODE    399.80 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.) =   19.15
  RAINFALL INTENSITY(INCH/HR) =   1.88
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.31
  EFFECTIVE STREAM AREA(ACRES) =      17.20
  TOTAL STREAM AREA(ACRES) =      17.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      27.92

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       73.94   18.33    1.928  0.26( 0.11) 0.42      43.3     399.10
      2       27.92   19.15    1.881  0.25( 0.08) 0.31      17.2     399.50

  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      101.38   18.33    1.928  0.26( 0.10) 0.39      59.8     399.10
      2       99.93   19.15    1.881  0.26( 0.10) 0.38      60.5     399.50
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     101.38    Tc(MIN.) =    18.33
 EFFECTIVE AREA(ACRES) =      59.77   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       60.5
 LONGEST FLOWPATH FROM NODE    399.10 TO NODE    399.80 =    2191.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    399.80 TO NODE    400.10 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) =    98.00
 FLOW LENGTH(FEET) =   310.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.89
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     101.38
 PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   18.86
 LONGEST FLOWPATH FROM NODE    399.10 TO NODE    400.10 =    2501.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    400.10 TO NODE    400.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.86
 RAINFALL INTENSITY(INCH/HR) =   1.90
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.39
 EFFECTIVE STREAM AREA(ACRES) =      59.77
 TOTAL STREAM AREA(ACRES) =      60.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     101.38

****************************************************************************
 FLOW PROCESS FROM NODE    399.90 TO NODE    400.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    104.00  DOWNSTREAM(FEET) =    102.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.30      0.25     0.500    69   10.99
 COMMERCIAL                 C        0.30      0.25     0.100    69    8.59
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.425
 SUBAREA RUNOFF(CFS) =      4.14
 TOTAL AREA(ACRES) =      1.60   PEAK FLOW RATE(CFS) =      4.14
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.10 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  102.00  DOWNSTREAM ELEVATION(FEET) =   98.00
  STREET LENGTH(FEET) =   970.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.43
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.52   FLOOD WIDTH(FEET) =   20.81
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    2.19
    SPLIT DEPTH(FEET) =    0.30   SPLIT FLOOD WIDTH(FEET) =    9.03
    SPLIT FLOW(CFS) =    1.35   SPLIT VELOCITY(FEET/SEC.) =    1.40
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   20.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.13
  STREET FLOW TRAVEL TIME(MIN.) =   7.39   Tc(MIN.) =   15.98
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.086
  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"       C        4.30      0.25     0.500    69
  COMMERCIAL                 C        2.70      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.346
  SUBAREA AREA(ACRES) =    7.00      SUBAREA RUNOFF(CFS) =   12.60
  EFFECTIVE AREA(ACRES) =      8.60    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =        8.6        PEAK FLOW RATE(CFS) =      15.45

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.81
  FLOW VELOCITY(FEET/SEC.) =  2.19   DEPTH*VELOCITY(FT*FT/SEC.) =   1.13
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  970.0 FT WITH ELEVATION-DROP =   4.0 FT, IS   13.5 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    400.10
  LONGEST FLOWPATH FROM NODE    399.90 TO NODE    400.10 =    1300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    400.10 TO NODE    400.10 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.) =   15.98
 RAINFALL INTENSITY(INCH/HR) =   2.09
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.36
 EFFECTIVE STREAM AREA(ACRES) =       8.60
 TOTAL STREAM AREA(ACRES) =       8.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.45

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      101.38   18.86    1.897  0.26( 0.10) 0.39      59.8     399.10
     1       99.93   19.67    1.852  0.26( 0.10) 0.38      60.5     399.50
     2       15.45   15.98    2.086  0.25( 0.09) 0.36       8.6     399.90

 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      110.39   15.98    2.086  0.26( 0.10) 0.38      59.2     399.90
     2      115.37   18.86    1.897  0.26( 0.10) 0.38      68.4     399.10
     3      113.57   19.67    1.852  0.26( 0.10) 0.38      69.1     399.50

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     115.37    Tc(MIN.) =    18.86
 EFFECTIVE AREA(ACRES) =      68.37   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =       69.1
 LONGEST FLOWPATH FROM NODE    399.10 TO NODE    400.10 =    2501.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    400.10 TO NODE    400.40 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    98.00  DOWNSTREAM(FEET) =    97.00
 FLOW LENGTH(FEET) =   315.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  44.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.80
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     115.37
 PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   19.53
 LONGEST FLOWPATH FROM NODE    399.10 TO NODE    400.40 =    2816.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    400.40 TO NODE    400.40 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.) =   19.53
 RAINFALL INTENSITY(INCH/HR) =   1.86
 AREA-AVERAGED Fm(INCH/HR) =  0.10
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.38
  EFFECTIVE STREAM AREA(ACRES) =      68.37
  TOTAL STREAM AREA(ACRES) =      69.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     115.37

****************************************************************************
  FLOW PROCESS FROM NODE    400.20 TO NODE    400.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   272.00
  ELEVATION DATA: UPSTREAM(FEET) =    104.00  DOWNSTREAM(FEET) =    102.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.646
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.60      0.25     0.500    69    9.78
  COMMERCIAL                 C        0.30      0.25     0.100    69    7.65
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      2.50
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.50

****************************************************************************
  FLOW PROCESS FROM NODE    400.30 TO NODE    400.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  102.00  DOWNSTREAM ELEVATION(FEET) =   97.00
  STREET LENGTH(FEET) =  1199.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.45
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.52   FLOOD WIDTH(FEET) =   20.81
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    2.20
    SPLIT DEPTH(FEET) =    0.19   SPLIT FLOOD WIDTH(FEET) =    3.72
    SPLIT FLOW(CFS) =    0.32   SPLIT VELOCITY(FEET/SEC.) =    1.12
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   20.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.20
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
  STREET FLOW TRAVEL TIME(MIN.) =   9.09   Tc(MIN.) =   16.73
```

```
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.032
 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"       C        2.10      0.25     0.500    69
 COMMERCIAL                 C        5.70      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.208
 SUBAREA AREA(ACRES) =    7.80      SUBAREA RUNOFF(CFS) =   13.90
 EFFECTIVE AREA(ACRES) =      8.70    AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.22
 TOTAL AREA(ACRES) =        8.7        PEAK FLOW RATE(CFS) =      15.47

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.81
 FLOW VELOCITY(FEET/SEC.) =  2.20   DEPTH*VELOCITY(FT*FT/SEC.) =   1.14
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1199.0 FT WITH ELEVATION-DROP =   5.0 FT, IS   14.5 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    400.40
 LONGEST FLOWPATH FROM NODE    400.20 TO NODE    400.40 =    1471.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    400.40 TO NODE    400.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.73
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.032
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        1.00      0.25     0.100    69
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.30      0.25     1.000    77
 SCHOOL                     C        0.40      0.25     0.600    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.376
 SUBAREA AREA(ACRES) =    1.70      SUBAREA RUNOFF(CFS) =    2.96
 EFFECTIVE AREA(ACRES) =     10.40   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.25
 TOTAL AREA(ACRES) =       10.4       PEAK FLOW RATE(CFS) =      18.43

****************************************************************************
 FLOW PROCESS FROM NODE    400.40 TO NODE    400.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   16.73
 RAINFALL INTENSITY(INCH/HR) =   2.03
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.25
 EFFECTIVE STREAM AREA(ACRES) =      10.40
 TOTAL STREAM AREA(ACRES) =      10.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      18.43
```

```
 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      110.39   16.66    2.037  0.26( 0.10) 0.38      59.2     399.90
     1      115.37   19.53    1.860  0.26( 0.10) 0.38      68.4     399.10
     1      113.57   20.35    1.816  0.26( 0.10) 0.38      69.1     399.50
     2       18.43   16.73    2.032  0.25( 0.06) 0.25      10.4     400.20

 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      128.78   16.66    2.037  0.26( 0.09) 0.36      69.6     399.90
     2      128.96   16.73    2.032  0.26( 0.09) 0.36      69.9     400.20
     3      132.19   19.53    1.860  0.26( 0.09) 0.36      78.8     399.10
     4      129.99   20.35    1.816  0.26( 0.09) 0.36      79.5     399.50

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     132.19    Tc(MIN.) =    19.53
 EFFECTIVE AREA(ACRES) =      78.77   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.36
 TOTAL AREA(ACRES) =       79.5
 LONGEST FLOWPATH FROM NODE    399.10 TO NODE    400.40 =    2816.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    400.40 TO NODE    401.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    97.00  DOWNSTREAM(FEET) =    94.00
 FLOW LENGTH(FEET) =   476.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  39.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.53
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     132.19
 PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =   20.28
 LONGEST FLOWPATH FROM NODE    399.10 TO NODE    401.00 =    3292.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 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.) =   20.28
 RAINFALL INTENSITY(INCH/HR) =   1.82
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.36
 EFFECTIVE STREAM AREA(ACRES) =      78.77
 TOTAL STREAM AREA(ACRES) =      79.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     132.19

****************************************************************************
 FLOW PROCESS FROM NODE    401.10 TO NODE    401.20 IS CODE =  21
----------------------------------------------------------------------------
```

```
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
 ELEVATION DATA: UPSTREAM(FEET) =    103.00  DOWNSTREAM(FEET) =    101.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.539
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.987
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 C        1.40      0.25     0.100    69    8.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      3.73
 TOTAL AREA(ACRES) =      1.40   PEAK FLOW RATE(CFS) =      3.73

****************************************************************************
 FLOW PROCESS FROM NODE    401.20 TO NODE    401.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  101.00  DOWNSTREAM ELEVATION(FEET) =   94.00
 STREET LENGTH(FEET) =  1286.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.35
   ***STREET FLOW SPLITS OVER STREET-CROWN***
   FULL DEPTH(FEET) =    0.52   FLOOD WIDTH(FEET) =   20.81
   FULL HALF-STREET VELOCITY(FEET/SEC.) =    2.51
   SPLIT DEPTH(FEET) =    0.39   SPLIT FLOOD WIDTH(FEET) =   13.48
   SPLIT FLOW(CFS) =    3.91   SPLIT VELOCITY(FEET/SEC.) =    1.99
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.52
   HALFSTREET FLOOD WIDTH(FEET) =   20.81
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.51
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
 STREET FLOW TRAVEL TIME(MIN.) =   8.53   Tc(MIN.) =   17.07
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.009
 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"       C        5.70      0.25     0.500    69
 COMMERCIAL                 C        6.30      0.25     0.100    69
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.20      0.25     1.000    77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.302
```

```
 SUBAREA AREA(ACRES) =   12.20      SUBAREA RUNOFF(CFS) =   21.23
 EFFECTIVE AREA(ACRES) =     13.60    AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =       13.6        PEAK FLOW RATE(CFS) =      23.73

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  21.64
 FLOW VELOCITY(FEET/SEC.) =  2.63   DEPTH*VELOCITY(FT*FT/SEC.) =   1.40
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1286.0 FT WITH ELEVATION-DROP =   7.0 FT, IS   22.8 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    401.00
 LONGEST FLOWPATH FROM NODE    401.10 TO NODE    401.00 =    1613.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.07
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.009
 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"       C        2.50      0.25     0.500    69
 COMMERCIAL                 C        2.90      0.25     0.100    69
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.30      0.25     1.000    77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.323
 SUBAREA AREA(ACRES) =    5.70      SUBAREA RUNOFF(CFS) =    9.89
 EFFECTIVE AREA(ACRES) =     19.30   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      33.62

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    401.00 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.) =   17.07
 RAINFALL INTENSITY(INCH/HR) =   2.01
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.29
 EFFECTIVE STREAM AREA(ACRES) =      19.30
 TOTAL STREAM AREA(ACRES) =      19.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      33.62

 ** CONFLUENCE DATA **
  STREAM       Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      128.78   17.41    1.986  0.26( 0.09) 0.36      69.6     399.90
     1      128.96   17.49    1.981  0.26( 0.09) 0.36      69.9     400.20
     1      132.19   20.28    1.820  0.26( 0.09) 0.36      78.8     399.10
     1      129.99   21.10    1.779  0.26( 0.09) 0.36      79.5     399.50
     2       33.62   17.07    2.009  0.25( 0.07) 0.29      19.3     401.10
```

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      161.39   17.07    2.009  0.26( 0.09) 0.35      87.5     401.10
      2      162.01   17.41    1.986  0.26( 0.09) 0.35      88.9     399.90
      3      162.09   17.49    1.981  0.26( 0.09) 0.35      89.2     400.20
      4      162.52   20.28    1.820  0.26( 0.09) 0.35      98.1     399.10
      5      159.61   21.10    1.779  0.26( 0.09) 0.35      98.8     399.50

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     162.52    Tc(MIN.) =    20.28
  EFFECTIVE AREA(ACRES) =      98.07   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       98.8
  LONGEST FLOWPATH FROM NODE    399.10 TO NODE    401.00 =    3292.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    403.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    94.00  DOWNSTREAM(FEET) =    88.00
  FLOW LENGTH(FEET) =  1124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.40
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     162.52
  PIPE TRAVEL TIME(MIN.) =   1.80    Tc(MIN.) =   22.08
  LONGEST FLOWPATH FROM NODE    399.10 TO NODE    403.00 =    4416.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    403.00 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.) =   22.08
  RAINFALL INTENSITY(INCH/HR) =   1.73
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =      98.07
  TOTAL STREAM AREA(ACRES) =      98.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     162.52

****************************************************************************
  FLOW PROCESS FROM NODE    402.10 TO NODE    402.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   256.00
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     99.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.469
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.002
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.40      0.25     0.500    69   10.84
  COMMERCIAL                 C        1.00      0.25     0.100    69    8.47
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA RUNOFF(CFS) =      6.30
  TOTAL AREA(ACRES) =      2.40   PEAK FLOW RATE(CFS) =      6.30

****************************************************************************
  FLOW PROCESS FROM NODE    402.20 TO NODE    402.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   99.00  DOWNSTREAM ELEVATION(FEET) =   95.00
  STREET LENGTH(FEET) =   817.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.46
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   17.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.18
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   6.25   Tc(MIN.) =   14.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.187
  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"       C        4.50      0.25     0.500    69
  COMMERCIAL                 C        2.90      0.25     0.100    69
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        0.10      0.25     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.352
  SUBAREA AREA(ACRES) =    7.50      SUBAREA RUNOFF(CFS) =   14.17
  EFFECTIVE AREA(ACRES) =      9.90    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        9.9        PEAK FLOW RATE(CFS) =      18.71

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  19.95
  FLOW VELOCITY(FEET/SEC.) =  2.35   DEPTH*VELOCITY(FT*FT/SEC.) =   1.19
  LONGEST FLOWPATH FROM NODE    402.10 TO NODE    402.30 =    1073.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    402.30 TO NODE    402.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   95.00  DOWNSTREAM ELEVATION(FEET) =   92.00
  STREET LENGTH(FEET) =   434.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 51.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  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) =      24.48
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.56
    HALFSTREET FLOOD WIDTH(FEET) =   20.23
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.61
  STREET FLOW TRAVEL TIME(MIN.) =   2.53   Tc(MIN.) =   17.25
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.997
  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"       C        2.10      0.25     0.500    69
  APARTMENTS                 C        0.30      0.25     0.200    69
  COMMERCIAL                 C        3.50      0.25     0.100    69
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        0.80      0.25     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.337
  SUBAREA AREA(ACRES) =    6.70      SUBAREA RUNOFF(CFS) =   11.53
  EFFECTIVE AREA(ACRES) =     16.60    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       16.6        PEAK FLOW RATE(CFS) =      28.55

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.59   HALFSTREET FLOOD WIDTH(FEET) =  21.45
  FLOW VELOCITY(FEET/SEC.) =  2.98   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE    402.10 TO NODE    402.00 =    1507.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   92.00  DOWNSTREAM ELEVATION(FEET) =   88.00
  STREET LENGTH(FEET) =   727.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 51.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
```

```
  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) =      49.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.71
    HALFSTREET FLOOD WIDTH(FEET) =   30.19
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.11
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.22
  STREET FLOW TRAVEL TIME(MIN.) =   3.90   Tc(MIN.) =   21.15
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.777
  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"       C       10.50      0.25     0.500    69
  COMMERCIAL                 C       15.70      0.25     0.100    69
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        1.20      0.25     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.293
  SUBAREA AREA(ACRES) =   27.40      SUBAREA RUNOFF(CFS) =   42.01
  EFFECTIVE AREA(ACRES) =     44.00    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =       44.0        PEAK FLOW RATE(CFS) =      67.27

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.78   HALFSTREET FLOOD WIDTH(FEET) =  36.83
  FLOW VELOCITY(FEET/SEC.) =  3.30   DEPTH*VELOCITY(FT*FT/SEC.) =   2.57
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  727.0 FT WITH ELEVATION-DROP =   4.0 FT, IS   58.8 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    403.00
  LONGEST FLOWPATH FROM NODE    402.10 TO NODE    403.00 =    2234.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    403.00 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.) =   21.15
  RAINFALL INTENSITY(INCH/HR) =   1.78
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.31
  EFFECTIVE STREAM AREA(ACRES) =      44.00
  TOTAL STREAM AREA(ACRES) =      44.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      67.27

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      161.39   18.87    1.896  0.26( 0.09) 0.35      87.5     401.10
```

```
    1      162.01   19.21    1.877  0.26( 0.09) 0.35      88.9     399.90
    1      162.09   19.29    1.873  0.26( 0.09) 0.35      89.2     400.20
    1      162.52   22.08    1.733  0.26( 0.09) 0.35      98.1     399.10
    1      159.61   22.91    1.697  0.26( 0.09) 0.35      98.8     399.50
    2       67.27   21.15    1.777  0.25( 0.08) 0.31      44.0     402.10

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      225.65   18.87    1.896  0.25( 0.09) 0.34     126.8     401.10
      2      226.73   19.21    1.877  0.25( 0.09) 0.34     128.9     399.90
      3      226.92   19.29    1.873  0.25( 0.09) 0.34     129.3     400.20
      4      229.64   21.15    1.777  0.25( 0.09) 0.34     139.1     402.10
      5      228.07   22.08    1.733  0.25( 0.09) 0.34     142.1     399.10
      6      223.73   22.91    1.697  0.25( 0.09) 0.34     142.8     399.50

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     229.64    Tc(MIN.) =    21.15
  EFFECTIVE AREA(ACRES) =     139.10   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =      142.8
  LONGEST FLOWPATH FROM NODE    399.10 TO NODE    403.00 =    4416.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    408.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    88.00  DOWNSTREAM(FEET) =    76.00
  FLOW LENGTH(FEET) =  3339.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  56.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.70
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     229.64
  PIPE TRAVEL TIME(MIN.) =   5.74    Tc(MIN.) =   26.89
  LONGEST FLOWPATH FROM NODE    399.10 TO NODE    408.00 =    7755.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    408.00 TO NODE    408.00 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.) =   26.89
  RAINFALL INTENSITY(INCH/HR) =   1.55
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.34
  EFFECTIVE STREAM AREA(ACRES) =     139.10
  TOTAL STREAM AREA(ACRES) =     142.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     229.64

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     88.00  DOWNSTREAM(FEET) =     87.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        6.70      0.25     0.500    69   12.62
  COMMERCIAL                 C        2.50      0.25     0.100    69    9.86
  URBAN POOR COVER
  "TURF"                     C        0.80      0.25     1.000    83   17.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.440
  SUBAREA RUNOFF(CFS) =     23.77
  TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     23.77

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    406.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   87.00  DOWNSTREAM ELEVATION(FEET) =   86.50
  STREET LENGTH(FEET) =   352.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.78
    HALFSTREET FLOOD WIDTH(FEET) =   37.17
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.67
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.31
  STREET FLOW TRAVEL TIME(MIN.) =   3.51   Tc(MIN.) =   13.37
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.310
  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"       C        6.80      0.25     0.500    69
  COMMERCIAL                 C        3.20      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.80      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.419
  SUBAREA AREA(ACRES) =   10.80      SUBAREA RUNOFF(CFS) =   21.44
```

```
  EFFECTIVE AREA(ACRES) =     20.80    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =       20.8        PEAK FLOW RATE(CFS) =      41.24

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.83   HALFSTREET FLOOD WIDTH(FEET) =  41.27
  FLOW VELOCITY(FEET/SEC.) =  1.73   DEPTH*VELOCITY(FT*FT/SEC.) =   1.43
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  352.0 FT WITH ELEVATION-DROP =   0.5 FT, IS   23.1 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    406.00
  LONGEST FLOWPATH FROM NODE    404.00 TO NODE    406.00 =     682.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    407.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   86.50  DOWNSTREAM ELEVATION(FEET) =   84.00
  STREET LENGTH(FEET) =  1031.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      46.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.79
    HALFSTREET FLOOD WIDTH(FEET) =   37.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.20
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.74
  STREET FLOW TRAVEL TIME(MIN.) =   7.80   Tc(MIN.) =   21.18
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.775
  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"       C        1.60      0.25     0.500    69
  COMMERCIAL                 C        3.10      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        2.10      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.472
  SUBAREA AREA(ACRES) =    6.80      SUBAREA RUNOFF(CFS) =   10.14
  EFFECTIVE AREA(ACRES) =     27.60    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.6        PEAK FLOW RATE(CFS) =      41.37

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.76   HALFSTREET FLOOD WIDTH(FEET) =  35.20
  FLOW VELOCITY(FEET/SEC.) =  2.15   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
  LONGEST FLOWPATH FROM NODE    404.00 TO NODE    407.00 =    1713.00 FEET.

****************************************************************************
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  FLOW PROCESS FROM NODE    407.00 TO NODE    408.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   84.00  DOWNSTREAM ELEVATION(FEET) =   76.00
  STREET LENGTH(FEET) =  1632.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      63.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.78
    HALFSTREET FLOOD WIDTH(FEET) =   36.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.42
  STREET FLOW TRAVEL TIME(MIN.) =   8.79   Tc(MIN.) =   29.96
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.455
  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"       C       22.30      0.25     0.500    69
  COMMERCIAL                 C       12.40      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        0.80      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.372
  SUBAREA AREA(ACRES) =   35.50      SUBAREA RUNOFF(CFS) =   43.52
  EFFECTIVE AREA(ACRES) =     63.10    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       63.1        PEAK FLOW RATE(CFS) =      76.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.83   HALFSTREET FLOOD WIDTH(FEET) =  41.44
  FLOW VELOCITY(FEET/SEC.) =  3.20   DEPTH*VELOCITY(FT*FT/SEC.) =   2.65
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1632.0 FT WITH ELEVATION-DROP =   8.0 FT, IS   61.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    408.00
  LONGEST FLOWPATH FROM NODE    404.00 TO NODE    408.00 =    3345.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    408.00 TO NODE    408.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   29.96
  RAINFALL INTENSITY(INCH/HR) =   1.46
  AREA-AVERAGED Fm(INCH/HR) =  0.10
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 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.40
 EFFECTIVE STREAM AREA(ACRES) =      63.10
 TOTAL STREAM AREA(ACRES) =      63.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      76.94

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      225.65   24.62    1.628  0.25( 0.09) 0.34     126.8     401.10
     1      226.73   24.96    1.616  0.25( 0.09) 0.34     128.9     399.90
     1      226.92   25.04    1.613  0.25( 0.09) 0.34     129.3     400.20
     1      229.64   26.89    1.548  0.25( 0.09) 0.34     139.1     402.10
     1      228.07   27.83    1.518  0.25( 0.09) 0.34     142.1     399.10
     1      223.73   28.66    1.493  0.25( 0.09) 0.34     142.8     399.50
     2       76.94   29.96    1.455  0.25( 0.10) 0.40      63.1     404.00

 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      296.95   24.62    1.628  0.25( 0.09) 0.36     178.6     401.10
     2      298.42   24.96    1.616  0.25( 0.09) 0.36     181.4     399.90
     3      298.69   25.04    1.613  0.25( 0.09) 0.36     182.1     400.20
     4      303.43   26.89    1.548  0.25( 0.09) 0.36     195.7     402.10
     5      302.84   27.83    1.518  0.25( 0.09) 0.36     200.7     399.10
     6      299.36   28.66    1.493  0.25( 0.09) 0.36     203.2     399.50
     7      294.69   29.96    1.455  0.25( 0.09) 0.36     205.9     404.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     303.43    Tc(MIN.) =    26.89
 EFFECTIVE AREA(ACRES) =     195.72   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.36
 TOTAL AREA(ACRES) =      205.9
 LONGEST FLOWPATH FROM NODE    399.10 TO NODE    408.00 =    7755.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    408.00 TO NODE    415.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    76.00  DOWNSTREAM(FEET) =    54.00
 FLOW LENGTH(FEET) =  4095.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.15
 ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     303.43
 PIPE TRAVEL TIME(MIN.) =   5.62    Tc(MIN.) =   32.51
 LONGEST FLOWPATH FROM NODE    399.10 TO NODE    415.00 =   11850.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    415.00 TO NODE    415.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
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  TIME OF CONCENTRATION(MIN.) =   32.51
  RAINFALL INTENSITY(INCH/HR) =   1.39
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.36
  EFFECTIVE STREAM AREA(ACRES) =     195.72
  TOTAL STREAM AREA(ACRES) =     205.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     303.43

****************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    410.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     76.00  DOWNSTREAM(FEET) =     74.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        0.60      0.25     0.100    69    8.59
  URBAN POOR COVER
  "TURF"                     C        0.20      0.25     1.000    83   14.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA RUNOFF(CFS) =      2.09
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.09

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    411.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   74.00  DOWNSTREAM ELEVATION(FEET) =   71.00
  STREET LENGTH(FEET) =   452.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.11
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =    8.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.75
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
  STREET FLOW TRAVEL TIME(MIN.) =   4.29   Tc(MIN.) =   12.88
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.361
  SUBAREA LOSS RATE DATA(AMC  II):
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```
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                 C        0.70      0.25     0.100    69
URBAN POOR COVER
"TURF"                     C        0.30      0.25     1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.370
SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    2.04
EFFECTIVE AREA(ACRES) =      1.80    AREA-AVERAGED Fm(INCH/HR) =  0.09
AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.35
TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =      3.68

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =   9.09
FLOW VELOCITY(FEET/SEC.) =  1.81   DEPTH*VELOCITY(FT*FT/SEC.) =   0.62
LONGEST FLOWPATH FROM NODE    409.00 TO NODE    411.00 =     782.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    412.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   71.00  DOWNSTREAM ELEVATION(FEET) =   61.00
  STREET LENGTH(FEET) =  1897.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.95
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   11.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.85
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =  17.09   Tc(MIN.) =   29.97
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.455
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        2.20      0.25     0.100    69
  URBAN POOR COVER
  "TURF"                     C        1.50      0.25     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.465
  SUBAREA AREA(ACRES) =    3.70      SUBAREA RUNOFF(CFS) =    4.46
  EFFECTIVE AREA(ACRES) =      5.50    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =        5.5        PEAK FLOW RATE(CFS) =      6.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  12.50
  FLOW VELOCITY(FEET/SEC.) =  1.90   DEPTH*VELOCITY(FT*FT/SEC.) =   0.78
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  LONGEST FLOWPATH FROM NODE    409.00 TO NODE    412.00 =    2679.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    412.00 TO NODE    413.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   61.00  DOWNSTREAM ELEVATION(FEET) =   60.00
  STREET LENGTH(FEET) =   413.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.09
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.51
    HALFSTREET FLOOD WIDTH(FEET) =   17.47
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
  STREET FLOW TRAVEL TIME(MIN.) =   4.43   Tc(MIN.) =   34.39
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.345
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        3.30      0.25     0.100    69
  SCHOOL                     C        2.70      0.25     0.600    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =    6.00      SUBAREA RUNOFF(CFS) =    6.82
  EFFECTIVE AREA(ACRES) =     11.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =       11.5        PEAK FLOW RATE(CFS) =      12.95

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.54   HALFSTREET FLOOD WIDTH(FEET) =  19.33
  FLOW VELOCITY(FEET/SEC.) =  1.65   DEPTH*VELOCITY(FT*FT/SEC.) =   0.90
  LONGEST FLOWPATH FROM NODE    409.00 TO NODE    413.00 =    3092.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    413.00 TO NODE    414.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   60.00  DOWNSTREAM ELEVATION(FEET) =   57.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
  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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.20
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.55
   HALFSTREET FLOOD WIDTH(FEET) =   19.70
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.73
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.51
 STREET FLOW TRAVEL TIME(MIN.) =   2.83   Tc(MIN.) =   37.22
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.285
 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"       C        0.60      0.25     0.500    69
 COMMERCIAL                 C        9.90      0.25     0.100    69
 SCHOOL                     C        6.50      0.25     0.600    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.305
 SUBAREA AREA(ACRES) =   17.00      SUBAREA RUNOFF(CFS) =   18.49
 EFFECTIVE AREA(ACRES) =     28.50    AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.33
 TOTAL AREA(ACRES) =       28.5        PEAK FLOW RATE(CFS) =      30.83

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.61   HALFSTREET FLOOD WIDTH(FEET) =  22.44
 FLOW VELOCITY(FEET/SEC.) =  2.95   DEPTH*VELOCITY(FT*FT/SEC.) =   1.79
 LONGEST FLOWPATH FROM NODE    409.00 TO NODE    414.00 =    3555.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    414.00 TO NODE    415.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   57.00  DOWNSTREAM ELEVATION(FEET) =   54.00
 STREET LENGTH(FEET) =   819.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 42.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  21.00
 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 =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      51.38
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.77
   HALFSTREET FLOOD WIDTH(FEET) =   35.36
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.66
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.03
 STREET FLOW TRAVEL TIME(MIN.) =   5.14   Tc(MIN.) =   42.36
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.193
 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"       C       21.30      0.25     0.500    69
 COMMERCIAL                 C       10.80      0.25     0.100    69
 URBAN POOR COVER
 "TURF"                     C        0.40      0.25     1.000    83
 SCHOOL                     C        9.50      0.25     0.600    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.425
 SUBAREA AREA(ACRES) =   42.00      SUBAREA RUNOFF(CFS) =   41.09
 EFFECTIVE AREA(ACRES) =     70.50    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       70.5        PEAK FLOW RATE(CFS) =      69.56

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.84   HALFSTREET FLOOD WIDTH(FEET) =  42.58
 FLOW VELOCITY(FEET/SEC.) =  2.79   DEPTH*VELOCITY(FT*FT/SEC.) =   2.33
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  819.0 FT WITH ELEVATION-DROP =   3.0 FT, IS   82.3 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    415.00
 LONGEST FLOWPATH FROM NODE    409.00 TO NODE    415.00 =    4374.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    415.00 TO NODE    415.00 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.) =   42.36
 RAINFALL INTENSITY(INCH/HR) =   1.19
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.39
 EFFECTIVE STREAM AREA(ACRES) =      70.50
 TOTAL STREAM AREA(ACRES) =      70.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      69.56

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      296.95   30.25    1.447  0.25( 0.09) 0.36     178.6     401.10
     1      298.42   30.59    1.438  0.25( 0.09) 0.36     181.4     399.90
     1      298.69   30.66    1.436  0.25( 0.09) 0.36     182.1     400.20
     1      303.43   32.51    1.389  0.25( 0.09) 0.36     195.7     402.10
     1      302.84   33.45    1.366  0.25( 0.09) 0.36     200.7     399.10
     1      299.36   34.29    1.347  0.25( 0.09) 0.36     203.2     399.50
     1      294.69   35.60    1.318  0.25( 0.09) 0.36     205.9     404.00
     2       69.56   42.36    1.193  0.25( 0.10) 0.39      70.5     409.00

 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      358.14   30.25    1.447  0.25( 0.09) 0.36     229.0     401.10
     2      359.86   30.59    1.438  0.25( 0.09) 0.36     232.3     399.90
```

3	360.19	30.66	1.436	0.25(0.09)	0.36	233.1	400.20
4	366.33	32.51	1.389	0.25(0.09)	0.36	249.8	402.10
5	366.43	33.45	1.366	0.25(0.09)	0.36	256.3	399.10
6	363.56	34.29	1.347	0.25(0.09)	0.36	260.2	399.50
7	359.82	35.60	1.318	0.25(0.09)	0.36	265.1	404.00
8	334.25	42.36	1.193	0.25(0.09)	0.37	276.4	409.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 366.43 Tc(MIN.) = 33.45
EFFECTIVE AREA(ACRES) = 256.33 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.36
TOTAL AREA(ACRES) = 276.4
LONGEST FLOWPATH FROM NODE 399.10 TO NODE 415.00 = 11850.00 FEET.

==

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 276.4 TC(MIN.) = 33.45
EFFECTIVE AREA(ACRES) = 256.33 AREA-AVERAGED Fm(INCH/HR)= 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.25 AREA-AVERAGED Ap = 0.364
PEAK FLOW RATE(CFS) = 366.43

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	358.14	30.25	1.447	0.25(0.09)	0.36	229.0	401.10
2	359.86	30.59	1.438	0.25(0.09)	0.36	232.3	399.90
3	360.19	30.66	1.436	0.25(0.09)	0.36	233.1	400.20
4	366.33	32.51	1.389	0.25(0.09)	0.36	249.8	402.10
5	366.43	33.45	1.366	0.25(0.09)	0.36	256.3	399.10
6	363.56	34.29	1.347	0.25(0.09)	0.36	260.2	399.50
7	359.82	35.60	1.318	0.25(0.09)	0.36	265.1	404.00
8	334.25	42.36	1.193	0.25(0.09)	0.37	276.4	409.00

==

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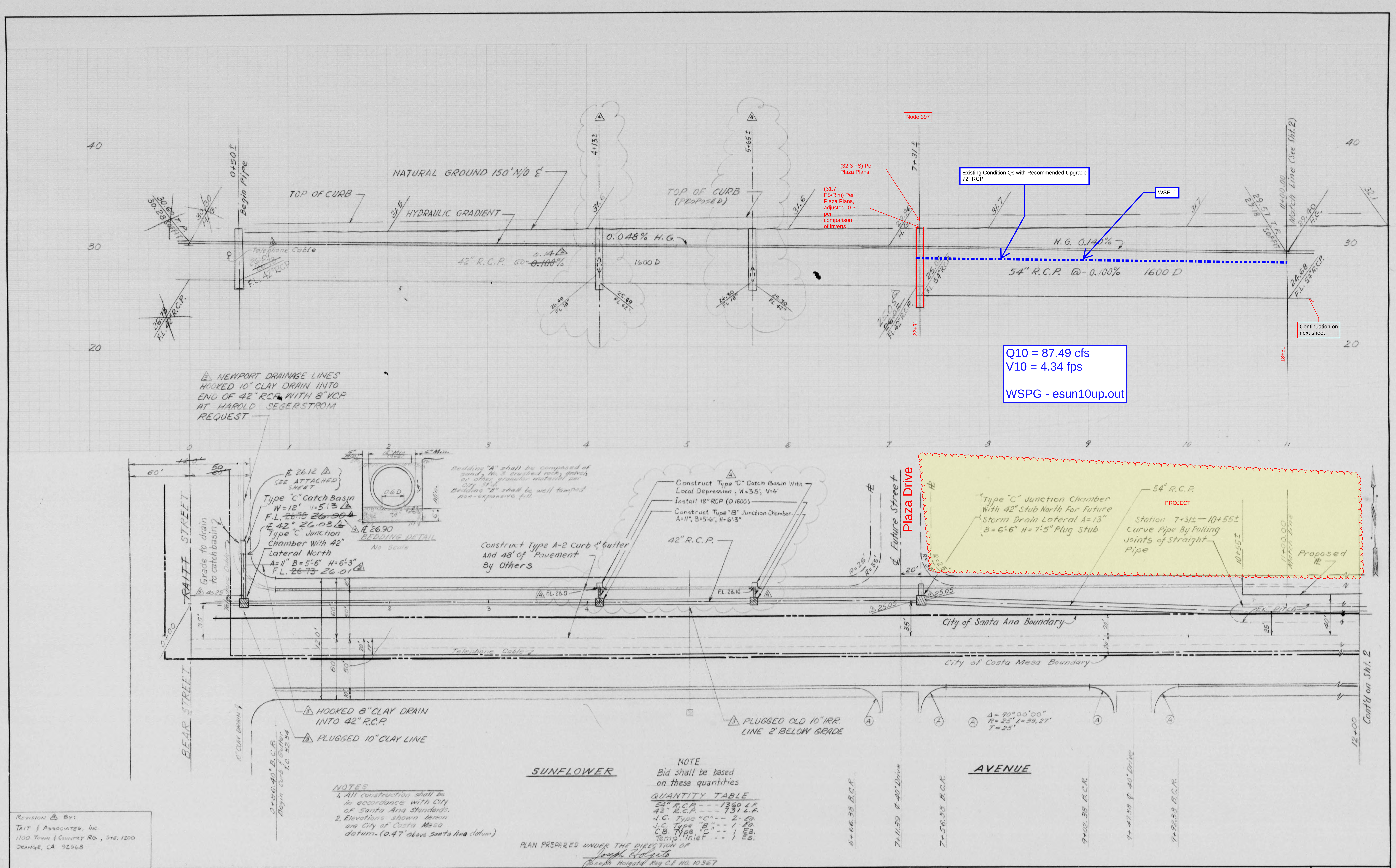
END OF RATIONAL METHOD ANALYSIS

♠

Attachment 6 – City of Santa Ana As-Built Plans with WSE's



REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APP'V'D
1	9/3/65	NKS	DETAIL A	
2	12/65		FIELD CHANGE	
3	3/18/66	MU	AS CONSTRUCTED	
4	3/31/95	MTB	ADDED C.B., 18" RCP, & J.C. @ STA 4+13 & 5+65	J.C.

REFERENCES

BENCH MARK: B.M. NO. 58-SA12-5 "+" North Edge 40" Dia. Standpipe 2' High, S.E. Corner Bear St. & Sunflower Ave per Circuit No. 1, Book 1002. Elev. 34.67' This Plan = 34.20' Santa Ana Datum.

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

DATE: 4-20-65

DESIGNED BY	VIKTOR GRUEN & Asso.	
DRAWN	Cavinee	
CHECKED		
R/W APPROVED		
RECOMMENDED		
APPROVED		
R. E. NO.		

SUNFLOWER AVENUE STORM DRAIN
FROM RAITT ST. (BEAR ST.) TO STATION 11+00

DEPARTMENT OF PUBLIC WORKS
CITY OF SANTA ANA
SHEET NO. 1 OF 2

18-58

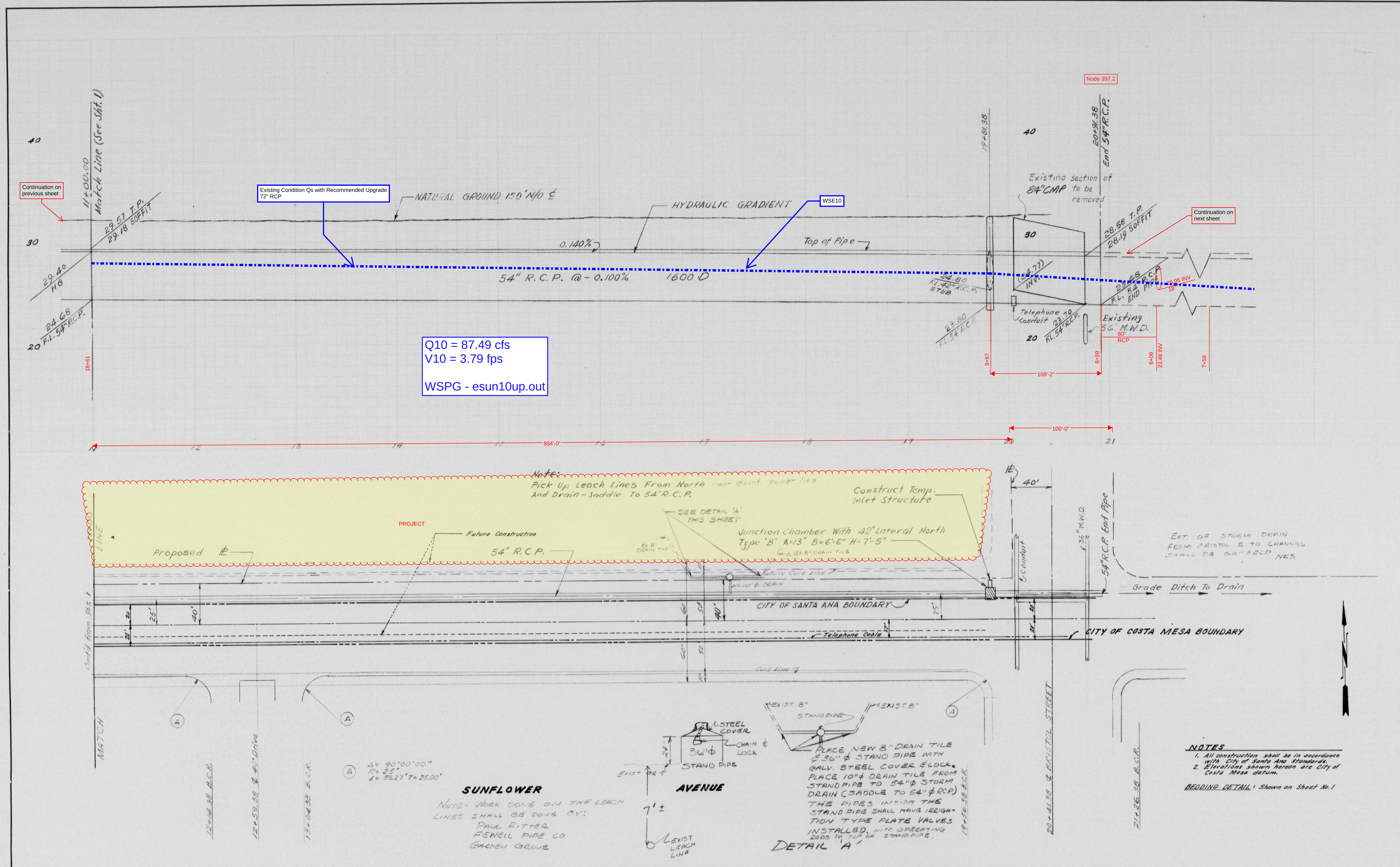
DRAWING NUMBER HF 18-58

DRAWING NUMBER 1 of 2

Sunflower Ave Storm Drain Raitt St / Station 11+00

DRAWING NUMBER 2 of 2

Sunflower Ave Storm Drainage Station 11+00 Station 19+56.38



REVISIONS				
NUMBER	DATE	INITIALS	DESCRIPTION	APP'V'D.
1		NKS	DETAIL 'A'	
2		MU	AS CONSTRUCTED	

REFERENCES

SCALE: HORIZ: 1" = 40' VERT: 1" = 4' — DATE 4-20-65

DESIGNED / DRAWN / CHECKED / R/W APPROVED / RECOMMENDED / APPROVED — R. E. NO. 3879

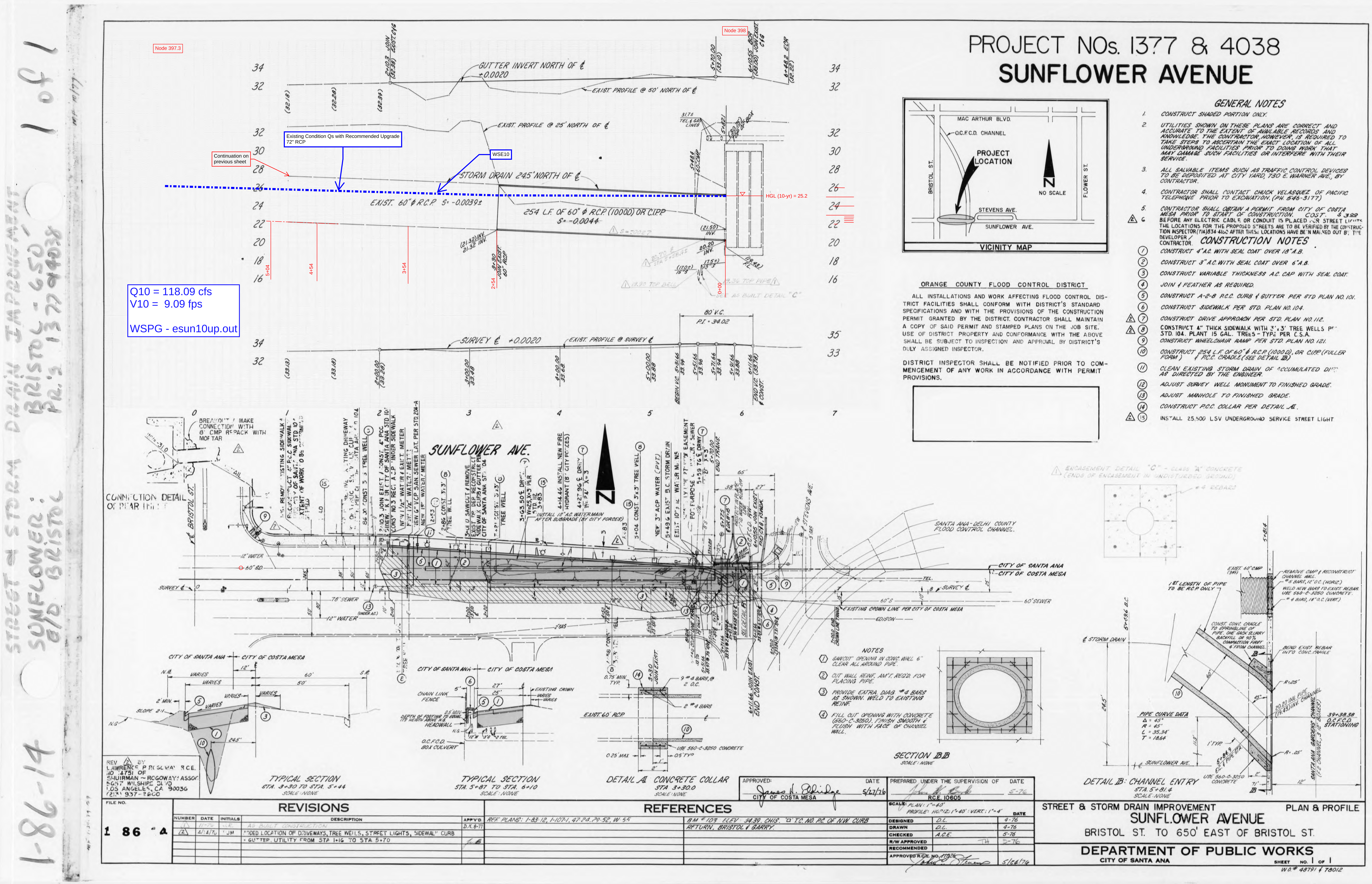
SUNFLOWER AVENUE STORM DRAIN FROM STATION 11+00 TO STATION 19+56.38

DEPARTMENT OF PUBLIC WORKS

CITY OF SANTA ANA — SHEET NO. 2 OF 2

18-58

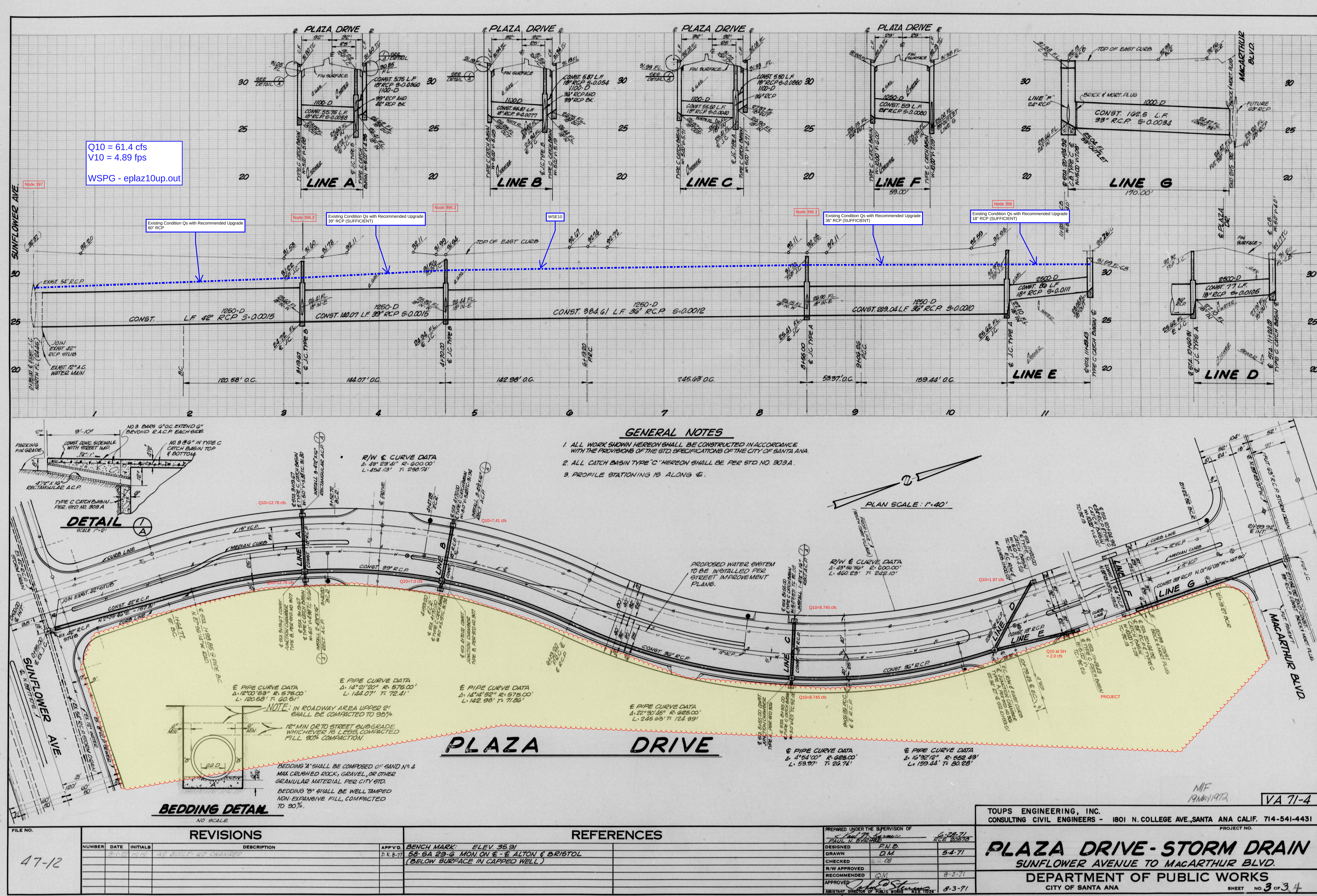
DRAWING NUMBER HF 18-58


PROJECT NOs. 1377 & 4038
SUNFLOWER AVENUE
Node 397.3
Node 398
Continuation on previous sheet
Existing Condition Qs with Recommended Upgrade 72" RCP
WSE10
HGL (10-yr) = 25.2
Q10 = 118.09 cfs
V10 = 9.09 fps
WSPG - esun10up.out
GUTTER INVERT NORTH OF ℄ +0.0020
EXIST. PROFILE @ 50' NORTH OF ℄
EXIST. PROFILE @ 25' NORTH OF ℄
STORM DRAIN 24.5' NORTH OF ℄
EXIST. 60" ∅ R.C.P. S = -0.0039±
254 L.F. OF 60" ∅ R.C.P. (1000D) OR CIPP S = -0.0044
SURVEY ℄ +0.0020
EXIST. PROFILE @ SURVEY ℄
SUNFLOWER AVE.
SANTA ANA-DELHI COUNTY FLOOD CONTROL CHANNEL
CITY OF SANTA ANA
CITY OF COSTA MESA
CONNECTION DETAIL
TYPICAL SECTION STA. 3+30 TO STA. 5+44 SCALE: NONE
TYPICAL SECTION STA. 5+87 TO STA. 6+10 SCALE: NONE
DETAIL A CONCRETE COLLAR STA 3+30.0 SCALE: NONE
SECTION B-B SCALE: NONE
DETAIL B: CHANNEL ENTRY STA. 5+81.4 SCALE: NONE
PIPE CURVE DATA
Δ = 45°
R = 45'
L = 35.34'
T = 18.64
NOTES
1 SAWCUT OPENING IN CONC. WALL 6" CLEAR ALL AROUND PIPE.
2 CUT WALL REINF. AMT. REQ'D. FOR PLACING PIPE.
3 PROVIDE EXTRA DIAG. #4 BARS AS SHOWN. WELD TO EXISTING REINF.
4 FILL OUT OPENING WITH CONCRETE (560-C-3250). FINISH SMOOTH & FLUSH WITH FACE OF CHANNEL WALL.
MAC ARTHUR BLVD.
O.C.F.C.D. CHANNEL
PROJECT LOCATION
BRISTOL ST.
FLOWER ST.
STEVENS AVE.
SUNFLOWER AVE.
NO SCALE
VICINITY MAP
GENERAL NOTES
1. CONSTRUCT SHADED PORTION ONLY.
2. UTILITIES SHOWN ON THESE PLANS ARE CORRECT AND ACCURATE TO THE EXTENT OF AVAILABLE RECORDS AND KNOWLEDGE. THE CONTRACTOR, HOWEVER, IS REQUIRED TO TAKE STEPS TO ASCERTAIN THE EXACT LOCATION OF ALL UNDERGROUND FACILITIES PRIOR TO DOING WORK THAT MAY DAMAGE SUCH FACILITIES OR INTERFERE WITH THEIR SERVICE.
3. ALL SALVABLE ITEMS SUCH AS TRAFFIC CONTROL DEVICES TO BE DEPOSITED AT CITY YARD, 730 E. WARNER AVE., BY CONTRACTOR.
4. CONTRACTOR SHALL CONTACT CHUCK VELASQUEZ OF PACIFIC TELEPHONE PRIOR TO EXCAVATION. (PH. 546-3177)
5. CONTRACTOR SHALL OBTAIN A PERMIT FROM CITY OF COSTA MESA PRIOR TO START OF CONSTRUCTION. COST. $ 300
2 6 BEFORE ANY ELECTRIC CABLE OR CONDUIT IS PLACED FOR STREET LIGHTS THE LOCATIONS FOR THE PROPOSED STREETS ARE TO BE VERIFIED BY THE CONSTRUCTION INSPECTOR (714)834-4100 AFTER THESE LOCATIONS HAVE BEEN MARKED OUT BY THE DEVELOPER / CONTRACTOR.
CONSTRUCTION NOTES
1 CONSTRUCT 4" A.C. WITH SEAL COAT OVER 18" A.B.
2 CONSTRUCT 3" A.C. WITH SEAL COAT OVER 6" A.B.
3 CONSTRUCT VARIABLE THICKNESS A.C. CAP WITH SEAL COAT.
4 JOIN & FEATHER AS REQUIRED.
5 CONSTRUCT A-2-8 P.C.C. CURB & GUTTER PER STD PLAN NO. 101.
6 CONSTRUCT SIDEWALK PER STD. PLAN NO. 104.
2 7 CONSTRUCT DRIVE APPROACH PER STD. PLAN NO. 112.
2 8 CONSTRUCT 4" THICK SIDEWALK WITH 3' x 3' TREE WELLS PER STD. 104. PLANT 15 GAL. TREES - TYPE PER C.S.A.
9 CONSTRUCT WHEELCHAIR RAMP PER STD. PLAN NO. 121.
10 CONSTRUCT 254 L.F. OF 60" ∅ R.C.P. (1000D), OR C.I.P.P. (FULLER FORM) & P.C.C. CRADLE (SEE DETAIL B)
11 CLEAN EXISTING STORM DRAIN OF ACCUMULATED DIRT AS DIRECTED BY THE ENGINEER.
12 ADJUST SURVEY WELL MONUMENT TO FINISHED GRADE.
13 ADJUST MANHOLE TO FINISHED GRADE.
14 CONSTRUCT P.C.C. COLLAR PER DETAIL A.
2 15 INSTALL 25,500 LSV UNDERGROUND SERVICE STREET LIGHT
ORANGE COUNTY FLOOD CONTROL DISTRICT
ALL INSTALLATIONS AND WORK AFFECTING FLOOD CONTROL DISTRICT FACILITIES SHALL CONFORM WITH DISTRICT'S STANDARD SPECIFICATIONS AND WITH THE PROVISIONS OF THE CONSTRUCTION PERMIT GRANTED BY THE DISTRICT. CONTRACTOR SHALL MAINTAIN A COPY OF SAID PERMIT AND STAMPED PLANS ON THE JOB SITE. USE OF DISTRICT PROPERTY AND CONFORMANCE WITH THE ABOVE SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY DISTRICT'S DULY ASSIGNED INSPECTOR.
DISTRICT INSPECTOR SHALL BE NOTIFIED PRIOR TO COMMENCEMENT OF ANY WORK IN ACCORDANCE WITH PERMIT PROVISIONS.
REV 2 BY LAWRENCE P. ROGOWAY R.C.E. NO. 14751 OF SHUIRMAN ~ ROGOWAY ASSOC. 5657 WILSHIRE BLVD. LOS ANGELES, CA 90036 (213) 937-2600
APPROVED: CITY OF COSTA MESA DATE 5/27/76
PREPARED UNDER THE SUPERVISION OF R.C.E. 10605 DATE 5-76
FILE NO. 1 86 A
REVISIONS
NUMBER | DATE | INITIALS | DESCRIPTION | APP'V'D.
1 | 11-76 | | AS BUILT CONSTRUCTION | D.K. 8-77
2 | 4/14/76 | JM | ADDED LOCATION OF DRIVEWAYS, TREE WELLS, STREET LIGHTS, SIDEWALK CURB & GUTTER, UTILITY FROM STA 1+16 TO STA 5+70
REFERENCES
REF PLANS: 1-83-12, 1-107-1, 47-24, 79-52, W-55
BM #103 ELEV 34.39 CHIS. "□" T.C. NO. P.C. OF N.W. CURB RETURN, BRISTOL & GARRY.
SCALE: PLAN: 1" = 40' PROFILE: HORIZ.: 1" = 40' VERT.: 1" = 4'
DESIGNED D.L. 4-76
DRAWN D.L. 4-76
CHECKED A.C.E. 5-76
R/W APPROVED 5-76
RECOMMENDED
APPROVED R.C.E. NO. 17926 5/26/76
STREET & STORM DRAIN IMPROVEMENT
PLAN & PROFILE
SUNFLOWER AVENUE
BRISTOL ST. TO 650' EAST OF BRISTOL ST.
DEPARTMENT OF PUBLIC WORKS
CITY OF SANTA ANA
SHEET NO. 1 OF 1
W.O. # 48791 & 78012
STREET & STORM DRAIN IMPROVEMENT SUNFLOWER: BRISTOL - 650' E/O BRISTOL PR.'s 1377 & 4038
1 of 1
1-86-A

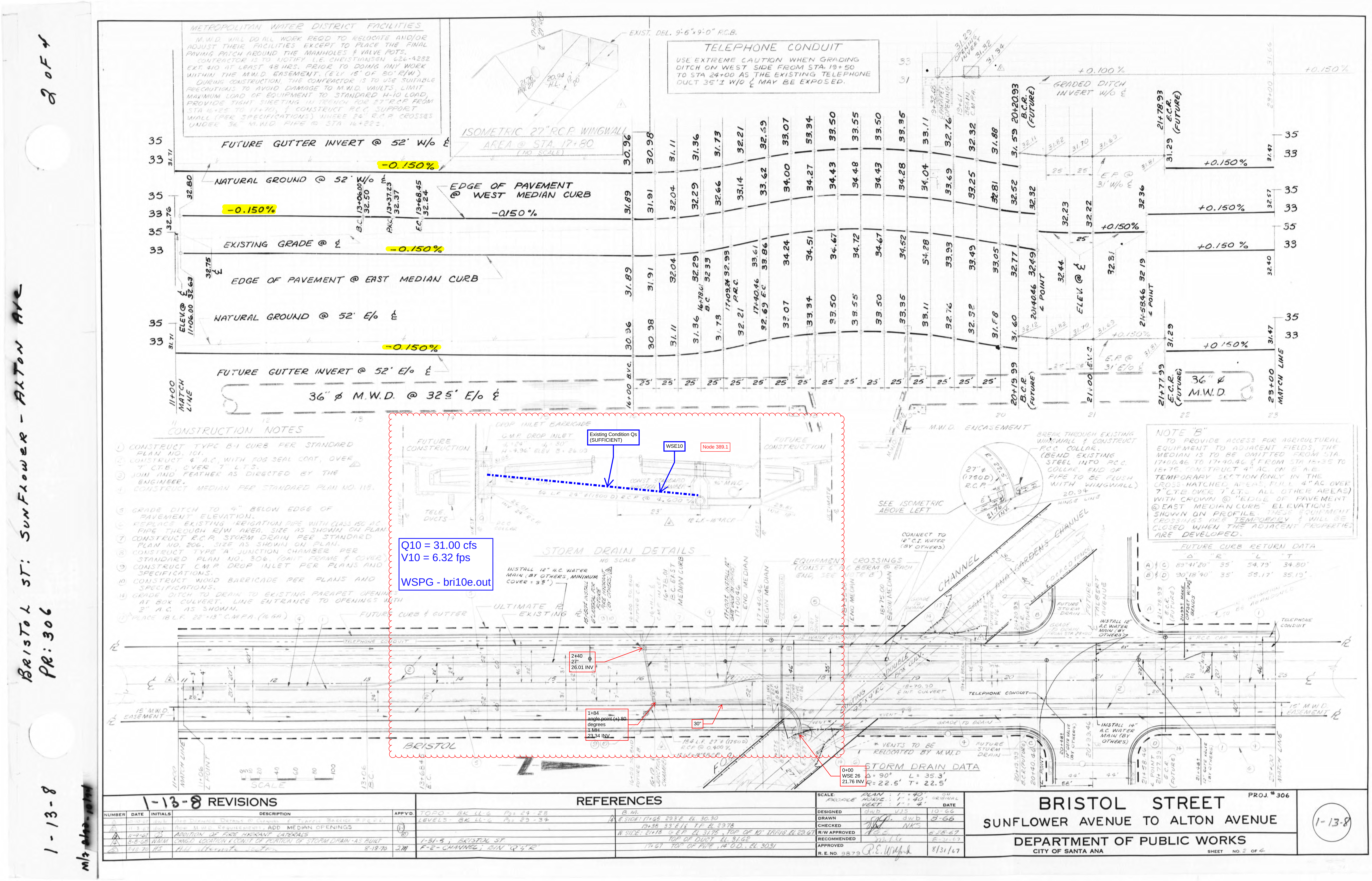
PLAZA DRIVE : SUNFLOWER AVE - MACARTHUR BLVD
STORM DRAIN
VA: 71-4
HF: 47-12

3 of 4

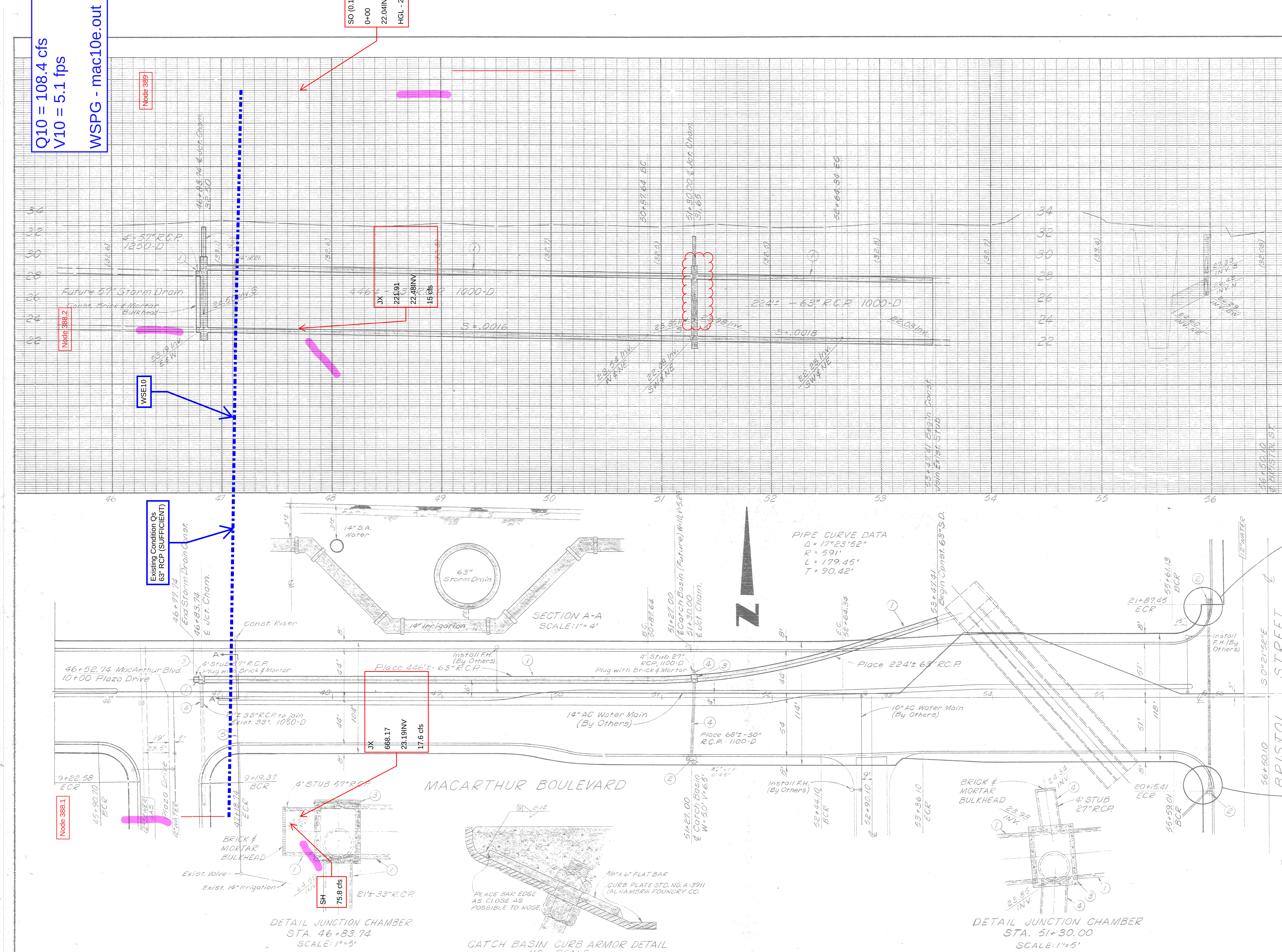
8/71



47-12



BRISTOL ST: SUNFLOWER - ALTON AVE
PR: 306
2 of 4
1-13-8
METROPOLITAN WATER DISTRICT FACILITIES
TELEPHONE CONDUIT
USE EXTREME CAUTION WHEN GRADING DITCH ON WEST SIDE FROM STA. 19+50 TO STA 24+00 AS THE EXISTING TELEPHONE DUCT 35'± W/O ℄ MAY BE EXPOSED.
ISOMETRIC 27" R.C.P. WINGWALL AREA @ STA. 17+80 (NO SCALE)
FUTURE GUTTER INVERT @ 52' W/o ℄
NATURAL GROUND @ 52' W/o ℄
EDGE OF PAVEMENT @ WEST MEDIAN CURB
EXISTING GRADE @ ℄
EDGE OF PAVEMENT @ EAST MEDIAN CURB
NATURAL GROUND @ 52' E/o ℄
FUTURE GUTTER INVERT @ 52' E/o ℄
36" ø M.W.D. @ 32.5' E/o ℄
-0.150%
+0.150%
11+00 MATCH LINE
23+00 MATCH LINE
CONSTRUCTION NOTES
1 CONSTRUCT TYPE B-1 CURB PER STANDARD PLAN NO. 101.
2 CONSTRUCT 4" A.C. WITH FOG SEAL COAT, OVER 7" C.T.B., OVER 7" L.T.S.
3 JOIN AND FEATHER AS DIRECTED BY THE ENGINEER.
4 CONSTRUCT MEDIAN PER STANDARD PLAN NO. 115.
5 GRADE DITCH TO 4" BELOW EDGE OF PAVEMENT ELEVATION.
6 REPLACE EXISTING IRRIGATION PIPE WITH CLASS 150 A.C. PIPE THROUGH R/W AREA. SIZE AS SHOWN ON PLAN.
7 CONSTRUCT R.C.P. STORM DRAIN PER STANDARD PLAN NO. 206. SIZE AS SHOWN ON PLAN.
8 CONSTRUCT TYPE "A" JUNCTION CHAMBER PER STANDARD PLAN NO. 306. (OMIT FRAME & COVER)
9 CONSTRUCT C.M.P. DROP INLET PER PLANS AND SPECIFICATIONS.
10 CONSTRUCT WOOD BARRICADE PER PLANS AND SPECIFICATIONS.
14 GRADE DITCH TO DRAIN TO EXISTING PARAPET OPENINGS AT BOX CULVERT. LINE ENTRANCE TO OPENINGS WITH 2" A.C. AS SHOWN.
17 PLACE 18 L.F. 22"×13" C.M.P.A. (16 GA)
STORM DRAIN DETAILS
NO SCALE
Existing Condition Qs (SUFFICIENT)
WSE10
Node 389.1
Q10 = 31.00 cfs
V10 = 6.32 fps
WSPG - bri10e.out
2+40
27"
26.01 INV
1+84
angle point (+) 90 degrees
1 MH
23.34 INV
30"
0+00
WSE 26
21.76 INV
STORM DRAIN DATA
Δ = 90° L = 35.3'
R = 22.5' T = 22.5'
SANTA ANA GARDENS CHANNEL
M.W.D. ENCASEMENT
SEE ISOMETRIC ABOVE LEFT
NOTE "B"
FUTURE CURB RETURN DATA
TELEPHONE CONDUIT
BRISTOL
SCALE
1-13-8 REVISIONS
ADDITION OF FIRE HYDRANT LATERALS
CHNGD. LOCATION & CONST. OF PORTION OF STORM DRAIN - AS BUILT
REFERENCES
1-31-5 ; BRISTOL ST
F-2-CHANNEL; BIN "Q & R"
SCALE: PLAN 1" = 40'; PROFILE HORIZ. 1" = 40', VERT. 1" = 4'
R.E. NO. 9879
8/31/67
BRISTOL STREET
SUNFLOWER AVENUE TO ALTON AVENUE
DEPARTMENT OF PUBLIC WORKS
CITY OF SANTA ANA
PROJ. # 306
SHEET NO. 2 OF 4



GENERAL NOTES

1. CONSTRUCT SHADED PORTION ONLY.
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH CITY OF SANTA ANA STANDARDS & SPECIFICATIONS.
3. STATIONING IS ALONG SURVEY CENTERLINE.
4. UTILITIES SHOWN ON THESE PLANS ARE CORRECT AND ACCURATE TO THE EXTENT OF AVAILABLE RECORDS AND KNOWLEDGE. THE CONTRACTOR, HOWEVER, IS REQUIRED TO TAKE STEPS TO ASCERTAIN THE EXACT LOCATION OF ALL UNDERGROUND FACILITIES PRIOR TO DOING WORK THAT MAY DAMAGE SUCH FACILITIES OR INTERFERE WITH THEIR SERVICE.

CONSTRUCTION NOTES

1. CONSTRUCT STORM DRAIN, SIZE & "D" AS SHOWN.
2. CONSTRUCT TYPE "C" CATCH BASIN PER STANDARD PLANS NOS. 303A, 305A & 305B, MODIFIED AS SHOWN PER DETAIL THIS SHEET.
3. CONSTRUCT TYPE "B" JUNCTION CHAMBER PER STANDARD PLANS NOS. 307 & 309.
4. PLACE CONNECTOR PIPE, SIZE & "D" AS SHOWN.
5. CONSTRUCT 217± L.F. 14" ACP (JOHNS-MANVILLE CLASS 2400 NON-PRESSURE OR APPROVED EQUAL) IRRIGATION LINE.

REVISIONS				
NUMBER	DATE	INITIALS	DESCRIPTION	APP'V'D.
△	9-15-72		AS BUILT	

REFERENCES

Topo.: Book LL-12, Pg. 133-138
Levels: Book LL-12, Pg. 139-144
Book LL-13, Pg. 59-62
Draw File: 1-13A-8

Bench Mark: OCS Tag So. End East Hdwl. Drain. Chnl. Crossing Bristol Elev. 33.01
T.B.M.: Mon. ℄ Int. Bristol & MacArthur Elev. 31.37

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

		DATE
DESIGNED	B.S. MI	10-71
DRAWN	M.I.	10-71
CHECKED		
R/W APPROVED		
RECOMMENDED		
APPROVED R.C.E. NO. 9879		2/16/72

STORM DRAIN
MACARTHUR BLVD.
PLAZA DRIVE TO BRISTOL STREET
DEPARTMENT OF PUBLIC WORKS
CITY OF SANTA ANA

SHEET NO. 3 OF 4
W.O. 48435

FILE NO.
DIETZGEN 138W-3 AGEPROOF FILM

Attachment 7 – WSPG Calculations

```
T1 RELATED BRISTOL HYDRAULICS-SUNFLOWER                                          0
T2 10-YEAR STORM EVENT
T3 EXISTING CONDITION
SO        .000  20.200  1                             25.200
R      254.000  21.320  1      .013                                             .000    .000 0
R      859.000  23.680  1      .013                                             .000    .000 0
R      967.000  23.800  1      .013                                             .000    .000 0
R     1600.000  24.020  1      .013                                             .000    .000 0
JX    1600.001  24.020  1  3   .013   30.600           24.800          90.0          .000
R     2231.000  25.050  1      .013                                             .000    .000 0
SH    2231.000  25.050  1                             25.050
CD   1  4   1    .000   6.000     .000  .000  .000   .00
CD   2  4   1    .000   4.500     .000  .000  .000   .00
CD   3  4   1    .000   4.500     .000  .000  .000   .00
Q            87.490   .0
```

Program Package Serial Number: 7065

WATER SURFACE PROFILE LISTING Date: 1-19-2023 Time: 1:50:56

RELATED BRISTOL HYDRAULICS-SUNFLOWER

10-YEAR STORM EVENT

EXISTING CONDITION

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
.000	20.200	5.000	25.200	118.09	4.69	.34	25.54	.00	2.94	4.47	6.000	.000	.00	1 .0
59.795	.0044					.0008	.05	5.00	.35	2.71	.013	.00	.00	PIPE
59.795	20.464	4.750	25.213	118.09	4.92	.38	25.59	.00	2.94	4.87	6.000	.000	.00	1 .0
52.315	.0044					.0009	.05	4.75	.39	2.71	.013	.00	.00	PIPE
112.110	20.694	4.527	25.222	118.09	5.16	.41	25.63	.00	2.94	5.16	6.000	.000	.00	1 .0
46.727	.0044					.0010	.05	4.53	.43	2.71	.013	.00	.00	PIPE
158.837	20.900	4.325	25.226	118.09	5.41	.45	25.68	.00	2.94	5.38	6.000	.000	.00	1 .0
42.252	.0044					.0011	.05	4.33	.47	2.71	.013	.00	.00	PIPE
201.089	21.087	4.140	25.226	118.09	5.68	.50	25.73	.00	2.94	5.55	6.000	.000	.00	1 .0
38.414	.0044					.0012	.05	4.14	.52	2.71	.013	.00	.00	PIPE
239.504	21.256	3.967	25.223	118.09	5.95	.55	25.77	.00	2.94	5.68	6.000	.000	.00	1 .0
14.496	.0044					.0013	.02	3.97	.56	2.71	.013	.00	.00	PIPE
254.000	21.320	3.901	25.221	118.09	6.07	.57	25.79	.00	2.94	5.72	6.000	.000	.00	1 .0
40.645	.0039					.0014	.06	3.90	.58	2.81	.013	.00	.00	PIPE
294.645	21.479	3.744	25.223	118.09	6.36	.63	25.85	.00	2.94	5.81	6.000	.000	.00	1 .0
37.331	.0039					.0016	.06	3.74	.63	2.81	.013	.00	.00	PIPE
331.976	21.624	3.596	25.221	118.09	6.67	.69	25.91	.00	2.94	5.88	6.000	.000	.00	1 .0
34.084	.0039					.0018	.06	3.60	.68	2.81	.013	.00	.00	PIPE

Program Package Serial Number: 7065
WATER SURFACE PROFILE LISTING Date: 1-19-2023 Time: 1:50:56
RELATED BRISTOL HYDRAULICS-SUNFLOWER
10-YEAR STORM EVENT
EXISTING CONDITION

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
366.060	21.757	3.457	25.214	118.09	7.00	.76	25.98	.00	2.94	5.93	6.000	.000	.00	1 .0
30.744	.0039					.0021	.06	3.46	.73	2.81	.013	.00	.00	PIPE
396.804	21.877	3.325	25.202	118.09	7.34	.84	26.04	.00	2.94	5.96	6.000	.000	.00	1 .0
26.912	.0039					.0024	.06	3.33	.79	2.81	.013	.00	.00	PIPE
423.716	21.982	3.200	25.182	118.09	7.70	.92	26.10	.00	2.94	5.99	6.000	.000	.00	1 .0
22.041	.0039					.0027	.06	3.20	.85	2.81	.013	.00	.00	PIPE
445.757	22.068	3.081	25.149	118.09	8.08	1.01	26.16	.00	2.94	6.00	6.000	.000	.00	1 .0
2.909	.0039					.0028	.01	3.08	.91	2.81	.013	.00	.00	PIPE
448.665	22.079	3.081	25.160	118.09	8.08	1.01	26.17	.00	2.94	6.00	6.000	.000	.00	1 .0
HYDRAULIC JUMP														
448.665	22.079	2.809	24.888	118.09	9.09	1.28	26.17	.00	2.94	5.99	6.000	.000	.00	1 .0
313.970	.0039					.0039	1.22	2.81	1.09	2.81	.013	.00	.00	PIPE
762.635	23.304	2.809	26.113	118.09	9.09	1.28	27.40	.00	2.94	5.99	6.000	.000	.00	1 .0
71.179	.0039					.0039	.27	2.81	1.09	2.81	.013	.00	.00	PIPE
833.814	23.582	2.827	26.409	118.09	9.01	1.26	27.67	.00	2.94	5.99	6.000	.000	.00	1 .0
25.186	.0039					.0036	.09	2.83	1.07	2.81	.013	.00	.00	PIPE
859.000	23.680	2.935	26.615	118.09	8.59	1.15	27.76	.00	2.94	6.00	6.000	.000	.00	1 .0
3.743	.0011					.0032	.01	2.94	1.00	4.20	.013	.00	.00	PIPE

Program Package Serial Number: 7065

WATER SURFACE PROFILE LISTING Date: 1-19-2023 Time: 1:50:56

RELATED BRISTOL HYDRAULICS-SUNFLOWER

10-YEAR STORM EVENT

EXISTING CONDITION

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
862.743	23.684	3.047	26.731	118.09	8.19	1.04	27.77	.00	2.94	6.00	6.000	.000	.00	1 .0
13.638	.0011					.0028	.04	3.05	.93	4.20	.013	.00	.00	PIPE
876.382	23.699	3.164	26.864	118.09	7.81	.95	27.81	.00	2.94	5.99	6.000	.000	.00	1 .0
27.845	.0011					.0024	.07	3.16	.87	4.20	.013	.00	.00	PIPE
904.227	23.730	3.288	27.018	118.09	7.45	.86	27.88	.00	2.94	5.97	6.000	.000	.00	1 .0
49.326	.0011					.0022	.11	3.29	.81	4.20	.013	.00	.00	PIPE
953.554	23.785	3.418	27.203	118.09	7.10	.78	27.99	.00	2.94	5.94	6.000	.000	.00	1 .0
13.446	.0011					.0020	.03	3.42	.75	4.20	.013	.00	.00	PIPE
967.000	23.800	3.445	27.245	118.09	7.03	.77	28.01	.00	2.94	5.93	6.000	.000	.00	1 .0
45.472	.0003					.0019	.08	3.44	.74	6.00	.013	.00	.00	PIPE
1012.472	23.816	3.583	27.399	118.09	6.70	.70	28.10	.00	2.94	5.89	6.000	.000	.00	1 .0
64.230	.0003					.0016	.11	3.58	.68	6.00	.013	.00	.00	PIPE
1076.702	23.838	3.730	27.568	118.09	6.39	.63	28.20	.00	2.94	5.82	6.000	.000	.00	1 .0
88.499	.0003					.0015	.13	3.73	.63	6.00	.013	.00	.00	PIPE
1165.201	23.869	3.886	27.755	118.09	6.09	.58	28.33	.00	2.94	5.73	6.000	.000	.00	1 .0
120.346	.0003					.0013	.16	3.89	.58	6.00	.013	.00	.00	PIPE
1285.547	23.911	4.053	27.964	118.09	5.81	.52	28.49	.00	2.94	5.62	6.000	.000	.00	1 .0
162.770	.0003					.0012	.19	4.05	.54	6.00	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING Date: 1-19-2023 Time: 1:50:56
RELATED BRISTOL HYDRAULICS-SUNFLOWER
10-YEAR STORM EVENT
EXISTING CONDITION

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
1448.317	23.967	4.232	28.199	118.09	5.54	.48	28.68	.00	2.94	5.47	6.000	.000	.00	1 .0
151.683	.0003					.0010	.16	4.23	.49	6.00	.013	.00	.00	PIPE
1600.000	24.020	4.369	28.389	118.09	5.35	.45	28.83	.00	2.94	5.34	6.000	.000	.00	1 .0
JUNCT STR	.0000					.0007	.00	4.37	.46		.013	.00	.00	PIPE
1600.001	24.020	4.794	28.814	87.49	3.61	.20	29.02	.00	2.51	4.81	6.000	.000	.00	1 .0
178.092	.0016					.0005	.08	4.79	.28	3.04	.013	.00	.00	PIPE
1778.093	24.311	4.567	28.877	87.49	3.79	.22	29.10	.00	2.51	5.12	6.000	.000	.00	1 .0
165.136	.0016					.0005	.09	4.57	.31	3.04	.013	.00	.00	PIPE
1943.229	24.580	4.361	28.942	87.49	3.97	.25	29.19	.00	2.51	5.35	6.000	.000	.00	1 .0
156.747	.0016					.0006	.09	4.36	.35	3.04	.013	.00	.00	PIPE
2099.976	24.836	4.173	29.009	87.49	4.17	.27	29.28	.00	2.51	5.52	6.000	.000	.00	1 .0
131.024	.0016					.0007	.09	4.17	.38	3.04	.013	.00	.00	PIPE
2231.000	25.050	4.021	29.071	87.49	4.34	.29	29.36	.00	2.51	5.64	6.000	.000	.00	1 .0

```
T1 Related Bristol Project                                                     0
T2 Plaza Drive Storm Drain
T3 Existing 10-year condition
SO       .000  24.450 1                             28.470
R      193.850  24.690 1       .013                                  .000    .000 0
R      319.670  24.720 1       .013                                12.015    .000 0
JX     319.690  24.720 1   1  2.013   12.750   12.750  25.600  26.410-90.0 90.0    .002
R      470.000  24.940 3       .013                                14.354    .000 0
JX     470.020  24.940 3   1  2.013    7.200    7.200  25.820  26.440-90.0 90.0    .002
R      619.000  25.120 4       .013                                14.227    .000 0
R      855.000  25.410 4       .013                               -21.635    .000 0
JX     855.020  25.410 4   1  2.013    8.750    8.750  26.150  26.900-90.0 90.0   -.002
R      906.260  25.460 4       .013                                -4.697    .000 0
R     1059.510  25.620 4       .013                               -15.893    .000 0
JX    1062.000  27.100 4   1   .013    2.000           27.100        -45.0         .000
R     1149.430  28.050 2       .013                                  .000    .000 0
SH    1149.430  28.050 2                             28.050
CD   1  4   1    .000   4.000     .000  .000  .000   .00
CD   2  4   1    .000   1.500     .000  .000  .000   .00
CD   3  4   1    .000   3.250     .000  .000  .000   .00
CD   4  4   1    .000   3.000     .000  .000  .000   .00
Q             2.000   .0
```

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Program Package Serial Number: 7065

WATER SURFACE PROFILE LISTING Date: 1-19-2023 Time: 2: 1:25

Related Bristol Project

Plaza Drive Storm Drain

Existing 10-year condition

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
.000	24.450	4.020	28.470	61.40	4.89	.37	28.84	.00	2.36	.00	4.000	.000	.00	1 .0
193.850	.0012					.0018	.35	4.02	.00	4.00	.013	.00	.00	PIPE
193.850	24.690	4.134	28.824	61.40	4.89	.37	29.19	.00	2.36	.00	4.000	.000	.00	1 .0
125.820	.0002					.0018	.23	.00	.00	4.00	.013	.00	.00	PIPE
319.670	24.720	4.361	29.081	61.40	4.89	.37	29.45	.00	2.36	.00	4.000	.000	.00	1 .0
JUNCT STR	.0000					.0012	.00	.00	.00		.013	.00	.00	PIPE
319.690	24.720	4.849	29.569	35.90	4.33	.29	29.86	.00	1.90	.00	3.250	.000	.00	1 .0
150.310	.0015					.0019	.28	.00	.00	3.25	.013	.00	.00	PIPE
470.000	24.940	4.937	29.877	35.90	4.33	.29	30.17	.00	1.90	.00	3.250	.000	.00	1 .0
JUNCT STR	.0000					.0013	.00	.00	.00		.013	.00	.00	PIPE
470.020	24.940	5.310	30.250	21.50	3.04	.14	30.39	.00	1.49	.00	3.000	.000	.00	1 .0
148.980	.0012					.0010	.15	.00	.00	2.28	.013	.00	.00	PIPE
619.000	25.120	5.296	30.416	21.50	3.04	.14	30.56	.00	1.49	.00	3.000	.000	.00	1 .0
236.000	.0012					.0010	.25	.00	.00	2.27	.013	.00	.00	PIPE
855.000	25.410	5.265	30.675	21.50	3.04	.14	30.82	.00	1.49	.00	3.000	.000	.00	1 .0
JUNCT STR	.0000					.0005	.00	.00	.00		.013	.00	.00	PIPE
855.020	25.410	5.542	30.952	4.00	.57	.00	30.96	.00	.62	.00	3.000	.000	.00	1 .0
51.240	.0010					.0000	.00	.00	.00	.89	.013	.00	.00	PIPE

```
                         Related Bristol Project
                           Plaza Drive Storm Drain
                             Existing 10-year condition
************************************************************************************************************************ ********
         | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super |Critical|Flow Top|Height/|Base Wt|     |No Wth
 Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev | Depth  | Width  |Dia.-FT|or I.D.|  ZL |Prs/Pip
        -|-       -|-      -|-       -|-       -|-      -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-   -|
 L/Elem  |Ch Slope |        |         |         |         SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR |Type Ch
*********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
         |         |        |         |         |               |         |       |        |        |       |       |     |
  906.260    25.460   5.495    30.955      4.00     .57     .00     30.96     .00      .62      .00   3.000    .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-      -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-    |-
  153.250    .0010                                        .0000       .01     .00      .00      .88    .013     .00   .00  PIPE
         |         |        |         |         |               |         |       |        |        |       |       |     |
 1059.510    25.620   5.340    30.960      4.00     .57     .00     30.97     .00      .62      .00   3.000    .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-      -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-    |-
JUNCT STR   .5944                                         .0000       .00    5.34      .00             .013     .00   .00  PIPE
         |         |        |         |         |               |         |       |        |        |       |       |     |
 1062.000    27.100   3.867    30.967      2.00    1.13     .02     30.99     .00      .53      .00   1.500    .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-      -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-    |-
   87.430    .0109                                        .0004       .03    3.87      .00      .43    .013     .00   .00  PIPE
         |         |        |         |         |               |         |       |        |        |       |       |     |
 1149.430    28.050   2.949    30.999      2.00    1.13     .02     31.02     .00      .53      .00   1.500    .000   .00   1   .0
        -|-       -|-      -|-       -|-       -|-      -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-    |-
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T1 RELATED BRISTOL PROJECT                                                   0
T2 MACARTHUR BLVD STORM DRAIN
T3 EXISTING 10-YEAR CONDITION
SO        .000  22.040  3                           27.450
R      221.910  22.480  3      .013                                    .000 -17.400 0
JX     221.921  22.480  3  2   .013   15.000          23.850         -90.0         .000
R      668.170  23.190  3      .013                                    .000    .000 0
JX     668.180  23.190  3  4   .013   17.600          24.500         -90.0         .000
SH     668.180  23.190  3                           23.190
CD   1  4   1    .000   5.420     .000  .000  .000   .00
CD   2  4   1    .000   2.500     .000  .000  .000   .00
CD   3  4   1    .000   5.250     .000  .000  .000   .00
CD   4  4   1    .000   4.750     .000  .000  .000   .00
CD   5  4   1    .000   4.750     .000  .000  .000   .00
Q            75.800   .0
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Program Package Serial Number: 7065

WATER SURFACE PROFILE LISTING Date: 1-19-2023 Time: 4:26:55

RELATED BRISTOL PROJECT

MACARTHUR BLVD STORM DRAIN

EXISTING 10-YEAR CONDITION

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
.000	22.040	5.410	27.450	108.40	5.01	.39	27.84	.00	2.92	.00	5.250	.000	.00	1 .0
221.910	.0020					.0013	.30	5.41	.00	3.62	.013	.00	.00	PIPE
221.910	22.480	5.289	27.769	108.40	5.01	.39	28.16	.00	2.92	.00	5.250	.000	.00	1 .0
JUNCT STR	.0000					.0012	.00	5.29	.00		.013	.00	.00	PIPE
221.921	22.480	5.489	27.969	93.40	4.31	.29	28.26	.00	2.70	.00	5.250	.000	.00	1 .0
399.125	.0016					.0010	.39	5.49	.00	3.52	.013	.00	.00	PIPE
621.046	23.115	5.250	28.365	93.40	4.31	.29	28.65	.00	2.70	.00	5.250	.000	.00	1 .0
47.124	.0016					.0010	.04	5.25	.00	3.52	.013	.00	.00	PIPE
668.170	23.190	5.219	28.409	93.40	4.32	.29	28.70	.00	2.70	.81	5.250	.000	.00	1 .0
JUNCT STR	.0000					.0008	.00	5.22	.15		.013	.00	.00	PIPE
668.180	23.190	5.417	28.607	75.80	3.50	.19	28.80	.00	2.42	.00	5.250	.000	.00	1 .0

```
T1 RELATED BRISTOL PROJECT                                                         0
T2 MACARTHUR 30" LATERAL
T3 EXISTING 10-YEAR CONDITION
SO        .000  23.850  1                           28.000
R       68.000  25.550  1      .013                                         .000     .000 0
SH      68.000  25.550  1                           25.550
CD   1  4   1    .000   2.500     .000  .000  .000   .00
Q            15.000   .0
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FILE: EMLAT10E.WSW                        W S P G W - CIVILDESIGN Version 14.07                              PAGE    1
                               Program Package Serial Number: 7065
                                                    WATER SURFACE PROFILE LISTING                    Date: 1-19-2023  Time: 5: 4: 3
                         RELATED BRISTOL PROJECT
                           MACARTHUR 30" LATERAL
                             EXISTING 10-YEAR CONDITION
************************************************************************************************************************ ********
         | Invert  |  Depth |  Water   |    Q    |  Vel     Vel  |  Energy  |  Super |Critical|Flow Top|Height/|Base Wt|      |No Wth
 Station |  Elev   |  (FT)  |  Elev    |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev  | Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
        -|-       -|-      -|-        -|-       -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-    -|
 L/Elem  |Ch Slope |        |          |         |         SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch
*********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
         |         |        |          |         |               |         |        |        |        |       |       |      |
     .000    23.850    4.150    28.000     15.00    3.06      .14    28.14      .00     1.31      .00   2.500     .000   .00   1   .0
        -|-       -|-      -|-        -|-       -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-     |-
   68.000    .0250                                         .0013      .09     4.15      .00      .82    .013      .00   .00  PIPE
         |         |        |          |         |               |         |        |        |        |       |       |      |
   68.000    25.550    2.541    28.091     15.00    3.06      .14    28.24      .00     1.31      .00   2.500     .000   .00   1   .0
        -|-       -|-      -|-        -|-       -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-     |-
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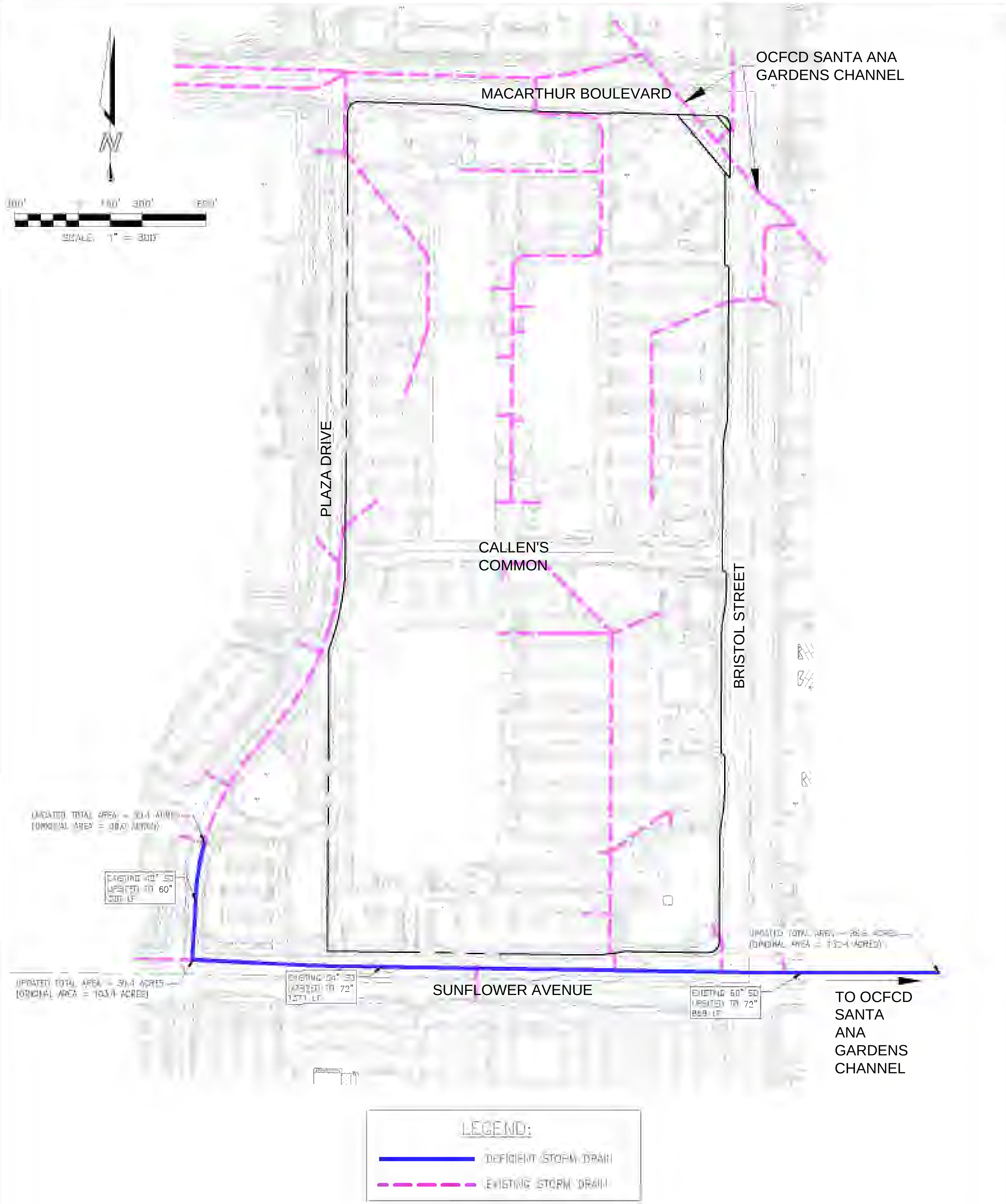
T1 RELATED BRISTOL-BRISTOL STREET                                               0
T2 10-YEAR STORM EVENT
T3 EXISTING CONDITION
SO        .000  21.760  1                           26.000
R      184.000  23.340  1      .013                                         .000    .000 0
TS     184.010  23.340  2      .013                                         .000
R      240.000  26.010  2      .013                                         .000  80.000 0
SH     240.000  26.010  2                           26.010
CD   1  4   1    .000   2.500     .000  .000  .000   .00
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q            31.000   .0
```

```
FILE: bri10e.WSW                          W S P G W - CIVILDESIGN Version 14.07                                         PAGE    1
                               Program Package Serial Number: 7065
                                          WATER SURFACE PROFILE LISTING                    Date: 1-19-2023  Time:11:19: 4
                          RELATED BRISTOL-BRISTOL STREET
                           10-YEAR STORM EVENT
                            EXISTING CONDITION
************************************************************************************************************************ ********
         | Invert  |  Depth |  Water   |    Q     |  Vel    Vel  |  Energy  | Super |Critical|Flow Top|Height/|Base Wt|     |No Wth
 Station |  Elev   |  (FT)  |  Elev    |  (CFS)   | (FPS)   Head |  Grd.El.|  Elev | Depth  | Width  |Dia.-FT|or I.D.|  ZL |Prs/Pip
        -|-       -|-      -|-        -|-        -|-      -|-    -|-       -|-     -|-      -|-      -|-     -|-     -|-   -|
 L/Elem  |Ch Slope |        |          |          |         SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR |Type Ch
*********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
         |         |        |          |          |              |         |       |        |        |       |       |     |
    .000    21.760    4.240    26.000     31.00     6.32     .62     26.62     .00    1.90      .00    2.500     .000   .00   1   .0
        -|-       -|-      -|-        -|-        -|-      -|-    -|-       -|-     -|-      -|-      -|-     -|-     -|-   |-
 184.000    .0086                                           .0057     1.05    4.24     .00    1.72    .013       .00   .00  PIPE
         |         |        |          |          |              |         |       |        |        |       |       |     |
 184.000    23.340    3.711    27.051     31.00     6.32     .62     27.67     .00    1.90      .00    2.500     .000   .00   1   .0
        -|-       -|-      -|-        -|-        -|-      -|-    -|-       -|-     -|-      -|-      -|-     -|-     -|-   |-
TRANS STR   .0000                                           .0122      .00    3.71     .00             .013       .00   .00  PIPE
         |         |        |          |          |              |         |       |        |        |       |       |     |
 184.010    23.340    3.265    26.605     31.00     9.87    1.51     28.12     .00    1.88      .00    2.000     .000   .00   1   .0
        -|-       -|-      -|-        -|-        -|-      -|-    -|-       -|-     -|-      -|-      -|-     -|-     -|-   |-
  55.990    .0477                                           .0188     1.05    3.26     .00    1.15    .013       .00   .00  PIPE
         |         |        |          |          |              |         |       |        |        |       |       |     |
 240.000    26.010    2.045    28.055     31.00     9.87    1.51     29.57     .00    1.88      .00    2.000     .000   .00   1   .0
        -|-       -|-      -|-        -|-        -|-      -|-    -|-       -|-     -|-      -|-      -|-     -|-     -|-   |-
```

Attachment 8 – Gardens Watershed – City of Santa Ana Existing Condition Recommended Storm Drain Improvements



GARDENS WATERSHED CITY OF SANTA ANA EXISTING CONDITION RECOMMENDED STORM DRAIN IMPROVEMENTS

Attachment 9 – Soil Type Documentation

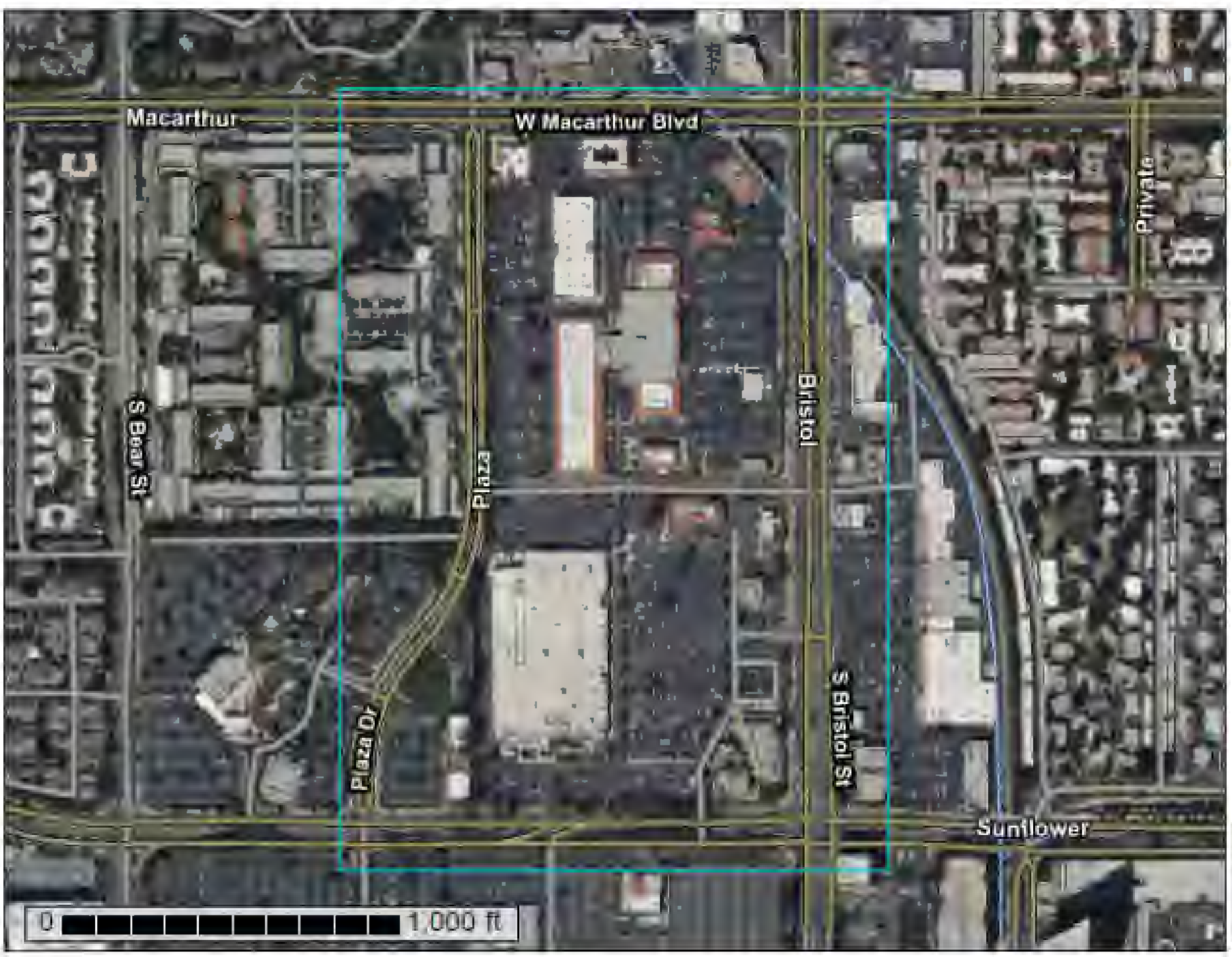
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

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



September 27, 2022

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Soil Map

Map Scale: 1:4,100 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

N

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Orange County and Part of Riverside County, California
Survey Area Data: Version 15, Sep 13, 2021

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

Date(s) aerial images were photographed: Mar 14, 2022—Mar 17, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
182	Omni silt loam, drained	64.4	75.3%
184	Omni clay, drained	21.2	24.7%
Totals for Area of Interest		**85.6**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Orange County and Part of Riverside County, California

182—Omni silt loam, drained

Map Unit Setting

National map unit symbol: hcnw
Elevation: 20 feet
Mean annual precipitation: 14 to 17 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 365 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Omni

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 12 inches: silt loam
H2 - 12 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R019XG907CA - Loamy Bottom
Hydric soil rating: Yes

Minor Components

Chino, silty clay loam

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

Bolsa, silt loam

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

184—Omni clay, drained

Map Unit Setting

National map unit symbol: hcny
Elevation: 20 feet
Mean annual precipitation: 14 to 17 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 365 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Omni

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 17 inches: clay
H2 - 17 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C

Ecological site: R019XG906CA - Clayey Bottom
Hydric soil rating: Yes

Minor Components

Chino, silty clay loam, drained
Percent of map unit: 10 percent
Hydric soil rating: No

Bolsa, silty clay loam, drained
Percent of map unit: 5 percent
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

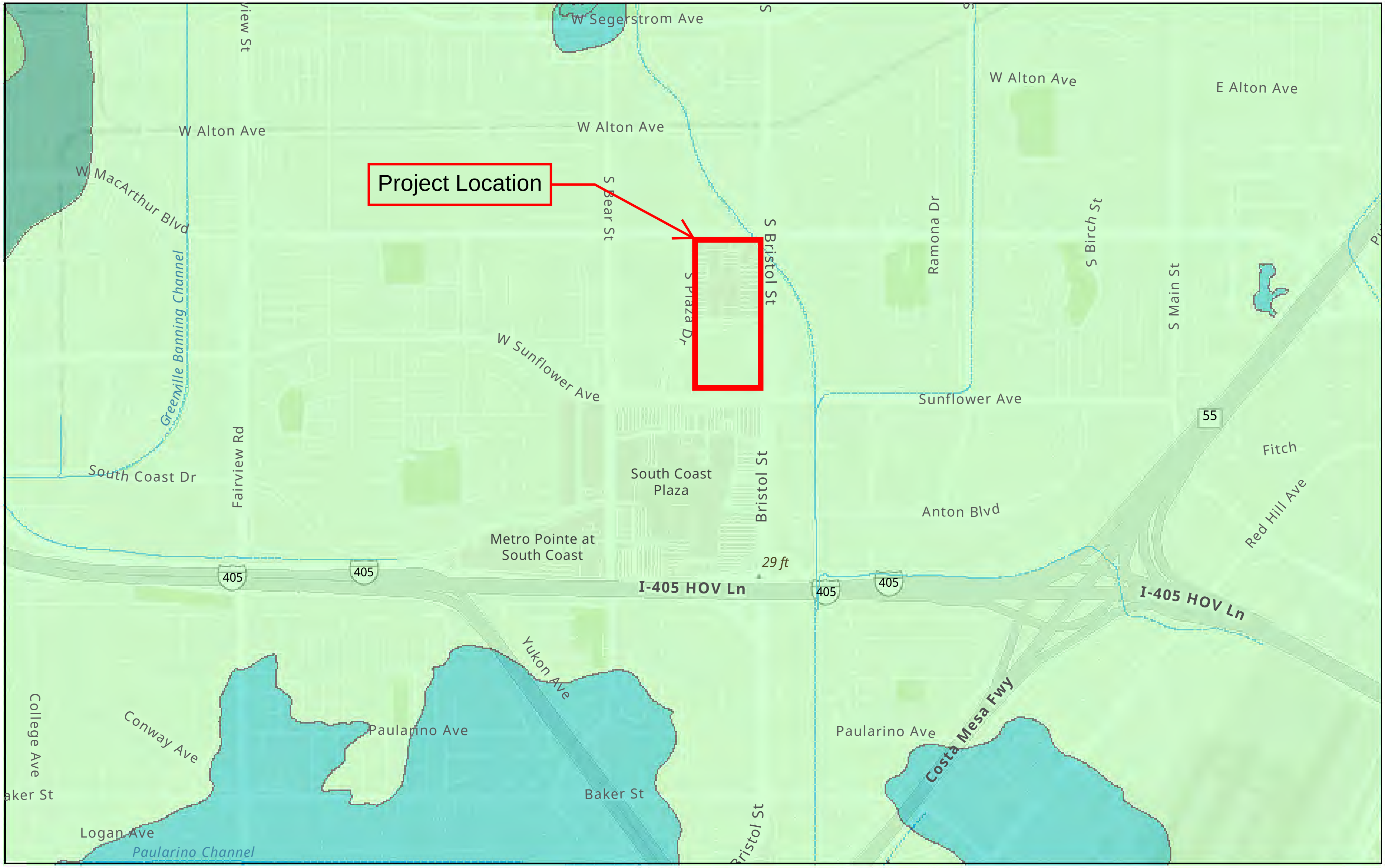
United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

OC Stormwater Program Land Development Tool



3/30/2023

Soil

A

B

C

D

Regional Channels

Open Conveyance

Closed Conveyance

1:25,609

0 0.17 0.35 0.7 mi

0 0.28 0.55 1.1 km

County of Los Angeles, California State Parks, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land

Serena Ausili

From: Michael Givens <michaelg@groupdelta.com>
Sent: Thursday, March 30, 2023 1:54 PM
To: Sue Williams
Cc: Oriana Slasor; Serena Ausili; 622-015@fuscoe.tonicdm.com
Subject: RE: Related Bristol - Hydrologic Soil Type

Yes, we can report the factual information that the OCPW site has classified the site soils as Hydraulic Group C.

Thanks,

Michael Givens, PhD, PE, GE, PG
Group Delta Consultants, Inc.
Associate Engineer / Office Manager
Mobile: (949) 295-2348
michaelg@groupdelta.com

From: Sue Williams <SWilliams@fuscoe.com>
Sent: Thursday, March 30, 2023 1:50 PM
To: Michael Givens <michaelg@groupdelta.com>
Cc: Oriana Slasor <oslasor@fuscoe.com>; Serena Ausili <SAusili@fuscoe.com>; 622-015@fuscoe.tonicdm.com
Subject: FW: Related Bristol - Hydrologic Soil Type

Hi Michael,
Thanks again for your guidance on the hydrologic soil type. Per email below from the plan-checker, they take no exception to this conclusion. Regarding their request for an addendum at the time of grading application, they are requesting an addendum to the geotechnical report. Would this be something you would be willing to prepare when the time comes?
Thank you,
Sue

SUSAN WILLIAMS, PE, MS, QSD/P
Associate Project Manager
O (949) 474-1960 | D (714) 642-7510

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From: Gary Solsona <GaryS@CannonCorp.us>
Sent: Thursday, March 30, 2023 1:40 PM
To: Sue Williams <SWilliams@fuscoe.com>
Cc: Oriana Slasor <oslasor@fuscoe.com>; Serena Ausili <SAusili@fuscoe.com>; 622-015@fuscoe.tonicdm.com; Jay

Kanani <JayK@CannonCorp.us>; bsarlak@santa-ana.org
Subject: RE: Related Bristol - Hydrologic Soil Type

Hi Sue – based on our review of your email below, we take no exception to your geotechnical engineer's conclusion. For entitlement purposes, please include your geotechnical engineer's email response in your hydrology and WQMP resubmittal. When you pursue the grading application, please include an addendum to the geotechnical report (signed and stamped by your geotechnical engineer) stating the basis of applying soil type C for this project.

If you have any questions, please let me know.

Thanks,
Gary

Gary Essex A. Solsona, PE, QSD
Public Works Manager
Cannon
Direct: 949-777-1580
Mobile: 909-234-7857
GaryS@CannonCorp.us

From: Sue Williams <SWilliams@fuscoe.com>
Sent: Wednesday, March 29, 2023 5:34 PM
To: Gary Solsona <GaryS@CannonCorp.us>
Cc: Oriana Slasor <oslasor@fuscoe.com>; Serena Ausili <SAusili@fuscoe.com>; 622-015@fuscoe.tonicdm.com; Jay Kanani <JayK@CannonCorp.us>
Subject: FW: Related Bristol - Hydrologic Soil Type

Hi Gary,
Thank you for your phone call. We discussed the soil type issue with the Geotech, and he reviewed and provided the link and snapshot of O.C. Public Works Stormwater Program Land Development Tool, which shows that the project is within soil type C. Please see below. Would you please confirm that soil type C is acceptable to be used for this project?
Thank you,
Sue

SUSAN WILLIAMS, PE, MS, QSD/P
Associate Project Manager
O (949) 474-1960 | D (714) 642-7510

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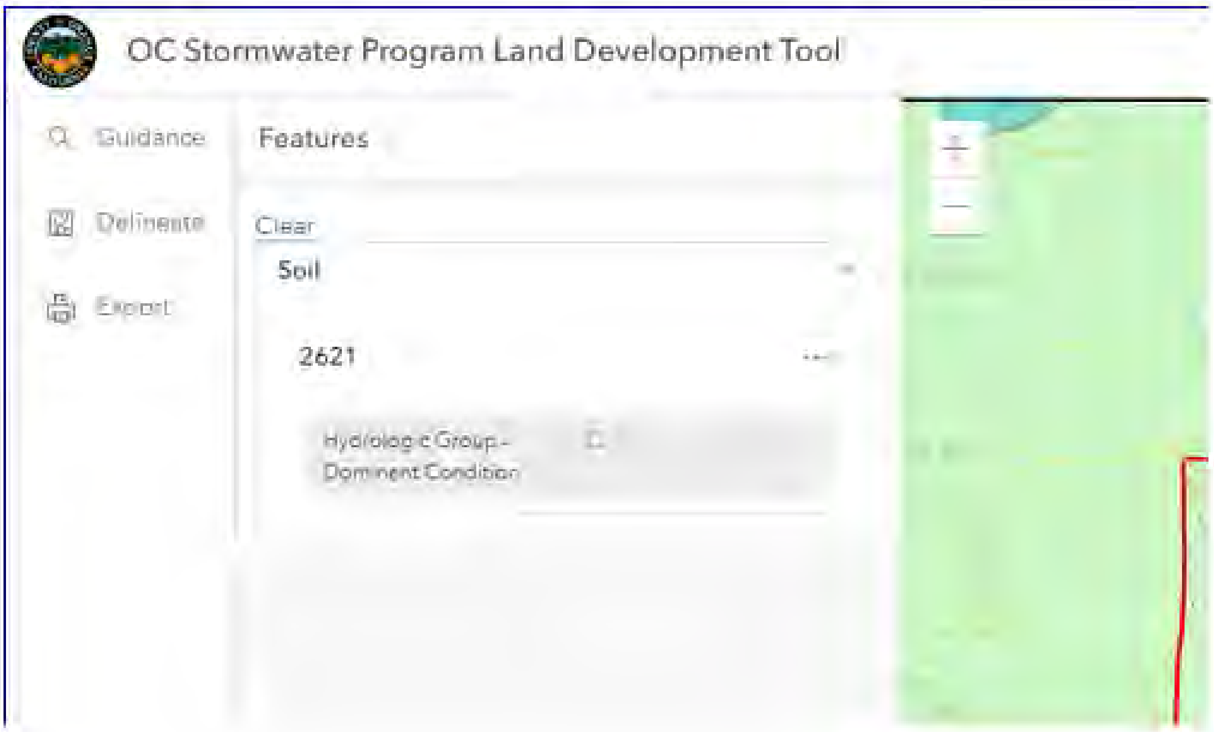
From: Michael Givens <michaelg@groupdelta.com>
Sent: Wednesday, March 29, 2023 5:27 PM
To: Sue Williams <SWilliams@fuscoe.com>
Cc: Oriana Slasor <oslasor@fuscoe.com>; Serena Ausili <SAusili@fuscoe.com>; 622-015@fuscoe.tonicdm.com
Subject: RE: Related Bristol - Hydrologic Soil Type

Sue,

The NRSC classifications and hydraulic group descriptions are different than the USCS classification that we use, which makes it difficult to directly identify the difference between hydraulic type C and D soils. The hydraulic soil groups C&D are fairly similar. However, below is a snippet from the OCPW website that classifies the project site as a hydraulic group type C that should be acceptable for the project.

https://ocerws.ocpublicworks.com/service-areas/oc-environmental-resources/oc-watersheds/regional-stormwater-program/water-quality



Regards,

Michael Givens, PhD, PE, GE, PG
Group Delta Consultants, Inc.
Associate Engineer / Office Manager
Mobile: (949) 295-2348
michaelg@groupdelta.com

From: Sue Williams <SWilliams@fuscoe.com>
Sent: Wednesday, March 29, 2023 4:39 PM
To: Michael Givens <michaelg@groupdelta.com>
Cc: Oriana Slasor <oslasor@fuscoe.com>; Serena Ausili <SAusili@fuscoe.com>; 622-015@fuscoe.tonicdm.com
Subject: Related Bristol - Hydrologic Soil Type

Your attachments have been security checked by Mimecast Attachment Protection. Files where no threat or malware was detected are attached.

Hi Michael,
It was nice talking to you. As a follow-up to our conversation, we are currently preparing a hydrology study for the project site, and would like your review and concurrence that the hydrologic soil type to be used at the site is soil group "C". As I mentioned, we are using U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) soil survey to provide the hydrologic soil type. Please see attached soil report, stating that the site is entirely within soil type "C". Here is the link to the NRCS soil survey website: Web Soil Survey (usda.gov)

The city's plan checker is referencing the 1986 O.C. Hydrology Manual soil map and TGD , which show this area as soil type "D". However, they advised that they would defer to you to provide guidance on the soil type that would be acceptable to be used for the hydrologic analysis. Would you please review and provide concurrence, as you deem accurate, that the project site is within soil type "C" as shown on the attached soil survey report?

Please let me know if you have questions or need additional information.

Thank you,
Sue

SUSAN WILLIAMS, PE, MS, QSD/P
Associate Project Manager
SWilliams@fuscoe.com

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Heads up! Effective April 3, 2023 our new Irvine office address will be:
15535 Sand Canyon, Suite 100, Irvine, CA 92618

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